

Non-cognitive skill formation in poor neighbourhoods of  
urban India

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# Non-cognitive skill formation in poor neighbourhoods of urban India\*

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## Abstract

Recent labour market research has shown that a good education comprises investment in both cognitive and non-cognitive skills. We examine the impact of a long-term programme designed to raise non-cognitive skills of children and adolescents in slums in Bombay. We use a cross-cutting design with two comparison groups of peers for young adults who have attended the programme until leaving high school to analyse whether, compared to those from a similar environment and background, enrollment in the programme demonstrably raises such skills. We find evidence of substantial impacts on both self-esteem and self-efficacy (of about one standard deviation), as well as evidence of a smaller impact on life evaluation and aspirations. Furthermore, in line with the literature, both self-esteem and self-efficacy are positively related to success in school-leaving examinations and initial labour market outcomes.

Keywords: non-cognitive skills;programme evaluation.

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# 1 Introduction

Most people would agree that a good education is more than the acquisition of obvious cognitive skills, such as literacy and numeracy. There are other valuable personal characteristics that are not strictly cognitive, such as attitudes, aspirations, agency and self-esteem, and these are generally formed during childhood. We usually assume that individuals with these characteristics are more likely to succeed than those who lack them. Employers reflect these beliefs when they seek personal interviews, letters of recommendation, and other personal evaluations, even when test scores and other measures of cognitive ability are available (Jencks (1979):p.122 [29]). Economists such as Heckman and his collaborators are now increasingly concerned with understanding how non-cognitive skills<sup>1</sup> affect socioeconomic outcomes, and whether the failures in building such skills are critical for children from disadvantaged backgrounds (see, for example, Carneiro et al.(2007) [8]; Cunha et al., (2006) [13] ; Heckman et al., (2006) [26]). The growing literature on non-cognitive skills makes it clear that such skills are vital determinant of future outcomes. For instance, as Cunha et al., (2010).[15] point out: "Non-cognitive abilities have direct effects on wages, schooling, teenage pregnancy, smoking, crime, performance on achievement tests, and many other aspects of social and economic life." (pp. 3). However, unlike the vast literature on investment in cognitive skills, little is known about how non-cognitive skills are formed, and whether initially poor non-cognitive skills can be remedied later in childhood. These are the questions we address using data from highly deprived areas slums of urban Bombay. Using carefully selected comparison groups, we find that those involved in a specific non-cognitive skill formation programme during their childhood and adolescence have higher non-cognitive skills such as agency and self-esteem as young adults, and that these skills correlate well with higher earnings and school performance, even after controlling for cognitive abilities.

While there is plenty of evidence on the effectiveness of interventions to raise cognitive (usually school-based) skills<sup>2</sup>, there is much less on sustained intervention to raise non-cognitive skills, especially in developing countries. The existing literature on non-cognitive skill formation is based mainly on short-term early childhood interventions in the U.S. and U.K., summarised in reviews by Currie (2001) [16] and Grantham-Mcgregor et al.,(2007) [25]. Overall, there is agreement that intervention in early childhood is likely to be beneficial. The impact of early childhood programmes such as the Perry School and the Carolina Abecedarian Project in the U.S. on a diverse range of outcomes including school attainment, earnings and antisocial behaviour, were found to be persistent in adulthood, with causal links via non-cognitive skills (Schweinhart (1993) [39] and Heck-

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<sup>1</sup>It should be emphasised that these skills require cognitive processes and as such the term non-cognitive is a misnomer. However, this is in popular use in the economic literature, even if psychosocial competencies might be a better description.

<sup>2</sup>See, for instance, Orazem and King (2008) [33] for an overview.

man et al., (2006) [26]). While research suggests that early childhood is a critical period for brain development, we cannot conclude that is the optimal age for child interventions, as there is no clear monotone relationship between brain development and general child development (see Gopnik et al.(1999) [24] and other references in Currie (2001) [16]). There is a dearth of longer-term interventions for school-age children and hence little evidence on the value of interventions in later childhood and adolescence. This study is among the first to offer some evidence on this issue.

In particular, we examine the impact of a long-term intervention targeting non-cognitive skills of children from poor backgrounds by a non-governmental organisation (NGO), Akanksha. Akanksha (which means aspiration in Hindi) focuses on a range of non-cognitive skills including self-esteem, a sense of agency and control, as well as aspirations through the use of workshops, mentoring, drama, art and story-telling. This programme is of tremendous interest as an opportunity to test whether non-cognitive skills can be changed through long-term intervention. We measure the impact of the programme on self-esteem and sense of agency (self-efficacy), and the more general outcomes of life-evaluation and aspirations.

The focus on self-esteem and self-efficacy as core non-cognitive skills is consistent with the evidence from psychology but also in line with practice among economists researching non-cognitive skills. These non-cognitive skills have been established as stable, measurable and strongly predictive of future outcomes by psychologists (Bandura (1977) [4], Donnellan et al., (2005) [19], Trezniewski et al., (2009) [43] and references cited therein). As a consequence they are part of standard measures incorporated in large longitudinal studies such as the National Longitudinal Survey of Youth in the U.S.A., the German Socio-Economic Panel and the Household Income and Labour Dynamics in Australia Survey. Economists researching non-cognitive skills (Heineck and Anger,2010,[27] , Cobb-Clark and Tan, 2011 [10]) have relied on these data and the measures there<sup>3</sup>. The two other more general indicators, expected life-evaluation and aspirations, refer to subjective perceptions of achievement and ambition, also feature in recent economic analysis (see Deaton (2008) [17]; Ray (2006) [34]).

Akanksha admits children between the ages of six and eight who attend primary school into its after-school programme<sup>4</sup>. It is an intensive programme where the children are tutored for about three hours every day after school. The children are expected to stay in the programme until they leave secondary school. The programme began in the mid 1990s and this study focuses on the first cohort of 60 students to complete the programme in 2007, at ages between seventeen and nineteen. A key feature for the design of this evaluation is that enrollment in this cohort was not randomised so the main challenge

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<sup>3</sup>Heckman et al. [26], use precisely these two measures: the Rotter Locus of Control Scale, which is a specific (early) measure of efficacy, and the Rosenberg Self-Esteem Scale.

<sup>4</sup>There is no connection between the schools that children enrolled in Akanksha attend and the programme offered by Akanksha.

in robustly identifying the impact of a non-randomised intervention ex-post is selection, both into and out of the programme. In the next section we describe the programme in detail and describe the features that might alleviate some of these concerns.

In addition, this study was designed so as to deal with these issues. First, we use purposive sampling to construct two comparison groups to isolate the treatment effect of Akanksha participants from neighbourhood and school. The first comparison group is that of peers from the same neighbourhood (slum) in which the 60 Akanksha participants were raised, sampled from a list of young people of similar age and sex to the treated who had also completed secondary school. We removed any peers who were acquaintances or friends of the participants and retained a group of 50. The second comparison group is that of classmates of the treated in their last two years in secondary school. This group was identified by the treated themselves. Consequently, in addition to controlling for the school effect, the comparison of the treated to their school peers yields a conservative estimate or lower bound on the true impact of the programme to the extent that peer effects matter in the transmission of non-cognitive skills. Secondly, the presence of two purposively different comparison groups allows an investigation of whether unobservable confounders matter for selection and outcomes. In particular, a comparison of the school and community peers can be used to infer potential selection bias arising from school choice; for instance, we assess whether the impact of Akanksha relative to the neighbourhood peers reflects differences in school experiences since selection by parents and pupils into Akanksha may well be correlated with school choice as well. Thirdly, we collected detailed recall data on parental non-cognitive skills and socioeconomic background to control further for observable confounders. Finally, matching methods were used fine tune the comparison.

Our design allows us to analyse whether, compared to children from a similar environment and background, and controlling for differences in home and school environments, those who had been enrolled in Akanksha have demonstrably higher non-cognitive skills. Overall, we find evidence consistent with the value-added of this programme. The effects are large: it appears to raise self-esteem and efficacy by about one standard deviation of indicators for the relevant population; the effect on life evaluation and aspirations is smaller but still substantial at just under half a standard deviation of each of these indicators.

It might be questioned whether investment in non-cognitive skills for disadvantaged children is a luxury relative to improving schooling. Existing evidence indicates, however, that cognitive and non-cognitive skills are strongly complementary in affecting socioeconomic outcomes (see Heckman et al., (2006) [26] Carneiro et al., (2007) [8]). We also offer some descriptive evidence that differences in non-cognitive skills explain variation in education and employment outcomes that is not explained by cognitive skill differences. We show that, controlling for cognitive skills, higher self-esteem and sense of agency are

associated with better performance on school examinations and higher wages.

In the next section we describe the Akanksha intervention in more detail. Section 3 then places this study in the context of the literature. This is followed by Section 4, which sets out the analytical framework. Section 5 describes the survey, specific outcomes of interest, and the empirical methodology, while Section 6 presents the main results and robustness checks. Before concluding, Section 7 offers some descriptive evidence on the association between non-cognitive skills and key educational and employment outcomes. We conclude with Section 8.

## 2 The Akanksha Intervention

Akanksha is an NGO that has been active in Bombay for the last 18 years. It aims to raise the non-cognitive skills of deprived children over the long-term, offering a 10 level programme taught in daily after-school three hour sessions. In the first 7 levels the emphasis is on having a good time and building up non-cognitive skills. The last 3 levels help prepare for a job, and build life skills. The skills and values are developed in a variety of ways including lessons, activities, and mentoring schemes.

In the lessons, for instance, the teachers convey notions of various values and skills, such as kindness, compassion, self-confidence and control. Initially, they do this through depicting the personalities, actions and experiences of fictional characters, followed by non-fictional well-known figures and group exercises in which children work to identify these skills. As part of this group work the children keep diaries in which they record their daily encounters with the values and skills that they learn about in class and share in the group. According to Akanksha, applying the skills enables the children to implement what they have learned outside the protected environment of the Akanksha centres.

Another core component of the programme is sports, drama and art activities. Here the children participate in ambitious projects such as the production of an annual musical that force them to take on new challenges, work as a group and persevere. Psychologists believe that among the key determinants of an individual's sense of own agency/ability to attain goals are "mastery" and "vicarious" experiences, where the former refers to own experience of success while the latter to the experience of success of those an individual is surrounded by and can relate to (Bandura(1977) [3]). In addition to providing children with a good time, the use of sports, drama and art, is aimed at providing children with "mastery" and "vicarious" experiences through guided successful completion of challenging but fun tasks.

Each child in Akanksha also has a mentor, whom they meet once a week to talk through the events of the week as well as think about the aspirations of the child. In addition, regular workshops are held by trained counsellors that help children talk about events that they find traumatic in their daily lives.

In order to understand selection into and out of the programme we interviewed those involved in the recruitment of the treatment group. These children were enrolled in the mid-1990's, and came from 4 different Bombay slum neighbourhoods: Colaba; P De Mello (Victoria Station); Gautam Nagar (Race Course); Mariamma Nagar (Worli). At the time Akanksha was an unknown organisation. Their first campaign was low-key involving a team of three who attempted to publicise the programme both at the community level (in the usual meeting places in the communities), and through visiting mothers with 6-7 year old children<sup>5</sup>. About 15-20 children per community were admitted in this first cohort (the programme has since grown) and taught in a centre usually located at a local school hall. There was no rationing of places, no targeting of a particular group by skills, and no inducement on offer (such as meals or vouchers); the only requirement was that parents had to make sure their children were enrolled in school. This does not throw up additional issues for selection since enrollment in primary school has been near universal at over 98 percent in these slums since the early 1990s. The choice to enrol in Akanksha, therefore, predominantly depended on parental choices; in interviews they reported that school timings and after school child care needs were the most important reasons. Particular abilities or skills in children were not targeted by the programmes, nor mentioned by parents as a reason for enrolment or non-enrolment into the programme.

Selection out of the programme appears to have been due to circumstances outside the control of the children and mostly within the first year. The treatment cohort consisted of about 77 children of whom 60 completed the programme. Ten students dropped out because their families moved away from the slum neighbourhood to slums elsewhere in Bombay. Others dropped out mainly because in the initial period, Akanksha lost access to classrooms near the slum that they had originally offered the children. Since that initial recruitment the programme has grown rapidly. They currently work with over 3,500 children in 58 centres and 6 schools in Bombay and nearby city of Pune. Current attrition rates are 4% per year - the bulk of dropouts occurs within the first two years of enrollment, mainly because of moves by the family or changes in timings in formal school.

### 3 Literature Review

The primary outcomes of interest in this study are self-esteem and efficacy (also known as agency or mastery). Efficacy captures a belief about the link between one's own behaviour and its consequences (Rotter (1966) [36]) and one's capability to behave or act to achieve desired outcomes. Individuals who believe that outcomes are due to their own efforts have high self-efficacy, as opposed to those who defer to circumstances outside their control

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<sup>5</sup>This alleviates concerns about systematic within-household selection of which child to enrol as only the 6-7 year-olds were eligible.

(Maddux (1991) [31]). More efficacious individuals are generally more active in improving their lives (Rotter(1966) [36]) and work out ways of exercising some measure of control even in the face of limited opportunities (Bandura (1977) [4]). Self-esteem, on the other hand, reflects a person’s overall evaluation of his own worth, in the sense of self-worth or self-respect (Rosenberg (1965) [38]). There is a large literature on both how these skills are formed and their impact on outcomes. We briefly summarise these literatures below. The specific measures used are discussed later in section on the data.

Both self-efficacy and self-esteem form during childhood and stabilise during adolescence (Sherman (1984) [41]). Studies, using samples of twins, have found that while variance in these skills is in part due to genetic factors, a substantial proportion of it is explained by environmental factors (Trzesniewski et al., (2003) [43]). Carton and Nowicki (1994) [9] offer a review of these factors. The first category includes parental influence; self-esteem and efficacy are positively correlated with having more nurturing, emotionally supportive, and warm parents who are consistent in their use of reward and punishment and encourage autonomy. Further, low self-efficacy and esteem in parents are related to low levels of these skills in children, suggesting persistence rather than mean-reversion in the transmission of these skills. Material circumstances are also an important determinant: Dercon and Krishnan ( 2009) [18] find a strong relationship between material poverty and self-esteem and efficacy for 12 year-old children across four countries. We focus on these channels of influence as key controls when estimating the impact of Akanksha.

The emphasis in on self-esteem and efficacy in this study is motivated by a large literature showing their importance for a diverse range of outcomes. The psychology literature presents ample evidence of the link between these skills and academic and occupational achievement, as well as general physical and mental well-being, and antisocial behaviour<sup>6</sup>. A number of studies in economics have also established a link between this domain of non-cognitive skills and education, employment and socioeconomic outcomes<sup>7</sup>.

There is only limited evidence on the role of specific interventions to raise these non-cognitive skills. As mentioned earlier, early childhood programmes such as the Perry School and the Carolina Abecedarian Project were found to raise non-cognitive skills, leading to persistent effects on educational attainment, earnings and anti-social behaviour (Schweinhart (1993) [39] and Heckman et al.,(2006) [26]). There appears to be less

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<sup>6</sup>See Bandura(1977) [4]; Swartzler and Fuchs (1996) [42]; Baumeister et al., (2003) [5]; Crocker and Wolfe (2001) [12]; Donnellan et al., (2005) [19].

<sup>7</sup>Carneiro et al., (2007) [8] find that, controlling for cognitive ability, children who have higher non-cognitive skills at age 11 are more likely to stay on at school after the age of 16. Goldsmith et al., (1997) [23] use the U.S. National Longitudinal Survey of Youth to examine the effect of self-esteem on wages. They find that self-esteem has a higher impact on wages than does education. Heckman et al.,(2006) [26] compare the labour outcomes of high-school drop-outs with those of high school graduates with similar cognitive skills but lower non-cognitive skills; they show that those in the latter group have lower wages and higher job turnover.



systematic evidence on whether it is possible to intervene to raise such skills for children from deprived families or deprived environments, especially in later childhood and in a sustained way; our study is an attempt to offer evidence on this. The problems in designing such studies may be one of the reasons for the limited evidence: the evidence from psychology suggests that these skills are unstable in early adolescence, so that the impact of such an intervention can only be captured over the long term. In particular, it has been argued that these skills are unstable in childhood and adolescence and are most stable (and hence measurable) between early adulthood and middle age (see Trzniewski et al., (2003, 2009) [43] [44]). While it recognises that these skills are formed during childhood and adolescence, we overcome the problem of unstable measurement by focusing on outcomes in early adulthood of a long-term intervention during childhood and adolescence.

## 4 Analytical Framework

We now turn to our study design and analytical framework. In order to achieve a plausible identification of impact, we use a design involving two comparison groups in addition to the treatment group. Our treatment group consists of the first set of Akanksha treated, who graduated from school and left Akanksha in the summer of 2007. One comparison groups consists of the peers of the same age and sex from the communities where the treated live; a second comparison group consists only of school peers of the treated, also from the same neighbourhood. Our key concern in this design was dealing with selection into the programme and its impact on the outcome variables. In addition to controlling for a rich of observable characteristics of both parents and children, the comparison groups allow us to eliminate unobservable school and neighbourhood effects. Furthermore, we ensured that both comparison groups had completed secondary school to control for any relevant unobservable selection effects into completion of schooling. This controls for selection out of Akanksha to the extent that it is driven by the same unobservable characteristics as dropping out of school.

The entire sample comes from similar slum neighbourhoods. The treated are therefore treated by both Akanksha and the formal school that both groups attended; the school peer comparison group are "treated" only by the formal school; and the community peer comparison group are not treated by either Akanksha or the formal school attended by the children in Akanksha<sup>8</sup>. We illustrate this below, with constant treatment effects and a linear specification for the outcomes.

Define two sets of schools: those attended by Akanksha students (and their classmates), denoted by  $S_A$ , and those attended by neighbourhood peers,  $S_N$ . Let  $X$  de-

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<sup>8</sup>This design is similar to a cross-cutting one since apart from the Akanksha intervention, the effect of being in the same school can be seen as an implicit additional treatment.

note the vector of background variables including parental background and parental non-cognitive skills.

$$S_i = 1 \text{ if person } i \text{ in } S_A \text{ and } 0 \text{ otherwise}$$

$$W_i = 1 \text{ if person } i \text{ in Akanksha and } 0 \text{ otherwise}$$

We can then denote the outcome for individual  $i$  as:

$$Y_i = S_i W_i (Y_{11i}) + S_i (1 - W_i) (Y_{10i}) + (1 - S_i) (1 - W_i) (Y_{00i}), \text{ where}$$

$$Y_{11i} = \tau + \theta_{SA} + X_i \beta + \varepsilon_{11i} : \quad \text{Treated (in Akanksha)} \quad (1)$$

$$Y_{10i} = \theta_{SA} + X_i \beta + \varepsilon_{10i} : \quad \text{Classmate} \quad (2)$$

$$Y_{00i} = \theta_{SN} + X_i \beta + \varepsilon_{00i} : \quad \text{Neighbourhood} \quad (3)$$

$\tau$  denotes the constant treatment effect of the Akanksha programme;  $\theta_{SA}$  and  $\theta_{SN}$  denote the fixed (or treatment) effect of the school and class attended. Note that these fixed effects are common to Akanksha participants and their schoolmates in the formal school attended, but distinct for neighbourhood peers since they attended a different class and school.

With two comparison groups, we make the following two assumptions about conditional independence of the outcome of the treated:

$$\text{Assumption 1} : (Y_i \perp W_i) \mid S, X_i \quad (\text{Selection into Akanksha})$$

$$\text{Assumption 2} : (Y_i \perp S_i) \mid W, X_i \quad (\text{Selection into Neighbourhood School})$$

Under these assumptions, we have:

$$E(Y_i \mid S_i = 1, W_i = 1, X) - E(Y_i \mid S_i = 1, W_i = 0, X) = \tau \quad (4)$$

$$E(Y_i \mid S_i = 1, W_i = 1, X) - E(Y_i \mid S_i = 0, W_i = 0, X) = \tau + (\theta_{SA} - \theta_{SN}) \quad (5)$$

$$E(Y_i \mid S_i = 1, W_i = 0, X) - E(Y_i \mid S_i = 0, W_i = 0, X) = (\theta_{SA} - \theta_{SN}) \quad (6)$$

Under *Assumption 1*, the estimate obtained from (1) – (2), (difference between treated and classmates) as in (4) must be unbiased. More important, however, is that the comparison of estimates from (4) and (5) allows us to validate *Assumption 1*. Note that under this assumption, (5) – (6) (the difference in difference between the treated and neighbourhood peer and the schoolmates and neighbourhood peers) must be equal to the

estimated impact in (4) (difference between treated and classmates). If *Assumption 2* holds, then school-specific fixed effects do not matter (or neighbourhood schools are of similar quality)<sup>9</sup>. We would then expect the estimate from (6) to be zero. Hence, if both assumptions hold, the pattern of results must be such that the estimated effect from (4) is equal to the estimated effect from (5), while the estimated effect in (6) is zero. Figure 1 provides a diagrammatic representation of the study design.

This design allows us to address potential selection effects attributable to neighbourhood and school influences, which are considered key determinants of non-cognitive skills (see Rosenberg (1965) [38]). The first comparison group of neighbourhood peers allows us to eliminate any common effects of the neighbourhood that they share, both on outcomes and on selection. The second comparison group allows us to control for any effects on outcomes that are due to formal schooling such as the classroom environment and teacher; similarly, if selection into Akanksha by parents was driven by similar (unobservable or observable) factors as school choice, then they are controlled for by using this comparison group. An important difference between the two comparison groups is that while the community peers were unacquainted with the treated, the school peers were identified by the treated themselves. Comparison of Akanksha treated to the classmates may therefore be contaminated to the extent that Akanksha treated select systematically different friends from themselves, or that peer effects matter in the transmission of non-cognitive skills<sup>10</sup>. As with school-specific fixed effects, if these school-peer related effects do not matter, we would expect the estimated effect in (6) to be zero. Clearly, a non-zero effect in (6) would be difficult to interpret as it could be attributable to school-specific differences between the community peers and the other two groups, peers effects, or selection into the classmate comparison group<sup>11</sup>. We return to this in the discussion of the results.

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<sup>9</sup>There were approximately 10 secondary schools within a 2 km radius in any neighbourhood and the treated group of 58 attended about 7 different schools. The school environment is therefore different across the sample, but there is little to suggest that schools attended by the peers from the community differ greatly in quality.

<sup>10</sup>The first possibility is that Akanksha alumni sort with classmates who differ substantially from them in non-cognitive skills. Suppose first that they select classmates with lower skills than them but are unaffected by them. We would then obtain a positive treatment effect of Akanksha which might, in fact, reflect this selection rather than the effect of the treatment. The second possibility is that they sort with stronger classmates - this would suggest that we have a negative (or insignificant) treatment effect. Finally, the peer effects that spillover to both groups (Akanksha and classmates) would bias the estimates of the treatment downwards towards zero.

<sup>11</sup> It is possible that there are systematic differences in the quality of schools attended by the neighbourhood peers and Akanksha. This becomes an issue only in the presence of selection/peer effects since in their absence, the comparison of (2) and (3) should yield an unbiased estimate of the treatment effect as well. The combination of estimates from (4), (5) and (6) and what we observe about the groups, however, should allow us to determine the likelihood that these biases are present.

## 5 Data

The survey was conducted in 2007, with the aim of interviewing all individuals who had completed Akanksha in that or the previous year. This is the first group to complete Akanksha since its inception in the mid 1990's. In total it consists of 60 young people and we were able to interview 58 of them<sup>12</sup>. We also interviewed 50 peers from the four communities in which the treated live, who are of the same age and sex as the treated and, like the treated, had completed secondary school. These peers were identified by our key informants and, importantly, were unacquainted with the treated. The second group consists of 46 young people who had been in the same class as the treated for at least the last two years of school; the individuals in this group were identified by the treated themselves. The relevant school catchment area was the same slum neighbourhood, so these school peers also come from the same neighbourhood. In addition to the interviews with the young people, we interviewed their primary carers (usually mothers).

The interviews were formally structured and conducted in Hindi (and occasionally in Marathi). The main aim of the interview with the young people was to measure the outcomes of interest including self-esteem and self-efficacy, as well as life evaluation and aspirations.

We follow the established way of measuring self-esteem and agency, through aggregation of responses to statements relating to a range of beliefs that reflect these skills. The measures are variations of the well-established Rosenberg Self-esteem Scale (Rosenberg (1965) [38]) and Rotter's Locus of Control Questionnaire (1966) [36]); both have been validated in a number of studies<sup>13</sup> to ensure that the selection of questions maps into and measures the concept that we seek to capture. The statements refer to one's beliefs about being able to affect outcomes, cope with stress, and attain goals as well as pride in oneself, one's achievements and background (Schwarzer and Fuchs [42]; Lambe [30]); the responses indicate the degree of agreement with the statements. The specific selection of statements used in this study have been validated for measuring self-esteem and agency in adolescents in the context of India<sup>14</sup>. Table 1 shows the statements and corresponding raw average scores used to construct each of the outcome measures<sup>15</sup>. The outcome measures used in the analysis were constructed by taking a standardised aver-

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<sup>12</sup>We did not interview two alumni because they were unable to keep their appointments with the survey team.

<sup>13</sup>See Robins et al., (2001) [35], Bagozzi (1993) [2], Sherer (1983) [40], Tipton (1984) [45]

<sup>14</sup>The selection was based on the question used in the Young Lives Longitudinal Study across four countries including southern India. (see <http://www.younglives.org.uk/what-we-do/research-methods/household-and-child-survey>). This is a large scale study of child development, led by a team at the University of Oxford.

<sup>15</sup>The score indicates the extent to which the respondent agrees with each statement. For negative statements the higher the score the more strongly the respondent disagrees with the statement. In other words, the individual scores indicate the extent to which the respondent agrees with the "positive sentiment" of the statement

age of the degree of agreement with the statements. The final indicators of esteem and self-efficacy, therefore, reflect the standardised deviation of the individual average score of all esteem/efficacy statements from the sample average.

Expected life evaluation is measured using Cantril's ladder<sup>16</sup>. In the survey young people were asked to place themselves on the "ladder of life" ten years from now. The ladder has nine steps, where the first refers to the worst possible life for the respondent, while the ninth to the best possible life; we use the step that they place themselves on as an indicator of (future) life evaluation. The survey further includes questions about the young people's role models which were used to construct a measure of aspirations. We asked all respondents to name up to three individuals who they consider successful, who they admire and who they know personally. Once the three role models were identified, we asked a number of questions relating to their education, wealth, and personality traits. The outcome measure used in the analysis is the number of role models named by the individual, who are wealthier than the individual and whose success the respondent thinks can be emulated within 10 years. This notion of aspirations is closely linked to that of an "aspirations window" proposed by Ray (2006) [34]<sup>17</sup>.

We also collected information on the attitudes of the young people (e.g. respondents played games designed to measure their behaviour towards risk<sup>18</sup>, time preference, propensity to cooperate<sup>19</sup>, as well as their educational attainment (including current school level and 10th standard exam results), current employment status and earnings. We also administered the Peabody Picture Vocabulary Test (PPVT) to measure cognitive skills<sup>20</sup>.

We interviewed the main carers to collect recall data on the pre-treatment socio-economic conditions. To this end they were asked about the environment in which the children were living a decade ago, including assets, facilities and quality of the dwelling, parental education and occupation, and extensive data on carer risk, time preferences, life evaluation, aspirations, self-esteem and self-efficacy. An issue of concern might be whether recall data truly captures the environment in which the children were raised or

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<sup>16</sup>Life evaluation is measured using Cantril's Self-Anchoring Scale, which has the respondent rate his or her current life on a ladder scale in which 0 is "the worst possible life for you" and 10 is "the best possible life for you." This is the measure used in the Gallup World Poll for instance.

<sup>17</sup>Ray suggests that "the window is formed from an individual's cognitive world, her zone of "similar", "attainable" individuals"

<sup>18</sup>This was based on similar attempts in ICRISAT villages by Binswanger (1981) [6] and Gine 'et al., (2008) [21]. Subjects were asked to choose between lotteries, where the riskier alternatives were a mean-preserving spread of the less risky ones - they had the same expected value, but a higher variance of payoffs. These games were played for real money and were not hypothetical.

<sup>19</sup>Time preference was measured using a hypothetical question where respondents were asked for the minimum amount they would be willing to accept as payment today in return for not waiting for a month for a sum of Rs.100 won on a lottery. The propensity to cooperate was measured using responses to a standard public good game (played individually against the larger virtual group for real stakes). Details are available upon request.

<sup>20</sup>The PPVT has been used in India before. It is a test of receptive vocabulary, administered individually. It does not test schooling in a particular language or curriculum.

simply reflects current conditions. To validate the use of recall responses, we examine the difference in responses to questions that were asked to the same respondent with reference to both the past and the present and find little evidence of nostalgia or other bias. In addition, we compare responses to the same recall questions by parent and child. We find that responses to questions asked with reference to the past and the present are systematically different - for instance, recall about past assets reveals less assets (of a similar type such as television and refrigerators). Further, there is significant correlation between the responses of the parent and child to the same recall questions. Details of these results are presented in the next section.

In all, we conducted 300 interviews as part of this survey; 154 with the young adults and the remainder with their carers.

## 5.1 Sample Descriptives

Table 2 provides summary statistics for the sample showing data on basic individual characteristics, as well as pre-treatment parental and socioeconomic characteristics; Table 3 presents summary statistics for the main outcomes. The first column of Table 2 shows statistics for the pooled sample, while Columns (2) – (4) show the disaggregated statistics for the treatment and each of the comparison groups. Columns (5) and (6) show tests of differences in means.

At the time of enrollment most young people were living with mothers who had less than primary education and were not employed. On average, the fathers have higher levels of education than the mothers and the majority worked as manual labourers. The primary carers are risk-averse and impatient with a discount rate of 52% over a month’s horizon<sup>21</sup>. The young people grew up in very modest households; about half had electricity, a third had running water, and they owned less than a fifth of the basic assets<sup>22</sup>. The average age is 19 and there are (slightly) more boys than girls.

The treated are of a similar age to the community peers (by construction) and slightly older than the classmates, by about 6 months. They are as wealthy as their community peers, but are worse off than the classmates. For instance, the classmates were more likely to live in households with running water and electricity and more of the basic assets. However, the carers of the three groups do not differ by attitudes towards risk and time

In short, in the pre-treatment period, the treated were materially worse off relative to the classmates. In contrast, the community peers are similar to the treated in the observed characteristics. As discussed earlier, there might be concerns about spillovers

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<sup>21</sup>This might seem high - but recent evidence across countries using a similar question suggests that this is in the median range. (Wang et al (2010) [46])

<sup>22</sup>The complete list of assets includes: gas stove, radio, television, video/dvd player, cable tv, landline phone, refrigerator, bicycle, motorbike/scooter.

and reflection effects between Akanksha treated and their classmates. The descriptive statistics presented here suggest that the treated select friends who are better-off, which, if anything, would bias our results against finding a significant treatment effect relative to the classmates: as the evidence in the literature review showed, non-cognitive skills tend to be positively correlated with socio-economic background.

We now turn to discussion of the patterns in the main outcomes. Table 3 presents summary statistics for the outcomes<sup>23</sup>. There are no significant differences between the treated and comparison groups in these outcomes. In contrast, there are differences between the carers of the treated and those of their peers. Pre-treatment self-esteem (based on recall)<sup>24</sup> in this group was almost two thirds of a standard deviation lower than that of carers of the classmates and community peers. A similar pattern holds with respect to self-efficacy, though the differences are smaller. We note that in addition to being worse off materially, having lower non-cognitive skills limits the ability of the carers of the treated to transmit non-cognitive skills, mitigating against finding an impact on the treated.

The treated also have similar future life evaluation to their peers. In contrast, their carers had far lower assessments of life a decade ago than those in the two comparison groups. The pattern in aspirations is somewhat different. While there are no significant differences across the groups of parents, the treated named role models who were relatively wealthier and living outside the community.

As discussed in the previous section, reliance on recall questions to capture the environment in which the child was raised may be a concern. To validate these questions we first examine the correlation between responses to questions asked with reference to the past and the present to the same respondent. We would expect the correlation between these responses to be relatively low, if they truly distinguish different time-periods. The top half of Table 4 shows that this is the case. For instance, both self-reported wealth<sup>25</sup> and that relative to others in the area has increased from ten years ago, and the correlation between responses about the present and past does not exceed 20 percent. There is also a similarly low correlation between responses to the life evaluation ladder question that carers were asked with reference to ten years ago and the present. Further, we compare responses from the carer and young person to the same recall questions. If the recall questions are informative about the circumstances 10 years ago then we would expect

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<sup>23</sup>The scores presented in Table 3 show the standardised deviation from the mean for each group, and the standardised mean score differenced across the two groups. The use of standardised measures allows for more intuitive interpretations of the magnitude of the treatment effects.

<sup>24</sup>In principle, since self-esteem and self-efficacy are stable in adulthood, a measure based on recall should not be very different from that measured contemporaneously.

<sup>25</sup>Self reported wealth is the answer to: Which of the following best describes your household you are living in ranked from 1 to 6 where: 1=very rich and 6=destitute Self-reported wealth relative to others in the area is the answer to the question: Compared to other households here, would you describe your household at the moment ranked from 1 to 7 where 1=the richest 7=the poorest.

the correlation between responses of the carers and young people to be relatively high. The second half of Table 4 presents evidence that this is also the case. The correlations between responses of carers and young people about assets and access to services 10 years ago are around 60 percent.

## 5.2 Estimation

We present three sets of estimates of the treatment effects in equations (4) (5) and (6). The first is a simple OLS estimate of the treatment effect followed by two sets of matching estimates. These are estimated using nearest neighbour Mahalanobis covariate matching, using Abadie et al.'s (2001) [1] bias adjustment<sup>26</sup>. We use nearest neighbour matching because in the context of small samples it is the most conservative: it yields the lowest bias in the point estimate at the cost of the highest standard errors. Further, as discussed in Caliendo et al., (2008) [7], if the selection of close control matches is sparse, which is likely with small samples, using fewer matches improves the quality of the matches, at the cost of higher variance. In the context of this study, one-to-one covariate matching, therefore, reduces the likelihood of falsely identifying a significant treatment effect. The estimates are robust to alternative matching estimators including propensity score calliper matching and multiple neighbour covariate matching. The OLS estimates are based on the same set of controls as used in the matching functions including individual characteristics (pre-treatment), household composition, parental characteristics (risk attitudes, time preference), endowments (index of assets, ownership of house 10 years ago) as well as parental non-cognitive skills.

The first set of estimates on matching offers a conservative estimate of the treatment effect controlling for a full range of covariates, including parental non-cognitive skills, as well as socioeconomic background and own attributes of the children and parents as described in Table 2<sup>27</sup>. The second set of estimates addresses potential concerns about family level unobservables that may affect both selection into the programme and outcomes. Despite our best efforts to measure parental background, own attributes and parental non-cognitive skills and norms, potential unobservables remain a concern. Hence, we also offer a difference-in-difference set of estimates where the outcomes are expressed as the difference between the child and parental (recall) measures of non-cognitive skills (rather than using these as covariates). The estimated treatment effects in these specifications reflect the difference between treatment and comparison groups, differenced between child and parent. This serves to remove biases due to unobservable family-specific effects that matter either in terms of parenting skills or the specific environment at home; this

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<sup>26</sup>This is a combination of matching algorithm and weighting matrix which has been shown to perform best in small samples. This is supported by Monte Carlo simulations conducted by Zhao (2004) [47].

<sup>27</sup>In addition to the key variables included in Table 2, we also include household composition and neighbourhood controls.



approach can also take care of family-specific unobservables related to enrollment and attendance at Akanksha. These estimates are of course only valid to the extent that the outcomes of interest are not affected by mean-reversion, and are hence offered as a comparison. It should be noted that the literature emphasises the persistence of low skills across generations and discounts the possibility of mean reversion (see Feinstein (2000) [20] Sherman (1984) [41]).

The main results also include two falsification tests to determine whether the effects that we find on non-cognitive skills are attributable specifically to the work that Akanksha does to raise these outcomes. We explore two alternative possibilities. The first is that being in Akanksha affects outcomes through simply providing children with more adult attention and time for socialising with peers. To test this we examine the effect of participation in sports clubs and youth groups, which also has these features<sup>28</sup>. Secondly, we explore the possibility that participation in Akanksha affects outcomes through providing children with proficiency in English, which may in turn raise their self-esteem, sense of agency, and aspirations in the context of Bombay where it is a key skill. Therefore, we also test whether attending an English medium school affects the outcomes of interest in a similar way to Akanksha. In both tests we exclude the treated from the sample and match those who receive the "alternative treatment" (youth clubs or English medium school) to those who do not in the remaining group.

Finally, in addition to estimating treatment effects relative to the two comparison groups, we also offer an estimate relative to the two groups combined. The advantage of the estimates relative to the pooled comparison group is better matching quality and, therefore, lower likelihood of matching bias. We also match classmates to the community peers and estimate a community "treatment effect", in order to investigate whether there are systematic differences between comparison groups<sup>29</sup>.

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<sup>28</sup>This test may also address some issues of selection into Akanksha to the extent that selection into youth clubs and sports groups is on similar characteristics as that into Akanksha.

<sup>29</sup>The matching functions relative to the two main comparison groups and the pooled group satisfy the balancing property. The balancing property requires that individuals with the same propensity score have the same distributions of covariates. While this validates the choice of matching function for propensity score matching, it does not directly do so for covariate matching. However, the satisfaction of the balancing property is useful for showing that the covariates included are relevant. Consistent with the descriptive statistics discussed above the quality of matching is somewhat better relative to the community than the classmate comparison group. Results are available upon request.

## 6 Results

### 6.1 Self-esteem and self-efficacy

Table 5 shows the three sets of estimates of the impact of Akanksha on self-esteem and self-efficacy. Row (1) show the OLS estimates, followed by the main results in Row (2) and (the difference-in-difference results in Row (3).

As with the raw differences between the treated and comparison groups in Table 3, the OLS results do not show significant differences even after controlling for a full set of pre-treatment characteristics including parental background and parental non-cognitive skills. However, once we match the groups on pre-treatment characteristics, we find strong evidence that being in Akanksha raises both self-esteem and efficacy. Akanksha raises self-esteem by half of a standard deviation relative to the community peers and 0.7 of a standard deviation relative to the classmates. The effect on self-efficacy is between 0.5 and 0.9 of a standard deviation relative to the classmates and community peers respectively. Importantly, in both cases, there is no statistically significant difference in outcomes between the two comparison groups suggesting that group-specific contaminants such as classmate reflection effects and community school effects are unlikely to matter<sup>30</sup>. This is equivalent to the estimate from Equation (6) being zero, implying that there is no difference between the estimates in (4) and (5). Hence, we pool the comparison groups in order to reduce the matching bias in the estimates. The treatment effect relative to the pooled groups for both self-esteem and self-efficacy is one standard deviation.

Could the strong effect that we find be misleading? The only plausible alternative explanation of the observed pattern is that the treated identify systematically "weaker" classmates and simultaneously, community peers attend worse schools that lower their skills to the level of the "weak" classmates. This would result in the overestimation of the Akanksha effect relative to both groups, while showing no difference between these groups. However, the descriptive statistics show convincingly that, if anything, Akanksha identify "stronger" classmates, from better-off backgrounds and with parents with higher non-cognitive skills. Furthermore, there is no reason to believe that there are systematic differences in the quality across schools attended in these communities<sup>31</sup>. Hence, we conclude that the pattern of results can only be consistent with a positive impact of Akanksha and absence of biases in the comparison groups.

Further, these results do not appear to be driven by parent/family level unobservables

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<sup>30</sup>It also suggests that unobservable selection effects into the programme, to the extent that they are correlated with school choice, are unlikely to affect our findings. For example, if particular parents choose to enrol children in Akanksha because they valued their child's later opportunities more, they are also likely to have been more careful in choosing schools. However, as the impacts controlling for school choice are not different from those not controlling for this, this suggests that this type of selection effect is not a concern.

<sup>31</sup>The share of those attending municipal schools (the remainder go to private schools) is similar across the three groups. Just over half of each group attend municipal schools.

as the impact persists in the difference-in-difference estimates (row (3)) for both self-esteem and self-efficacy. The two sets of pooled estimates are similar in magnitude suggesting that reversion to the mean is unlikely to be relevant<sup>32</sup>.

We now turn to the falsification tests (Columns (5) and (6)) which support the hypothesis that the impacts we find are attributable specifically to the work Akanksha does to build self-esteem and self-efficacy. (Note that we omit the treated when making this comparison). Neither participating in youth clubs, nor attending an English medium school has effects on these skills that are comparable to the impact of Akanksha<sup>33</sup>. The share of those attending youth clubs is 28% for classmates and higher, at 38% for community peers. More classmates attend English medium schools (similar to the treated by construction) at 30% while only 14% on average of the community peers do so.

## 6.2 Expected Life Evaluation and Aspirations

As explained earlier, life evaluation and aspirations are best regarded as measures of future well-being and ambition, and as such are distinct from measures of the non-cognitive skills, self-efficacy and esteem<sup>34</sup>.

The raw differences suggested no difference in expected life evaluation between the treated and comparison groups, but higher aspirations among the treated. Matching on covariates we find that the higher aspirations persist and life evaluation is now also significantly higher (Table 6). Since there is no significant difference between the two comparison groups, we focus on the treatment effect estimates relative to the pooled comparison group (Column(4)). The effect on expected life evaluation is three-quarters of a step, equivalent to just under a half of a standard deviation increase. Similarly, Akanksha has a positive effect on aspirations; more of the attainable role models named by the treated are wealthier and live outside the community. The size of the effect is equivalent to two-fifths of a standard deviation. As mentioned previously, this measure of aspirations reflects the notion of "aspirations window", proposed by Ray (2006) [34]. However, there are more grounds for caution in interpreting these results than those for the previous outcome measures. Firstly, the effect relative to the community comparison group is only marginally significant (at 11 percent) in the main specifications, though the significance and magnitude of this effect increase substantially with a differenced measure of the outcome. Secondly, as with life evaluation, there is fluctuation in the size of the treatment effects relative to the pooled comparison group, ranging between 0.4 -1.0 standard deviation.

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<sup>32</sup>to the extent that outcomes are affected by reversion to the mean, the estimates in the main specification (matching on parental self-esteem and self-efficacy) will be smaller than the difference-in-difference specification. These differences are negligible in the pooled specification where estimates converge.

<sup>33</sup>Oddly, attending an English medium school has a significant negative effect on self-efficacy in the difference-in-difference specification, this does not hold in the main specification.

<sup>34</sup>This implies that discussions about mean reversion are not relevant here.

As before, there is no evidence to suggest that the effect on life evaluation works through channels other than the content of Akanksha’s programme; being in a youth club and attending an English medium school do not have a significant effect on this outcome. However, attending an English medium school has a positive effect on aspirations, suggesting that English proficiency can have an important effect on who one knows and looks up to.

### 6.3 Other robustness checks: Omitted variables

Throughout this paper, we ensure robustness of our analysis and findings in various ways. Our empirical and estimation strategies aim to eliminate a number of potential sources of contamination of the estimated effects. We selected two comparison groups that are similar along two key unobservable dimensions – neighbourhood and school environments. We use a rich set of covariates to match treatment and comparison groups including parental non-cognitive skills, and offer alternative estimates that control for some parental and household level unobservables through differencing. We verify that the effects we find are attributable to the work that Akanksha does with the participants rather than some other features of the programme by testing the effects of alternative treatments.

The final check is to allow for the possibility that despite the careful treatment of possible sources of bias, there are, nevertheless, some omitted unobservable variables would cause the violation of the conditional independence assumption (CIA). We do this by conducting sensitivity analysis as in Ichino et al., (2008) [28]. This is part of the Rosenbaum and Rubin (1983) [37] family of tests, which allow us to test the sensitivity of the estimates to "likely" omitted variables that affect both selection and outcome. These tests introduce a confounding variable into the matching set and test the sensitivity of the results to this confounder ( $\gamma$ ). We examine a range of possible confounders but our strongest test is obtained by examining the potential effect of having omitted unmeasured cognitive ability - perhaps the treated simply had higher cognitive ability? As explained further below, we use a generated variable with a distribution similar to that of the PPVT scores as the measure of this omitted variable.

Table 7 presents the results presents the estimates of the treatment effect obtained by adding a selection of confounders to the matching set. The first four columns of each sub-table (1a-4a and 1b-4b) show the proportions of observations for which the binary variable takes the value of one in each of the four groups, denoted by  $p_{ij}$ , where  $i$  is a treatment indicator and  $j$  is an indicator of whether the outcome is above the mean. The effect of the confounder on the outcome (the outcome effect  $\Lambda$ ) is estimated using a logistic regression (Columns 5a and 5b). The table presents the odds ratio of the estimated effect of the confounder on the probability of being treated (the selection effect  $\Gamma$ , in Columns 6a and 6b). The key results are in Columns 7a and 7b, which show the

estimated treatment effect with the confounder.

The first row of the table shows the estimated treatment effects using propensity score radius matching with no confounder. The remaining rows introduce a range of confounders with different distributions; in all cases except the PPVT score (last row of the table) the parameters of the confounders are set to follow the distributions of covariates included in the main matching function.

Overall, the estimated treatment effects of Akanksha on self-esteem and self-efficacy are very robust to possible violations of the CIA. We introduce a range of confounders with various distributions and find that the variation in the size of the treatment effects does not exceed 0.04 of a standard deviation, irrespective of the direction and magnitude of the selection and outcome effects of these confounders. The statistical significance of the estimates also remains constant.

The last row of the table introduces a confounder which is not, in fact, in the matching set - the results of the PPVT test (a measure of cognitive achievement). This variable is not in the matching set as the test was administered during the survey (post-treatment) and is unlikely to constitute a valid control for pre-treatment differences between the groups, not least as the Akanksha treatment may well have had an impact on PPVT as well. However, to the extent that the PPVT score, at least in part, proxies inherent cognitive ability, introducing a confounder with a similar distribution is a way of testing the sensitivity of our findings to omitted controls for unobservable cognitive ability. We use the raw PPVT scores to construct a binary variable indicating whether an individual scored above the mean. The results suggest that the estimated treatment effects of Akanksha on self-esteem and self-efficacy hold even in the presence of omitted controls for ability. This is particularly encouraging in the context of a non-randomised evaluation, as selection into treatment on ability is a valid concern that cannot be fully controlled for. In addition, the distribution of the binary PPVT indicator is such that it has a positive impact on both selection into treatment and the outcomes. As discussed by Ichino et al., (2008) [28], omitted variables that follow this distribution are of particular concern since they may bias the results towards finding a falsely significant effect. Reassuringly, we find that in this case omission of such a variable would have no inflationary effect on the estimates of treatment effects on both self-esteem and self-efficacy<sup>35</sup>.

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<sup>35</sup>We also examined the sensitivity of the estimated treatment effects of Akanksha on our measures of life satisfaction and aspirations. As before, the magnitude of the estimates remains stable. These results are available on request.

## 7 Non-cognitive skills and outcomes: Beyond cognitive skills

There is a vast literature in economics and other social sciences establishing the importance of cognitive skills for child development and future outcomes<sup>36</sup>. A relevant question is whether non-cognitive skills matter *in addition* to these; below, we offer some descriptive evidence to suggest that this is so in our data. We have data on Standard 10 exam results and wages received by those who are employed. The correlations between these and non-cognitive skills are shown in Figures 2 and 3. It might be argued that in settings with low educational achievement, the measurement of cognitive skills is sufficient to explain variation in socioeconomic outcomes. We examine this below by comparing the relationship of non-cognitive skills to outcomes, both with and without the control for cognitive achievement measured by the PPVT test<sup>37</sup>. We ask whether non-cognitive skills have any role in affecting outcomes, once we control for cognitive achievement. Arguably, if the variation in non-cognitive skills that is uncorrelated with cognitive skills is simply noise, then the measurement of cognitive skills might be considered sufficient. We show below that this is not the case.

Figures 2a and 2b show the associations between examination results in Standard 10, self-esteem and self-efficacy. These are two-way lowess graphs with the examination results (going from Fail to First Class) on the Y-axis and each of the skills on the X-axis, obtained using partial linear regressions. Consistent with the existing literature there is a strong positive association between examination results and both self-esteem and self-efficacy. In the sample, children with higher self-esteem are more likely to have attained better exam results; the same holds with respect to self-efficacy. The point to note here is that these results hold even controlling for cognitive achievement. This supports the hypothesis that non-cognitive skills matter independently from cognitive achievement. These correlations also hold with respect to wages (Figures 3a and 3b), although only 44 percent of the sample were in work at the time of the survey.

Overall, the link between non-cognitive skills and adult outcomes widely reported in the economics and psychology literatures is supported by the associations in our data.

## 8 Conclusions

This study contributes to the literature on how non-cognitive skills are formed, and in particular whether initially poor non-cognitive skills can be remedied later in childhood. It investigates the impact of an NGO that offers informal education to children from

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<sup>36</sup>References include Murnane et al., (1995) [32] for the USA and Connolly et al., (1992) [11] for the UK. For a review of the literature for developing countries see Glewwe (2002) [22].

<sup>37</sup>The simple correlation between psychosocial skills and the PPVT scores is about 0.18.

slums in Bombay. The NGO concentrates on raising non-cognitive skills and aspirations of children who join the programme at the start of primary school and stay both in school and in the programme until they complete secondary school. We use a cross-cutting design in order to obtain estimates of the impact of the programme.

We find a remarkably strong and robust effect of the intervention on both self-esteem and self-efficacy: being in the programme raises both by about one standard deviation. We also examine the impact on life evaluation and a measure of aspirations. The effects of the intervention on life evaluation is about half of a standard deviation, while that for aspirations is lower at 0.4. The size and significance of the estimated impacts on self-esteem and self-efficacy are robust to alternative estimators, while the results on aspirations are more sensitive to the methods used. Simulations show that the estimates are insensitive to the introduction of potential confounders. We also examine plausible alternative channels for the effects that we find, using enrolment in programmes such as youth clubs and English medium schools. These are found to have no effect.

This is a non-randomised evaluation of a long-term intervention and thus warrants a careful and thorough examination of robustness of estimates. Arguably, if skill accumulation could be meaningfully measured over the short horizon it would have been possible to evaluate the impact of this intervention using a short-term intervention, possibly in a randomised framework, at some point during childhood. However, the evidence from the psychology literature suggests strongly that these skills are unstable in early childhood and adolescence and are most stable (and hence measurable) between early adulthood and middle age (see Trzesniewski et al., (2003, 2009) [43] [44]) while, at the same time, they are generally formed throughout childhood. This presents particular challenges to designing any evaluation design, and our focus on a long-term intervention on measurable outcomes in early adulthood is at least sensitive to these concerns. We aim, therefore, to offer a robust and persuasive method of evaluating the long-term impact of this intervention addressing, in particular, concerns about selection into and out of the programme. While the programme did not target specific children with high or low potential, parental choices were key for enrolment. The combination of extensive controls for parental pre-treatment background and non-cognitive skills and the use of matching techniques control for observable confounders. The careful choice of comparisons groups allow us to control for and distinguish between the role of unobservable neighbourhood and school confounders. The comparison between the different control groups also shows that selection into Akanksha based on unobservable criteria correlated with school choice is unlikely to have been a problem in the evaluation. The robustness analysis also demonstrates that any selection into the programme based on ability is unlikely to have had a substantial effect on the findings either. While selection issues cannot be entirely ruled out, none of the findings suggest that the treated were more predisposed to higher non-cognitive skills ex-post without the programme.

The purpose of this paper was to ask whether interventions to raise non-cognitive skills can be effective. The evidence provided here suggests that they can be and, combined with what we already know about the importance of the broader set of skills for key socioeconomic outcomes, offers firm grounds for interventions targeting non-cognitive skills. It has always been clear that such skills matter - what is less certain is whether they are malleable over time. Our evidence suggests that there are reasons for optimism.

## References

- [1] Abadie, A., Drukker, D., Herr, J.L. and Imbens, G., 2001, "Implementing Matching Estimators for Average Treatment Effects in Stata", *Stata Journal*, 1(1): 1-18.
- [2] Bagozzi, R.P., 1993, "Assessing construct validity in personality research. Applications to measures of self-esteem", *Journal of Research in Personality*, 27(1): 49-87 (3 p.1/4).
- [3] Bandura, A., 1977, "Self-Efficacy: Toward a Unifying Theory of Behavioral Change." *Psychological Review*: 191-215.
- [4] Bandura, A., Barbaranelli C., Caprara, G.V., and Pastorelli, C., 2001, "Self-Efficacy Beliefs as Shapers of Children's Aspirations and Career Trajectories", *Child Development*, 72 (1): 187-206.
- [5] Baumeister, R.F., Campbell J.D., Krueger, J.I., and Vohs, K., 2003, "Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles?" *Psychological Science in the Public Interest*, 4(1):1-44.
- [6] Binswanger, H.P. 1981. "Attitude Toward Risk: Theoretical Implications of an Experiment in Rural India." *Economic Journal*, Vol. 91: 867-890.
- [7] Caliendo, M. and Kopeinig, S. (2008): Some Practical Guidance for the Implementation of Propensity Score Matching, *Journal of Economic Surveys*, 22(1): 31-72
- [8] Carneiro, P., Crawford, C. and Goodman A., 2007, "The Impact of Early Cognitive and Non-Cognitive Skills on Later Outcomes", Discussion Paper 92, Centre for the Economics of Education, London School of Economics, London
- [9] Carton, J. S., and S. Nowicki, Jr, 1994, "Antecedents of individual differences in locus of control of reinforcement: A critical review", *Genetic, Social, and General Psychology Monographs*, 120: 31-81.
- [10] Cobb-Clark, D. A. & Tan, M., 2011. "Noncognitive skills, occupational attainment, and relative wages," *Labour Economics*, Elsevier, vol. 18(1), pages 1-13, January

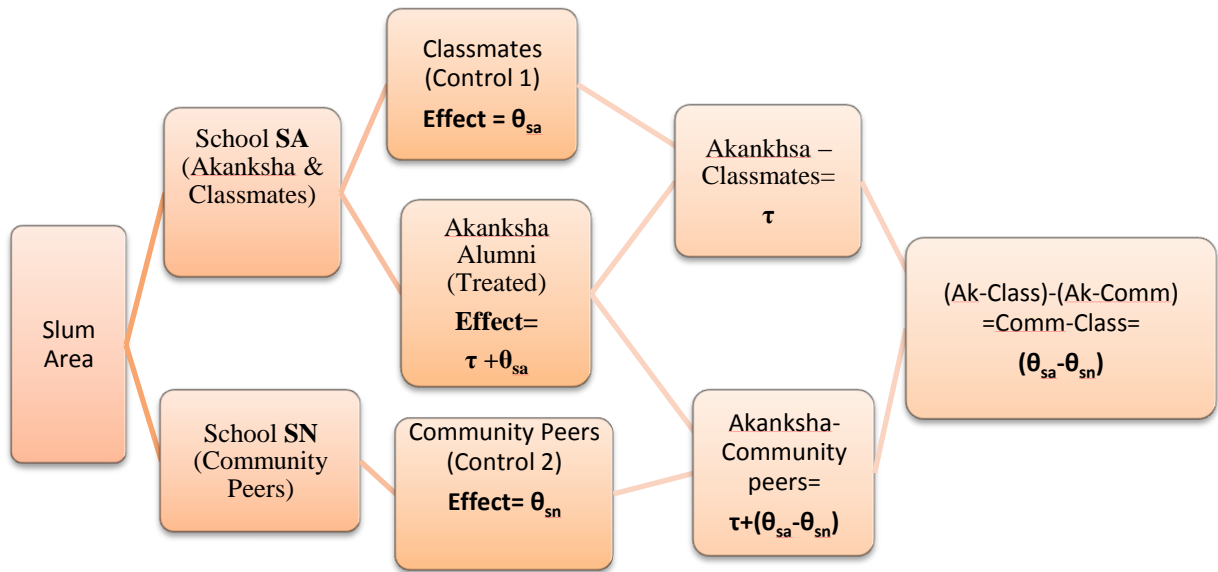


- [11] Connolly, S. & Micklewright, J. and Nickell, S., 1992. "The Occupational Success of Young Men Who Left School at Sixteen," *Oxford Economic Papers*, Oxford University Press, vol. 44(3): 460-79
- [12] Crocker, J., and Wolfe ,C.T., 2001, "Contingencies of Self-Worth", *Psychological Review*, 108:593–623.
- [13] Cunha, F, Heckman, J., Lochner, L. J, & Masterov, D. V., 2006, "Interpreting the Evidence on Life Cycle Skill Formation," eds. E.A. Hanushek and F. Welch, 2006. *Handbook of the Economics of Education*, 12, 697-812, Amsterdam: North-Holland.
- [14] Cunha, F. and Heckman, J., 2009. "The Economics and Psychology of Inequality and Human Development," *Journal of the European Economic Association*, MIT Press, 7(2-3):320-364.
- [15] Cunha F. and Heckman, J., and Schennah, S. 2010, "Estimating the Technology of Cognitive and Noncognitive Skill Formation" NBER Working Paper 1566
- [16] Currie, J., 2001, "Early Childhood Intervention Programs: What Do We Know?," *Journal of Economic Perspectives*,15(2): 213-238.
- [17] Deaton, A., 2008, "Income, Aging, Health and Wellbeing Around the World: Evidence from the Gallup World Poll", *Journal of Economic Perspectives*, 22: 53-72.
- [18] Dercon, S. and Krishnan, P., 2009, "Poverty and the Psycho-Social Competencies of Children: Evidence from the Young Lives Sample in Four Developing Countries", *Children, Youth and Environments*, 19(2)
- [19] Donnellan, M.D., Trzesniewski,K.H., Robins, R.W., Moffitt, T.E., and Caspi, A., 2005, "Low Self-Esteem Is Related to Aggression, Antisocial Behavior, and Delinquency" *Psychological Science*, 16 (4): 328-355.
- [20] Feinstein, L., 2000, "The Relative Economic Importance of Academic, Psychological and Behavioural Attributes Developed in Childhood", London School of Economics, Centre for Economic Performance, Working Paper Number 0443.
- [21] Giné, X.,Townsend, R. & Vickery, J., 2008, "Patterns of Rainfall Insurance Participation in Rural India," *World Bank Economic Review*, Oxford University Press, 22(3):539-566.
- [22] Glewwe, P., 2002, "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes", *Journal of Economic Literature*, 40(2): 436-482.
- [23] Goldsmith, A., Veum, J., and Darity, W., 1997. "The Impact of Psychological and Human Capital on Wages." *Economic Inquiry*, 35(4):815-29.

- [24] Gopnik, A., Meltzoff, A.N., and Kuhl, P.K., 1999. *The Scientist in the Crib: Minds, Brains and How Children Learn*. New York: Harper Collins
- [25] Grantham-McGregor, S., Cheung, Y.B., Cueto, S., Glewwe, P., Richter, L., and Strupp, B., 2007, "Developmental Potential in the First 5 years for Children in Developing countries", *Lancet*, 369(9555): 60-70.
- [26] Heckman, J., Stixrud, J., and Urzua, S., 2006, "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior," *Journal of Labor Economics*, 24(3).
- [27] Heineck, G. and Anger, S., 2010. "The returns to cognitive abilities and personality traits in Germany", *Labour Economics*, Volume 17, Issue 3, pp. 535-546
- [28] Ichino, A., Mealli, F., and Nannicini, T., 2008, "From temporary help jobs to permanent employment: what can we learn from matching estimators and their sensitivity?," *Journal of Applied Econometrics*, 23(3):305-32.
- [29] Jencks, C., 1979, *Who gets ahead?* New York: Basic Books, 1979
- [30] Lambe, P., 2006, "Conceptualising and measuring agency using the British Household Panel Survey", Mimeo, University of Exeter.
- [31] Maddux, J.E. 1991, "Self efficacy", in C. R. Snyder and D.R. Forsyth (Eds.), *Handbook of Social and Clinical Psychology*, New York: Pergamon.
- [32] Murnane, R. J , Willett, J. B and Levy, F., 1995. "The Growing Importance of Cognitive Skills in Wage Determination," *The Review of Economics and Statistics*, MIT Press, 77(2):251-66.
- [33] Orazem, P. F. and King, E.M., 2008, "Schooling in Developing Countries: The Roles of Supply, Demand and Government Policy." Chapter 55 in T. P. Schultz and John Strauss, eds. *Handbook of Development Economics*, Vol. 4, Amsterdam: North Holland
- [34] Ray, D., 2006, "Aspirations, Poverty and Economic Change," in A. Banerjee, R. Bénabou and D. Mookherjee (eds), *What Have We Learnt About Poverty*, Oxford University Press.
- [35] Robins, R.W., Hendin, M.H. and Trzesniewski, K.H., 2001, "Measuring Global Self-Esteem: Construct Validation of a Single-Item Measure and the Rosenberg Self-Esteem Scale", *Personality and Social Psychology Bulletin*, vol.27: 151-161.
- [36] Rotter, J. 1966, "Generalized expectancies for internal versus external control of reinforcements", *Psychological Monographs*, 80( 609).

- [37] Rosenbaum, P. and Rubin, D., 1983, "Assessing Sensitivity to an Unobserved Binary Covariate in an Observational Study with Binary Outcomes", *Journal of the Royal Statistical Society, Series B*, 45:212-218.
- [38] Rosenberg, M. 1965, *Society and the adolescent self-image*, Princeton, NJ: Princeton University Press
- [39] Schweinhart, L.J., Barnes, H.V., Weikart, D.P., 1993, "Significant Benefits: The High/Scope Perry Preschool Study Through Age 27", High/Scope Educational Research Foundation, Ypsilanti, MI.
- [40] Sherer M. ; Adams C. H., 1983, "Construct validation of the Self-Efficacy Scale", *Psychological Reports*, 53 (3): 899-902
- [41] Sherman, L.W.,1984, "Development of children's perceptions of internal locus of control: A cross-sectional and longitudinal analysis", *Journal of Personality*, 52:338-354.
- [42] Swartzler, R., and Fuchs, R., 1996, "Self-efficacy and health behaviours", in Conner, M and Norman, P., (eds) *Predicting Health Behaviour*,163-196, Ooen University.
- [43] Trzesniewski, K.H., M.B. Donnellan, and R.W. Robins, 2003, "Stability of Self-esteem across the Life Span", *Journal of Personality and Social Psychology*, 84(1): 205-20
- [44] Trzesniewski, K. H., & Donnellan, M. B., 2009, "Reevaluating the evidence for increasing self-views among high school students: More evidence for consistency across generations (1976-2006)", *Psychological Science*, 20:920-922.
- [45] Tipton R.M., and Worthington E.L. Jr., 1984, "The Measurement of Generalized Self-Efficacy: A Study of Construct Validity", *Journal of Personality Assessment*, Vol.48(5):545-8.
- [46] Wang, M. , Rieger, M.O. and Hens, T., 2010, "How Time Preferences Differ: Evidence from 45 Countries" . Swiss Finance Institute Research Paper No. 09-47.
- [47] Z. Zhao, 2004, "Using Matching to Estimate Treatment Effects: Data Requirements, Matching Metrics, and Monte Carlo Evidence," *The Review of Economics and Statistics*, MIT Press, 86(1):91-107.

**Figure 1: Study Design**



**Table 1: Self-esteem and self-efficacy statements: raw scores**

Characteristic	Statement	Mean raw score
Self-esteem (children)	I feel proud to show my friends or other visitors where I live	3.2 (0.97)
	I feel proud of the job the main breadwinner in my family did when I was at school	3.7 (0.62)
	The job I do makes me feel proud	3.8 (0.67)
	I am proud of my past achievements at school	3.6 (0.76)
	I am not comfortable with/feel shy around members of the opposite sex*	2.7 (1.2)
	My parents/guardians felt proud to show friends or other visitors where we lived	3.3 (0.92)
	My parents/guardians were ashamed of their clothes *	3.5 (0.79)
	My parents/guardians felt proud of the job they did	3.1 (0.96)
	My parents/guardians were embarrassed by/ashamed of the work they had to do, or by the fact that they had no job*	3.4 (0.88)
My parents/guardians were proud of my achievements at school	3.7 (0.70)	
Self-esteem (parents)	I felt proud to show my friends or other visitors where I live	2.9 (1.1)
	I felt proud of the job the main breadwinner in my family did	3.7 (0.69)
	I felt proud of my children/NAME	3.9 (0.41)
	The job I did made me feel proud	3.7 (0.72)
Self-Efficacy (children)	If I try hard, I can improve my situation in life	3.9 (0.34)
	It feels as if other people in my family make all the decisions about how I spend my time*	2.1 (0.90)
	I like to make plans for my future work or studies	3.6 (0.72)
	I have no choice about the work I do - I must work*	2.5 (1.2)
	Working hard will be rewarded by a better job in the future	4.0 (0.23)
	My parents/guardians believed that if one tries hard, one can improve ones situation in life	3.9 (0.25)
	My parents/guardians liked to make plans for the future	3.6 (0.64)
My parents/guardians believed that working hard would be rewarded by a better job in the future	3.9 (0.3)	
Self-Efficacy (parents)	I believed that If I tried hard, I could improve my situation in life	3.6 (0.69)
	I liked to make plans for my future work or that of my children	3.5 (0.67)
	I had no choice about the work I did - I must work*	1.7 (1.1)
	I believed that working hard would be rewarded by a better job in the future	3.8 (0.5)
	I had no choice about which school to send my NAME to*	1.6 (0.89)
	I could do little to help my child/children do well in school, no matter how hard I tried*	1.8 (1.0)

Note: Mean raw score is the mean score on a scale from 1 to 4 (1- strongly disagree; 2- disagree; 3 – agree; 4 – strongly agree). Standard errors in brackets.

**Table 2: Basic individual, socio-economic and parental characteristics**

	All (1)	Akanksha Treated (2)	Community Peers (3)	Classmates (4)	Akanksha- Community (5)	Akanksha – Classmates (6)
					Differences in means z-score	
<b>Individual characteristics</b>						
Male (%)	0.58	0.58	0.58	0.59	-0.01	-0.08
Age in years	19.33 (1.74)	19.61 (1.69)	19.28 (1.93)	19.04 (1.56)	0.96	1.76*
<b>Dwelling characteristics 10 yrs ago</b>						
Dwelling owned (%)	0.76	0.74	0.74	0.83	-0.04	-1.08
Electricity in house (%)	0.54	0.46	0.46	0.72	-0.04	-2.66***
Water in house (%)	0.33	0.25	0.32	0.46	-0.85	-2.25***
Asset index <sup>a</sup>	0.19 (0.25)	0.12 (0.18)	0.12 (0.19)	0.35 (0.30)	0.09	-4.77***
<b>Parental characteristics 10 yrs ago</b>						
Primary carer is male (%)	0.21	0.11	0.20	0.35	-1.37	-3.00***
Mother's education: incomplete primary (%)	0.74	0.77	0.74	0.70	0.38	0.87
Mother not working (%)	0.74	0.65	0.76	0.83	-1.25	-2.01**
Father's education: incomplete primary (%)	0.42	0.46	0.54	0.26	0.87	2.04**
Father employment: manual labour (%)	0.42	0.42	0.56	0.28	-1.43	1.46
<b>Carer attitudes</b>						
Parental risk <sup>b</sup>	1.30 (1.59)	1.46 (1.73)	1.09 (1.49)	1.34 (1.53)	1.19	0.39
Parental discount rate <sup>c</sup>	0.72 (1.92)	0.48 (0.69)	0.54 (1.70)	0.56 (1.08)	1.06	0.05
Total Observations	154	58	50	46		

Note: Standard errors in brackets. No standard errors for binary variables reported.

<sup>a</sup>Asset index is an average based on a list of 9 durable assets: gas stove, tv, cable, video/dvd, telephone, radio, bike, scooter, fridge.

<sup>b</sup>Parental risk is the coefficient of relative risk aversion. Obtained from risk game with 6 options (for real stakes) and risk aversion parameters computed with CRRA utility function.

<sup>c</sup>The parental discount rate is  $\rho = (100/\text{minimum accepted for payment}) - 1$  obtained from a hypothetical question.

\*=significant at 10%; \*\*=significant at 5%; \*\*\*=is significant at 1%

**Table 3: Testing differences in key outcomes**

	Akanksha Treated	Community Peers	Class- mates	Akanksha- Community t-stat	Akanksha- Classmates t-stat	Akanksha- Joint t-stat
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Self-esteem</b>						
Standardised mean self-esteem score	0.11 (1.08)	-0.11 (1.01)	-0.01 (0.90)	1.06	0.59	1.01
Standardised mean parental self-esteem score	-0.37 (1.04)	0.28 (0.85)	0.28 (0.73)	-3.50***	-3.50***	4.34***
<b>Self-efficacy</b>						
Standardised mean self-efficacy score	0.18 (1.06)	-0.15 (1.02)	-0.05 (0.89)	1.58	1.09	1.6
Standardised mean parental self-efficacy score	-0.16 (0.92)	-0.09 (0.92)	0.42 (0.97)	-0.38	-3.09***	1.95**
<b>Expected Life Evaluation</b>						
Expected Life Evaluation (in 10 Years)	7.33 (1.90)	6.86 (1.82)	7.52 (1.50)	1.31	-0.55	0.53
Expected Life Evaluation (10 Years Ago)	2.61 (1.77)	2.56 (1.66)	3.96 (2.51)	0.16	-3.18***	-1.79*
<b>Aspirations Window</b>						
Aspirations Window	0.70 (0.91)	0.40 (0.81)	0.39 (0.74)	1.81*	1.87*	2.21**
Aspirations Window - parents	0.26 (0.55)	0.28 (0.57)	0.24 (0.52)	-0.15	0.22	0.03
Total Observations	58	50	46			

Notes: Standard errors in brackets.

Self-esteem and self-efficacy are mean standardised scores of items in Table 1.

Life evaluation is based on 9-step ladder, in which 1 represents the worst possible life and 9 the best possible life.

Aspirations Window is the number of attainable role models named by respondent who are richer/more successful than them.

**Table 4: Exploring the validity of the recall questions**

	10 years ago	Today	Correlation
<b>Young Person Questionnaire</b>			
Self-reported wealth	4.1 (0.92)	4.7 (0.58)	0.15
Self-reported wealth relative to others in the area	3.4 (0.96)	4.0 (0.65)	0.19
<b>Carer Questionnaire</b>			
Life Evaluation	3.0 (2.09)	5.1 (2.3)	0.22
<b>Recall Question Responses by Parent and Child</b>			
	Young Person	Carer	Correlation
<b>Assets 10 years ago</b>			
Asset index	0.18 (0.18)	0.13 (0.17)	0.61
<b>Access to Services 10 years ago</b>			
Electricity	0.64	0.54	0.59
Water in household compound	0.38	0.34	0.56

Note: Standard error in brackets, not reported for binary variables. Correlation coefficients are calculated between recall and current answer, and between young person's and carer's answer to same question.

*Self reported wealth* is the answer to: Which of the following best describes your household you are living in: 1=Very rich, 2=Rich, 3=Comfortable – can manage to get by, 4=Never have quite enough, struggle to get by, 5=Poor, 6=Destitute

*Self-reported wealth relative to others in the area* is the answer to the question: Compared to other households here, would you describe your household at the moment as: 1=The richest, 2=Among the richest, 3=Richer than most households, 4=About Average, 5=A little poorer than most households, 6=Among the poorest, 7=The poorest, 77=NK.

Life evaluation is the answer to the ladder of life question as before.

Asset index is an average based on a list of 9 durable assets: gas stove, tv, cable, video/dvd, telephone, radio, bike, scooter, fridge .



**Table 5: Akanksha Treatment Effect on Self-esteem and Self-efficacy**

	Akanksha – Community (1)	Akanksha – Classmates (2)	Community - Classmates (3)	Akanksha - Pooled (4)	Club- no club (5)	English Med. School – Non (6)
	Akanksha treatment effect	Akanksha treatment effect	Community treatment effect	Akanksha treatment effect	Club treatment effect	English medium treatment effect
<b>Self-Esteem levels</b>						
OLS, robust se (1)	0.32 (0.25)	0.38 (0.29)	-0.07 (0.21)	0.44* (0.20)	0.03 (0.22)	0.07 (0.20)
Nearest Neighbour Covariate Matching (2)	0.52** (0.26)	0.70*** (0.28)	0.13 (0.26)	0.99*** (0.23)	-0.11 (0.24)	0.36 (0.28)
<b>Self-Esteem Difference-in-Difference</b>						
Nearest Neighbour Covariate Matching (3)	1.11*** (0.29)	1.09*** (0.35)	0.17 (0.38)	0.97*** (0.27)	-0.28 (0.34)	-0.21 (0.38)
<b>Self-Efficacy levels</b>						
OLS, robust se (1)	0.37 (0.26)	0.18 (0.28)	-0.11 (0.22)	0.41* (0.22)	0.06 (0.26)	-0.48** (0.22)
Nearest Neighbour Covariate Matching (2)	0.90*** (0.28)	0.48** (0.25)	0.09 (0.22)	0.93*** (0.24)	0.01 (0.28)	-0.28 (0.28)
<b>Self-Efficacy Difference-in-Difference</b>						
Nearest Neighbour Covariate Matching (3)	0.78*** (0.24)	0.67* (0.44)	-0.09 (0.32)	0.82*** (0.26)	0.07 (0.38)	-0.65* (0.41)
Total Observations	108	104	96	154	96	96

\*Significant at 10%; \*\*Significant at 5%; \*\*\*Significant at 1%; standard errors in brackets.

Self-esteem and self-efficacy are mean standardised scores of items in Table 1.

All specifications in this table include individual characteristics (pre-treatment), household composition, parental characteristics (risk attitudes, time preference), endowments (index of assets, ownership of house 10 years ago) as well as parental non-cognitive skills.

**Table 6: Akanksha Treatment Effect on Expected Life Evaluation and Aspirations**

	Akanksha – Community (1)	Akanksha – Classmates (2)	Community- Classmates (3)	Akanksha - Pooled (4)	Club-no club (5)	English Med. School – Non (6)
	Akanksha treatment effect	Akanksha treatment effect	Community treatment effect	Akanksha treatment effect	Club treatment effect	English medium treatment effect
<b>Expected life evaluation in 10 years – Levels</b>						
OLS, robust se (1)	0.71* (0.42)	0.18 (0.37)	-0.66* (0.38)	0.28 (0.31)	0.23 (0.36)	0.06 (0.44)
Nearest Neighbour Covariate Matching (2)	1.16*** (0.40)	1.09*** (0.42)	0.06 (0.42)	0.74** (0.36)	-0.34 (0.40)	0.24 (0.46)
<b>Life evaluation – Difference- in- Difference</b>						
Nearest Neighbour Covariate Matching (3)	1.09* (0.68)	0.71 (0.68)	-0.11 (0.68)	2.01*** (0.53)	0.40 (1.06)	0.39 (0.81)
<b>Aspirations Window – Levels</b>						
OLS, robust se (1)	0.32* (0.18)	0.41* (0.22)	-0.09 (0.16)	0.31* (0.17)	-0.01 (0.18)	0.33 (0.26)
Nearest Neighbour Covariate Matching (2)	0.30^ (0.19)	0.52*** (0.19)	-0.13 (0.21)	0.37** (0.19)	-0.03 (0.22)	0.47* (0.26)
<b>Aspirations Window – Difference-in-Difference</b>						
Nearest Neighbour Covariate Matching (n=1, Mahalanobis) (3)	0.69*** (0.28)	0.51** (0.23)	-0.28 (0.21)	0.87*** (0.20)	0.13 (0.25)	0.43 (0.30)
Total Observations	108	104	96	154	96	96

Note: \*Significant at 10%; \*\*Significant at 5%;\*\*\*Significant at 1%;

Difference in difference in life evaluation = Child expected future life evaluation - parental life evaluation 10 years ago

**Table 7: Sensitivity analysis: Estimates of Akanksha Treatment Effects with Confounders**

	SELF-ESTEEM								SELF-EFFICACY							
	Fraction U=1 by treatment/outcome								Fraction U=1 by treatment/outcome							
	$p_{11}$	$p_{10}$	$p_{01}$	$p_{00}$	$\Lambda$	$\Gamma$	ATT w/ U	<i>s.e.</i>	$p_{11}$	$p_{10}$	$p_{01}$	$p_{00}$	$\Lambda$	$\Gamma$	ATT w/U	<i>s.e.</i>
	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)	(7a)	(8a)	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)	(7b)	(8b)
No confounder							0.66	0.24							0.45	0.20
Treatment =Akanksha and Control = joint (Community peers + Classmates) Confounder similar to:																
Owned dwelling (pre-treatment)	0.78	0.63	0.83	0.75	4.4	0.79	0.68	0.25	0.81	0.56	0.77	0.79	0.85	0.79	0.45	0.20
Electricity in house (pre-treatment)	0.47	0.47	0.61	0.57	1.53	0.68	0.68	0.25	0.41	0.61	0.46	0.67	0.69	0.63	0.43	0.20
Water in dwelling (pre-treatment)	0.25	0.26	0.33	0.42	0.72	0.57	0.67	0.25	0.22	0.33	0.33	0.42	1.07	0.62	0.44	0.20
Primary carer is male	0.14	0.05	0.25	0.28	1.16	0.29	0.69	0.26	0.08	0.17	0.26	0.28	1.09	0.35	0.43	0.20
Father's education: secondary school	0.28	0.58	0.19	0.47	0.23	1.5	0.67	0.25	0.35	0.44	0.23	0.46	0.69	1.19	0.45	0.20
Mother nor working (pre-treatment)	0.64	0.68	0.81	0.78	3.22	0.57	0.70	0.25	0.59	0.78	0.90	0.72	5.24	0.54	0.45	0.20
Father manual labourer (10 years ago)	0.39	0.53	0.42	0.43	1.29	1.14	0.68	0.25	0.49	0.33	0.51	0.37	1.69	1.19	0.45	0.20
Parent values responsibility	0.31	0.42	0.33	0.40	1.09	0.94	0.67	0.25	0.35	0.33	0.26	0.46	0.39	0.89	0.44	0.20
Parent values respectfulness	0.36	0.63	0.69	0.62	2.2	0.52	0.67	0.26	0.46	0.44	0.69	0.61	5.61	0.47	0.46	0.20
Parent values thrift	0.11	0.16	0.25	0.33	0.75	0.33	0.69	0.26	0.16	0.06	0.28	0.32	0.65	0.32	0.42	0.20
<b>PPVT score above the mean</b>	0.72	0.53	0.69	0.40	12.5	2.03	0.65	0.25	0.65	0.67	0.59	0.46	3.08	2.20	0.42	0.20

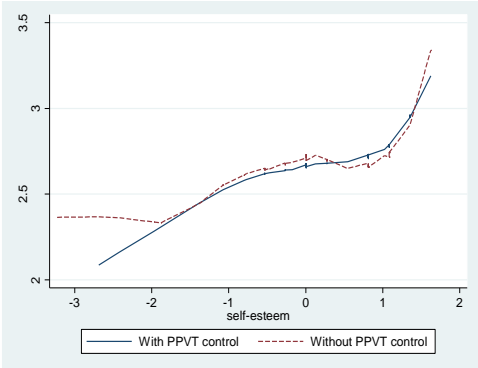
$\Gamma$ =selection effect = odds ratio of logistic regression of confounder on probability of being treated,

$\Lambda$ =outcome effect = odds ratio of logistic regression of confounder on outcome,

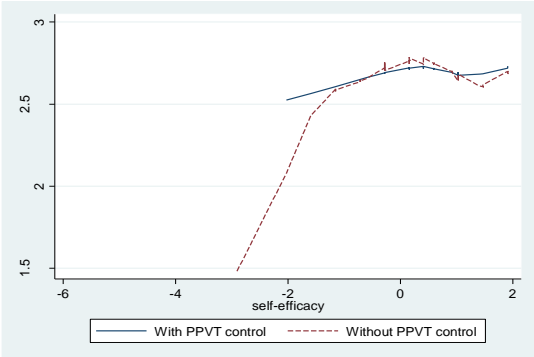
$i$ =treatment indicator,  $j$ =outcome indicator (for continuous outcome variable – indicates whether outcome is above the mean)

**Figure 2: Two-way Lowess Graphs of Standard 10 Results against Non-cognitive Skills**

**(a) Self-Esteem (standardised mean score)**  
**(standardised mean score)**



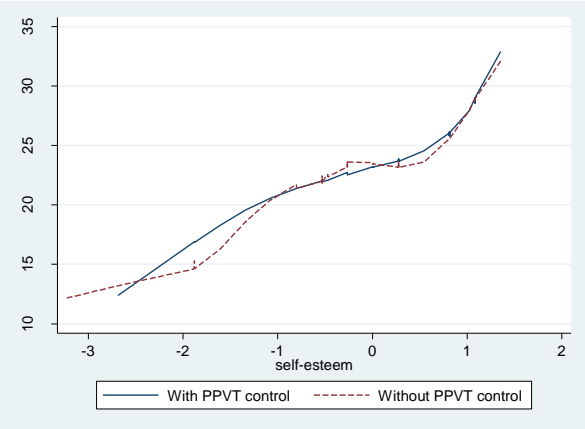
**(b) Self-Efficacy**  
**(standardised mean score)**



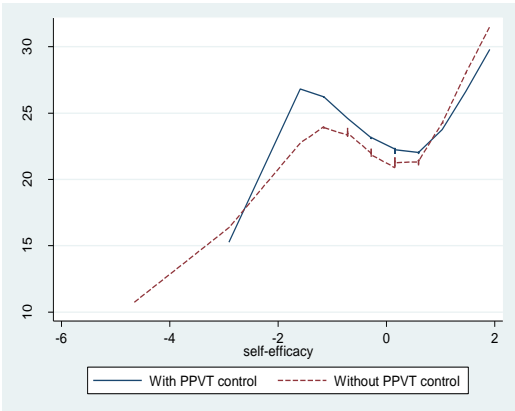
Note: Y-axis is Standard 10 exam results: 1=Fail, 2=Pass, 3=2<sup>nd</sup> Class, 4=1<sup>st</sup> class/Distinction

**Figure 3: Two-way Lowess Graphs of Wages against Non-cognitive Skills**

**(a) Self-Esteem (standardised mean score)**  
**mean score)**



**(b) Self-Efficacy (standardised mean score)**



Note: Y-axis is wages per hour in Rs.