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PARENTAL INVESTMENTS AND SKILLS FORMATION DURING INFANCY AND YOUTH: LONG TERM EVIDENCE FROM AN EARLY CHILDHOOD INTERVENTION

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Parental Investments and Skills Formation During Infancy and Youth: Long Term Evidence From an Early Childhood Intervention

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ABSTRACT

What happens to children during the early years is recognized to be very important for their long run development. It is also increasingly clear that the skills that are relevant for economic success and more generally well-being are multidimensional, including different types of socioemotional skills. In this paper, we look at the long run impacts of an intervention targeted to premature children, known as Kangaroo Mother Care. We do so using data from a randomised control trial performed several decades ago in Bogotá, Colombia, to assess the short run impacts of such an intervention. A large fractions of the participants to that trial were examined over 20 years after the original intervention. We first show that the original intervention had a significant impact on externalizing socio-emotional skills at age 22 and a variety of adult outcomes. We then perform a mediation analysis which involves the estimation of a production function of socioemotional skills and show that the long run impact seems to be explained entirely by an increase on one type of parental investment measured when the participants were 12 months old. Our results also show a remarkable degree of persistence of different types of skills.

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1 Introduction

It is now clear that individual success in most modern societies depends on a variety of skills, ranging from cognition to different types of socioemotional skills as well as physical health and fitness. Following initial findings that primarily examined the connection between cognitive abilities (often represented by standardized exam results) and labor market outcomes, the literature has come to acknowledge the multifaceted nature of skills and has investigated the role of specific skills in achieving success in the labor market and other outcomes. We now understand that differences in skills, both cognitive and socioemotional, with which individuals enter adulthood, are indicative of disparities in their overall well-being (Heckman and Mosso, 2014; Saltiel et al., 2017). The role of these different skills in the process of production and in economic development has changed together with technical progress: it is now clear that socioemotional skills are increasingly important, as discussed in Deming (2017) and Weidmann and Deming (2021). This evidence makes it important to understand the process of skill formation, and, from a policy perspective, to assess the malleability of different types of skills.

In this paper, we examine the long-term effects of an early childhood intervention developed in Colombia in the 1970s, which aimed to protect low-weight or premature babies from the consequences of prematurity. This intervention, known as Kangaroo Mother Care (KMC), involves placing low-weight or premature babies in a Kangaroo position (skin-to-skin) 24 hours a day until developmental conditions allow them to leave this position. KMC was introduced as a substitute for the use of incubators in Neonatal Intensive Care Units (NICUs).

As discussed in Charpak et al. (1997), a Randomized Controlled Trial (RCT) showed that, in the short run, KMC had better impacts than the standard incubators, including on mortality and morbidity. Furthermore, recent evidence (Charpak et al., 2017), using data from a long run follow up of the same subjects of the same RCT, indicates that KMC has long-term effects on a variety of outcomes. The original RCT assigned preterm babies born in 1993-94 to either KMC (Kangaroo Mother Care) or traditional care (incubators) (Charpak et al., 2017). That dataset includes information at birth, as well as at ages 1 and 20. The long term follow up collected information at age 20 on a variety of outcomes for the original subjects of the study, as we discuss below. This long-term follow up is one of the few data sets in the developing world that follows subjects on such a long time-span.

Building on this evidence, we use data from the original RCT and its long term follow up. We focus on the long-term impacts of KMC on different types of skills, both cognitive and socioemotional, in young adults. Exploiting the fact that the data we have the subjects in the experiment for about 20 years, we can also document

the long-term impact of early skills, regardless of the effect of the intervention.

We also aim to identify the mechanisms that may have led to the long run effects of the intervention that we observe. Since KMC requires intensive parental time compared to incubators, the KMC experiment provides a unique opportunity to understand the effects of parental investments on different types of skills. We analyze how KMC, by altering early childhood parental investments, might have long-term effects on skills by enhancing parental capacity.

To analyze this hypothesis, we perform a mediation analysis, related to that of Heckman et al. (2013) and others, estimating a model of parental investment in the early years and its relationship to three long-term outcomes: cognitive skills (IQ, ability to concentrate and recall details of practical situations, verbal memory, and learning capabilities), externalizing skills (hyperactivity, inattention, antisocial behavior), and internalizing skills (depression, anxiety, somatic issues, and avoidance).

Our approach proceeds in three steps. First, following standard procedures widely used in the psychology and the economics literature, we construct measures of skills at 20 years, using factor models to recover the relevant latent variables. Second, we look at whether KMC had an impact, direct or indirect, on the skills we measure. For this purpose, we estimate a structural model to establish the relationship between KMC, parental investments (at age 1 year), childhood skills and adulthood skills. This part of the analysis follows the approach used by Cunha and Heckman (2010) and Attanasio et al. (2020), Attanasio et al. (2020) and others. Finally, we explore an observed manifestation of the increase of parental capacity: the improved knowledge of parents about their children.

Our first result is the finding that the KMC program improves externalizing socio-emotional skills, as measured by psychometric instruments twenty years later, as previously noted in Charpak et al. (2017).[1] Although cognitive skills and health indicators at one year of age are associated with skills at 20 years of age, KMC does not affect cognitive, health or internalizing socioemotional skills in young adulthood. However, the improvement in externalizing socio-emotional skills is substantial and can also be seen in some daily-life outcomes we measure, such as an 11-percentage-point reduction in the probability of reporting violent behavior at school (30% of children report such events). To judge the size of the impact, we note that its magnitude equals two-fifths of the association found between reporting violent behavior and having a family history of mental disorders (+26 pp.). It is also twice the magnitude of the association between the outcome and living in a more violent neighborhood (+4.5 pp. for each standard deviation of reports of personal injuries).

Our model estimates imply that 58.6% of the KMC impact on externalizing behavior can be explained via the transmission from childhood observed investments.

[1] While we utilize the same dataset as Charpak et al. (2017), we employ a distinct factor model.

This result is consistent with the hypothesis that the nature of the intervention induced a closer connection between parents and children in the early years which resulted in better externalizing skills.

We hypothesize that a better understanding of their children might allow parents to guide them better in avoiding violent reactions in their daily interactions. For this, we take advantage of the design of one behavioral checklist (ABCL) used to measure such conduct, administered to the children, their best friends, and their parents. Finally, we show that the KMC also reduces the difference between best friends' and parents' reports; we interpret this as better knowledge of KMC parents (compared with TC parents) of their children. This is in line with the findings that KMC improved bonding and attachment during the first year of age (Tessier et al., 1998; Gathwala et al., 2008).

This paper relates to several branches of the literature on Early Childhood Interventions (ECI). First, it provides further results of the KMC intervention compared with the traditional NICUs treatment. Our results align with previous contributions showing that KMC has similar health and cognitive results on children's health (Conde-Agudelo and Díaz-Rossello, 2016; Charpak et al., 2017; Cortés et al., 2022). On top of that, KMC has some other unexpected gains compared to incubators, mainly on bonding and attachment (Whitelaw and Sleath, 1985; Tessier et al., 1998). Second, it is also related to research on interventions targeting low birth weight's effects like that of Bharadwaj et al. (2013) who study the effect on test scores; in this paper we expand on the outcomes considered. Third, our paper is related to research aimed at unveiling the mechanisms behind the effects of early childhood interventions (ECI). There is evidence that ECI impact both cognitive and socio-emotional dimensions of child development. However, the most long-lasting effects seem to be observed in the latter rather than on the former.

Evidence of long-run effects of early interventions is limited. However, when available, the evidence suggests that the impacts of such interventions on *externalized behavior*, such as violence or aggressive interpersonal relations, are particularly evident. This is evident for the Jamaican home visiting model (Walker et al., 2011) or parenting programs (Attanasio et al., 2020). As stated by Walker et al. (2011), understanding how to reduce these behaviors is essential for several countries suffering from an epidemic of violence, as is the case in several countries in Latin America and the Caribbean.

Within this research, studies about parental capacity and parental investments are scarce (with an exception being Attanasio et al. 2020). We show that parental capacity is a driver of skill development but only for the case of externalizing skills.

The rest of the paper is organized in six sections. After this introduction. Section 2 briefly explains what is KMC about and the main features of the RCT designed

to evaluate it. Section 3 describes the data we use, while section 4 presents our empirical strategy. Section 5 reports the main results, and section 6 discusses and concludes.

2 Background: KMC program and the 1993 RCT

Premature and low birth weight are among the main causes of high mortality, other health problems or human potential losses (Behrman and Rosenzweig, 2004; Datar and Jacknowitz, 2009; Oza et al., 2014; Royer, 2009; Torche and Echevarría, 2011). There are two protocols accepted by the World Health Organization (WHO) that try to mitigate the short, medium and long-term consequences of prematurity and low birth weight. The most traditional and more widely known protocol involves the use of Neonatal Intensive Care Units and is mainly characterized by the use of incubators until babies self-regulate temperature; it is thus *capital intenseive*. We will refer to this protocol as Traditional Care (TC). The alternative but already well-established protocol is Kangaroo Mother Care (KMC) protocol which was created in the 1970s. KMC is *parental time intensive* since it replaces incubators with 24-hour skin-to-skin contact between the mother (or other caregivers) and the newborn in an upright position; this is known as the Kangaroo position. Besides the Kangaroo position, KMC is characterized by exclusive breastfeeding and clinical monitoring. Regarding nutrition, breastfeeding is complemented with Pre-term formula and vitamin supplements only when strictly necessary. Regarding clinical monitoring, babies are followed daily until they gain 20 grams per day and then weekly until the 40th week of the corrected age.

One of the main studies about the safety and health results of the KMC protocol is a Randomized Control Trial design (RCT) conducted in 1993. The aim was, precisely, to evaluate the effect of the KMC protocol comparing it with the TC on main health outcomes (Charpak et al., 1997). In the study premature children born in 1993 and 1994 in one particular hospital[2] in Bogotá were assigned to either KMC or TC. Before entering the study, all newborns were born in delivery rooms in the hospital, received special care when needed and received the treatment needed to survive and to adapt to the extrauterine life. Once they were stabilized and adapted to the extrauterine life and accomplished the eligibility criteria, they were randomly allocated either to the TC or the KMC. The main difference between the two treatments is the assignment to the 24-hour skin-to-skin upright position with the mother or other caregivers or to NICUs; all other elements of the KMC protocol, such as exclusive breastfeeding and pediatric controls were common to both treatments (Charpak et al., 1997). Both groups of individuals are monitored weekly

[2]The San Pedro Claver clinic which was the main public hospital in Bogotá at that moment.

until 41 weeks of post-conceptional age and the, quarterly at 3, 6, 9, and 12 months of corrected age. Eligibility criteria were the following: first, the mother should understand and follow instructions. Second, the infant had overcome significant problems in adapting to extra-uterine life, gaining weight, and could suck and swallow properly. Randomization was performed using a randomized block design with four strata based on birth weight, <1200grs, 1200-1499grs, 1500-1800grs, and 1801-2000grs. This allows, by design, both treatment and control groups to be perfectly balanced concerning birth weight.[3] This study's results allowed to conclude that KMC performed similarly to the TC standard regarding mortality rates, growth, and hospitalizations (Charpak et al., 2001). Moreover, as the babies grew up, it was clear that KMC outperformed TC in some areas such as mental development (Tessier et al., 2003), and intra-households relationships were also affected, as shown by an increase of bonding (Tessier et al., 1998).

The safety of KMC and the fact that its health results are comparable to those of TC was stablished by several studies that used data of the RCT mentioned above and several other studies (Boundy et al., 2016) presents a meta-analysis to study the associations between the use of KMC and neonatal outcomes. This has led to the inclusion of KMC on the list of approved protocols to care for the aforementioned health problems. Charpak et al. (2005) presents details about the implementation of KMC and some historical facts about the origin of the protocol.

3 Available Data

In this section, we briefly describe the data we use, starting with the information available from the 2013-14 long-term follow-up of the original trial. We then discuss the data from the other waves of the study and, in particular, measures on individual skills and parental investment.

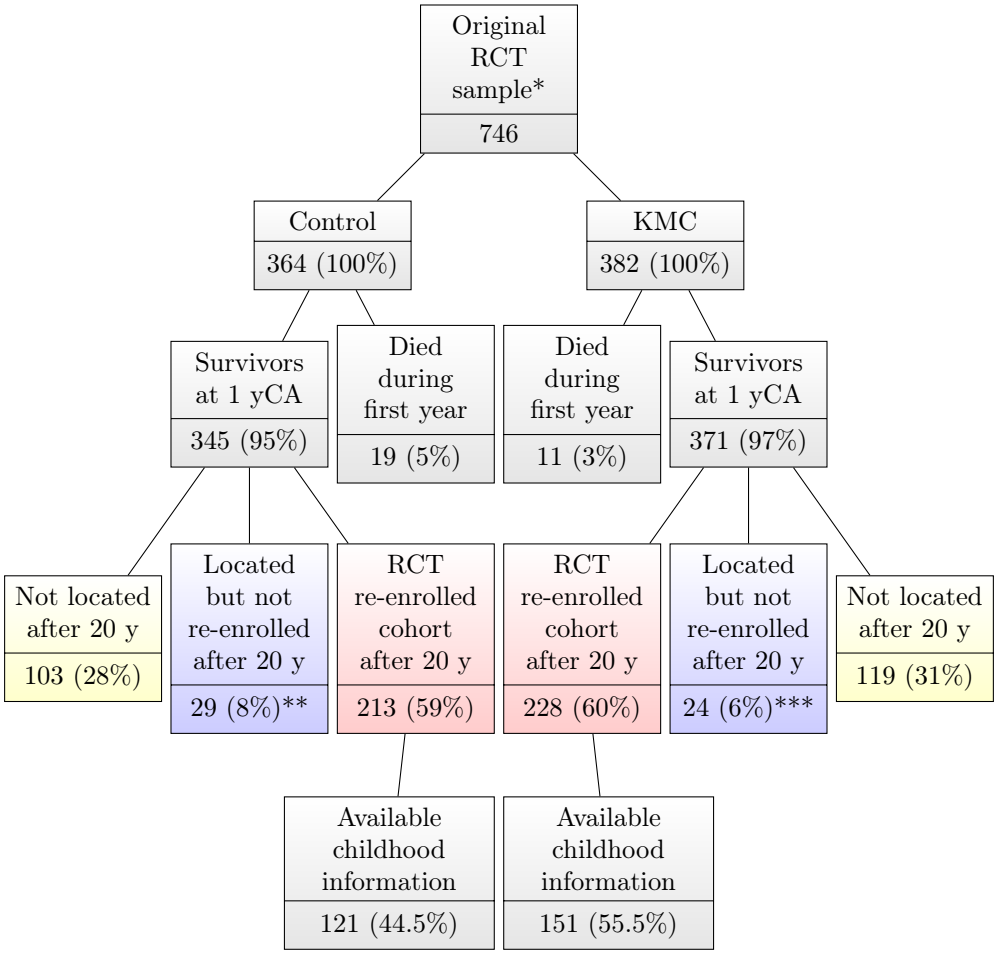
3.1 The 2013-14 KMC-RCT follow-up

For this paper, we use data from the 1993 RCT combined with data from follow-ups in 1995 and between 2012 and 2014. The data allow to follow participants in the original RCT from birth until approximately 20 years. Figure 1 shows the details of samples from birth to 20 years old. The original sample comprised 746 individuals (newborn babies), 364 in the control group and 382 in the treatment group. Of these children, 19 in the control group and 11 in the treatment group died by one year of corrected age. Between 2012 and 2014, 496 participants were recontacted, and

[3]The sample was designed to study the mortality rate at one year of corrected age. To detect a twofold (two-tailed) difference departing from an incidence rate of 10% for the control group, at a 95% of significance and 80% of power, a sample of $N = 656$ was needed.

441 were re-enrolled, 213 from the control group and 228 from the treatment group. Table 1 shows that the re-enrolled sample is balanced in terms of clinical outcomes at birth, as well as their enrollment in the treatment and control groups. Nevertheless, it comprises more educated and older parents with a 13% larger income.

Figure 1: Path From Birth to 20 Years of the Re-enrolled Cohort



The number in parentheses is the percentage with respect to the total of newborns in each subgroup: Control and KMC.
*1084 newborns weighing more than 2000 grams were considered at the beginning of the study. From these newborns, only 748 were included in the RCT; the remaining 338 newborns were non-eligible because of malformations or pathologies (52), were transferred to another clinic (129), or died before randomization (157).
**Two died before reaching 20 years, 22 refused to participate, and 5 were out of scope.
***One died before reaching 20 years, 19 refused to participate, and 6 were out of scope.
This information is taken from Charpak et al. (2017)

Table 1: Difference in means in pre-treatment characteristics, between follow-up and no follow-up individuals (for those that have data available).

	Follow-Up		No Follow-Up		Mean		
Variables	N	Mean	N	Mean	Coeff	p-val	pwyoung
Girl	441	0.56	305	0.53	0.027	0.473	0.988
Age of the mother	441	27.75	304	26.60	1.147	0.009	0.109
Mother Education: Primary or less	441	0.20	302	0.26	-0.063	0.045	0.366
Mother Education: Secondary	441	0.55	302	0.58	-0.027	0.460	0.988
Mother Education: Above Secondary	441	0.26	302	0.17	0.091	0.002	0.031
Father Education: Primary or less	441	0.20	303	0.21	-0.012	0.700	0.993
Father Education: Secondary	441	0.55	303	0.59	-0.041	0.269	0.925
Father Education: Above Secondary	441	0.23	303	0.16	0.072	0.013	0.146
HH income per capita in 1000 COP, 1993	439	87.33	304	76.83	10.494	0.007	0.087
Multiple pregnancy	439	0.17	301	0.21	-0.043	0.145	0.760
Weight at birth (grs)	441	1715.05	305	1727.23	-12.184	0.526	0.988
Gestational age (Ballard)	441	33.78	305	33.76	0.021	0.916	0.993
Weight at eligibility age (grs)	441	1691.72	305	1706.67	-14.949	0.372	0.967
Age at eligibility	441	35.00	305	34.98	0.015	0.924	0.993
Hospitalized in neonatal period	441	0.61	305	0.62	-0.009	0.811	0.993
KMC Treated	441	0.52	304	0.51	0.010	0.780	0.993

Notes: pwyoung: Westfall and Young (1990) adjusted p-values free step-down resampling methodology with 1,000 repetitions.

We consider only observations for which information on gender, multiple pregnancy, if has older siblings, age of the mother, mother's education level, and income per capita in 1993, which we use to control for heterogeneity, are available. In addition, we consider only individuals for whom we can construct at least one of the skills or investments in adulthood. Thus, the re-enrolled sample was reduced to 429 observations out of 441 who were re-enrolled individuals at the 20-year review. The sample is further restricted according to the availability of childhood investment information. With this additional restriction, we work with the 272 observations presented in the bottom boxes of Figure 1.

Pre-treatment characteristics for the final analysis sample are reported in Table 2. As we see there, except for weight at eligibility, multiple pregnancy, and the fraction of fathers with education above secondary, both groups are balanced in the follow-up sample. On average, gestational age is approximately 33 weeks in both groups, and one week and a half later are eligible to enter into the RCT. Between birth and eligibility, both groups of children lose weight on average. Weight loss is larger in the KMC group, and the difference becomes significant.

Table 2: Pre-treatment characteristics.

	KMC		TC		Difference of means		
Variables	N	Mean	N	Mean	Coeff	p-val	pwyoung
Girl	151	0.52	121	0.56	-0.039	0.525	0.996
Age of the mother	151	27.42	121	28.43	-1.006	0.166	0.889
Mother Education: Primary or less	151	0.15	121	0.21	-0.054	0.251	0.953
Mother Education: Secondary	151	0.58	121	0.55	0.031	0.614	0.996
Mother Education: Above Secondary	151	0.27	121	0.25	0.024	0.660	0.996
Father education no-info	151	0.03	121	0.02	0.017	0.375	0.988
Father Education: Primary or less	146	0.17	119	0.20	-0.030	0.530	0.996
Father Education: Secondary	146	0.53	119	0.61	-0.086	0.160	0.889
Father Education: Above Secondary	146	0.30	119	0.18	0.116	0.027	0.346
HH monthly income per capita at 1993 (USD of 2018)	151	229.92	121	209.70	20.221	0.218	0.939
Number of personal injury reports, $r = 500$ m	147	0.02	117	-0.06	0.088	0.472	0.991
Multiple pregnancy	151	0.20	121	0.10	0.100	0.020	0.297
Has older siblings	151	0.46	121	0.51	-0.055	0.365	0.988
Has family history of mental disorders	151	0.16	121	0.17	-0.015	0.749	0.996
Weight at birth (grs)	151	1700.76	121	1746.61	-45.850	0.138	0.855
Gestational age (Ballard)	151	33.70	121	33.80	-0.100	0.737	0.996
Weight at eligibility age (grs)	151	1664.01	121	1725.12	-61.117	0.031	0.376
Age at eligibility	151	34.93	121	34.85	0.080	0.751	0.996
Hospitalized in neonatal perio	151	0.68	121	0.56	0.120	0.043	0.479
Acute Fetal Distress	151	0.50	121	0.49	0.016	0.798	0.996

Notes: pwyoung: Westfall and Young (1993) adjusted p-values free step-down resampling methodology.

3.2 Individual skills and parental investments

In this study, we use data from three periods: first, information *at birth*, when newborns were allocated into treatment and control groups; second, information collected during the first year of life (*Early Childhood*); and third, information collected in the long run followup, when the subjects were between 19 and 20 years of age (*Adulthood*).

At birth, a first set of variables are available to measure the overall health situation of the newborn: height, weight, gestational age, presence of acute fetal distress, whether the newborn was hospitalized or not, the total number of hospitalization days, whether the newborn was in a neonatal UCI, and whether the mother suffered toxemia.

During early childhood, we use three sets of variables: anthropometrics, parental investments and abilities. Anthropometric measures were collected at 3, 6, 9 and 12 months after birth and are used to estimate a *health* factor. Parental investments are captured through a compound of measures that document and summarize the degree to which the household environment and parenting practices promote child development. This information is obtained using the *Home Observation Measurement of the Environment* (HOME) inventory (0-3 years) (Caldwell et al., 1984), which involves an interview and an observation of parent-child interaction. The HOME inventory

is composed of six sub-scales (Parental Responsivity, Acceptance of Child, Organization of the Environment, Learning Materials, Parental Involvement, and Variety in Experience). Unfortunately, the HOME inventory was administered to a smaller sub-sample at one year of age, including some children for which there are no anthropometric measures. As we mentioned above, this omission limits the size of the sample we can use for some of our analysis substantially.

Finally, we have data that capture the abilities of children captured with the *Griffiths Mental Development Scale* (Griffiths). It was administered to a subset of the respondents, both at 6 and 12 months of age. It consists of a set of exercises summarized in 6 scales: locomotor, personal-social, hearing and language, eye and hand coordination and performance. These variables correspond to what we label as the *cognitive skills* factor.[4]

In young adulthood, for our analysis, we use two sets of variables: parental investments and abilities.[5] For parental investments, we have data captured using the early adolescent HOME inventory (2003 version). This inventory contains 60 questions organized in seven sub-scales (Physical environment, Learning materials, Modelling, Fostering self-sufficiency, Regulatory activities, Family companionship and Acceptance).

The data on different types of abilities at 19-20 years is richer than those available at early childhood. They comprise cognitive skills, internalized and externalized socio-emotional characteristics. Cognitive abilities at young adulthood are captured through three instruments. A first instrument is the second edition of the *Wechsler Abbreviated Scale of Intelligence* (WASI-II), which measures the Intelligence Quotient (Verbal, Performance and Global IQ) and is developed by Pearson (2015). It involves indicators of vocabulary, similarities, block design and matrix reasoning. The second instrument is the neuropsychological computer-based system, the *Test of Attentional Performance 2.3* (TAP), designed by Zimmermann and Fimm, is directed to capture the ability to concentrate and recall details of practical situations which are key to minimize errors. It has measures on working memory, divided attention, alertness, among others (Psytest, 2015). The third instrument is the *California Verbal Learning Test - Second Edition* (Delis et al., 2000, CVLT-II), which aims to measure verbal memory and learning capabilities.

Turning to socio-emotional ability, we follow the literature and distinguish between *externalizing* and *internalizing* skills. The former are captured by indicators of depression, anxiety, somatic and avoidance. The latter are measured by indicators of

[4]We do not have access to the original Griffiths responses, but to five components derived from them (Charpak et al., 2001). For this reason, in the Appendix we consider a version of the main model estimates with these indexes directly, rather than using our summary variable.

[5]The database has also information on health at 20 years, but we do not use it, since the study's focus is on abilities.

hyperactivity, inattention, and antisocial behavior. This information was captured with the *Adult Behavioral Checklist* (ABCL), designed by the Achenbach System of Empirically Based Assessment (ASEBA) for individuals aged 18-59 years (ASEBA, 2015). It is a well-established measure in the field of psychology which is assessed from those individuals close to the studied subject (friends and family).

We also include a self-administered version, Adult Self-Report (ASR). An important feature of the instrument is that it also includes the classification of respondents in categories of mental illness which are constructed in order to be consistent with the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5).

Our estimates of the entire measurement system are based on the sample of 272 observations (based on the availability of childhood investments). Yet, each construct could be derived using more data. For instance, the externalized behavior factor can be estimated using 431 observations, even though for some of them there is no information on childhood investments. In Table A1 in the appendix, we show that the correlation of the measures derived using the main sample and the largest potential alternative is very high. Moreover, the estimated impact of KMC on these variables is unaffected by the sample used to estimate the measurement system.

4 Empirical Strategy

In this section, we describe our empirical strategy. We start, in section 4.1, by describing the way in which we use the available measures to estimate the latent factors representing the outcomes of interest and the potential mediators we consider in our analysis.

When we estimate the measurement systems relating the available measures to the latent factors of interest, we let the distribution of the latter to be a function of observable, including the intervention we consider. Therefore, a by-product of this analysis, which we briefly discuss in section 4.2, are the long run impacts of the KMC intervention.

Finally, in section 4.2, we discuss a structural model and how we estimate it to perform a mediation analysis that allows us to uncover the mechanisms through which KMC obtains the observed impacts.

4.1 Measuring individual skills and parental investments

The measures available in our data set are made of a large number of items, which are often either binary or discrete, with a small number of possible outcomes. The challenge we face is to reduce the multidimensionality of the available measures (such as the Griffiths and the HOME) and to synthesize these wealth of measures in

effective estimates of the latent factors of interest. In particular, we are interested in a number of latent factors at two points in the life cycle (early childhood - 12 months - and young adulthood -19-20 years). Such latent factors are a set of outcomes that represents human development (which we label dimensions of development) and a number of possible drivers of such outcomes (which we label parental investment). In addition, we also want to summarize the information we have at birth.

To tackle this challenge, we first need to establish how many factors we can identify at each age and for each type of variable of interest (dimensions of development or drivers of development). We then need to use the available measures to estimate such factors. The strategy we use is slightly different for outcomes and their drivers, partly because of the nature of the data available.

To provide estimates of such individual skills and parental investments from a pool of items (questions in the instrument) that involve cognitive, academic, personality, and behavioral characteristics we follow Attanasio et al. (2020) and Heckman et al. (2013) who estimate a dedicated measurement system (Gorsuch, 2003), that is we assume that each latent factor leads on one of the available measures.

The approach we follow, therefore, uses information from $K^{\eta_t^j}$ measures (questions) to estimate the latent factor η_t^j of interest. The individual measures that capture latent factor η_{it}^j are denoted m_{it}^{jk} (with $t \in \{1,2\}$, $k \in \{1,...,K^{\eta_{it}^j}\}$). To be clearer, the superscript j for individual i refers to questions within the HOME inventory for period t when the relevant latent factor is a dimension of parental investment and to questions within the tests measuring individual development discussed below otherwise. In particular, the relationship between measures m_{it}^{jk} and latent variables $\ln(\eta_{it}^j)$ is modeled as follows:

$$m_{it}^{jk} = v_{tk} + \varphi_{tk}\ln(\eta_{it}^j) + \beta' z_{it}^{kj} + \phi_{tk}; \qquad \forall k \in \{1,...,K^{\eta_{it}^j}\} \tag{1}$$

where the η_{it}^j is the factor to be estimated, v_{tk} is a measure-specific intercept, and where z_{it}^{kj} is a vector of observable variables, including an indicator of KMC treatment. ϕ_{tk} is a classical and additive measurement error, which we assume to be *iid*, normally distributed with mean 0 and sample variance $\sigma_t^{m(j)}$. The age and measure specific parameter φ_{tk} is the loading factor that represents the importance of factor j for measure k. Given that the factors are latent variables, identification requires normalization on the location and scale (Anderson and Rubin, 1956; Heckman et al., 2013). For each factor j, we set one of the factor loadings φ_{tk} to 1 and the mean of all factors to 0 (location).

4.1.1 Measurement of Individual Skills and Health

As mentioned above, in addition to the information on outcomes at 12 months and 20 years, we also use information on a variety of indicators about the physical

conditions of newborns. To summarize this information, we estimate a latent factor grouping data on height and weight at birth, gestational age, records of acute fetal distress and toxemia, and information on hospitalization and usage of intensive care. We also add information on both weight at 3, 6, 9, and 12 months of age.

As for the developmental outcomes at 12 months, we only have information on cognitive development, which we take from the Griffiths instruments that were used at the time. We keep the original structure and factor models used in Charpak et al. (2017).

In young adulthood, we follow the literature and assume that there is one cognitive factor and two socio-emotional factors, which we label as internalizing and externalizing skills. Given this assumption, we follow a standard confirmatory factor analysis. In particular, we group together the scales constructed by the KMC team and estimate three factors, representing cognitive skills, externalizing and internalizing socio-emotional skills. For cognitive skills we use cognitive skills estimated from information on the WASI, CVLT, and TAP instruments, obtaining a Cronbach's alpha of 0.6587.

We estimate the externalizing behavior factor from the constructs capturing hyperactivity reported by the best friend, antisocial behavior from ABCL reported by the individual and the best friend, and hyperactivity and defiance from the Conners self-reported instrument. We exclude parents' reports, since they may measure parents' knowledge about their children, We also exclude deficit attention, since it is not only related to externalized skills. The resulting externalized behavior factor is calculated and yields a Cronbach's alpha of 0.7490.

Next, we estimate a factor representing internalizing behavior using the four ABCL measures (depression, anxiety disorder, somatic, avoidance). In this case, we use both self-reported and information reported by the best friend. This procedure yields a Cronbach's alpha of 0.7237.

4.1.2 Measurement of Parental Investments

The identification and estimation of the factors representing parental investment is more complex, both because we need to establish the number of factors we want to use and because of the large number of items available in the tests we use. Our approach, described in the Appendix, is made of five steps.

The HOME inventory is composed of a set of 60 binary items. The first step in our procedure consists of aggregating the individual *discrete* items in a number of *continuous indexes*. In particular, in early childhood, we use the six subscales in which the HOME test is divided to assign individual items to one of six factors. Given this assignment, rather than computing the subscales using the HOME algorithm, we estimate six measurement systems to extract continuous subscales in

each of the two time periods. We adopt this procedure to capture the fact that the importance of certain measures to capture a given factor might be different in the specific context in which we operate.

Having obtained these continuous factors, we proceed with an exploratory factor analysis to further reduce the dimension of *parental investment.* This procedure led us to identify two factors representing parental investment during early childhood, with the first factor including the items in the subscales representing responsivity, learning materials, involvement, and variety. The second factor, instead, included items from the subscales representing acceptance, and organization.

In young adulthood, we follow a similar approach, but use seven subscales in the first step. When, in the second step we use the seven continuous indexes to further reduce the dimension of investment, the exploratory factor analysis yields three factors. The first includes the physical environment, learning materials, and modeling subscales, the second regulatory activity, family companionship, and acceptance; and the third foster self-sufficiency.

Having established the number of factors and the measurements that are loaded to them, we go back to the individual items and use this structure to estimate IRT-2PL models to extract the estimates of the relevant factors we use in our analysis. In this last step, as we did for the outcomes, we let the mean of the factors to be influenced by a number of observable variables, including an indicator of KMC treatment.

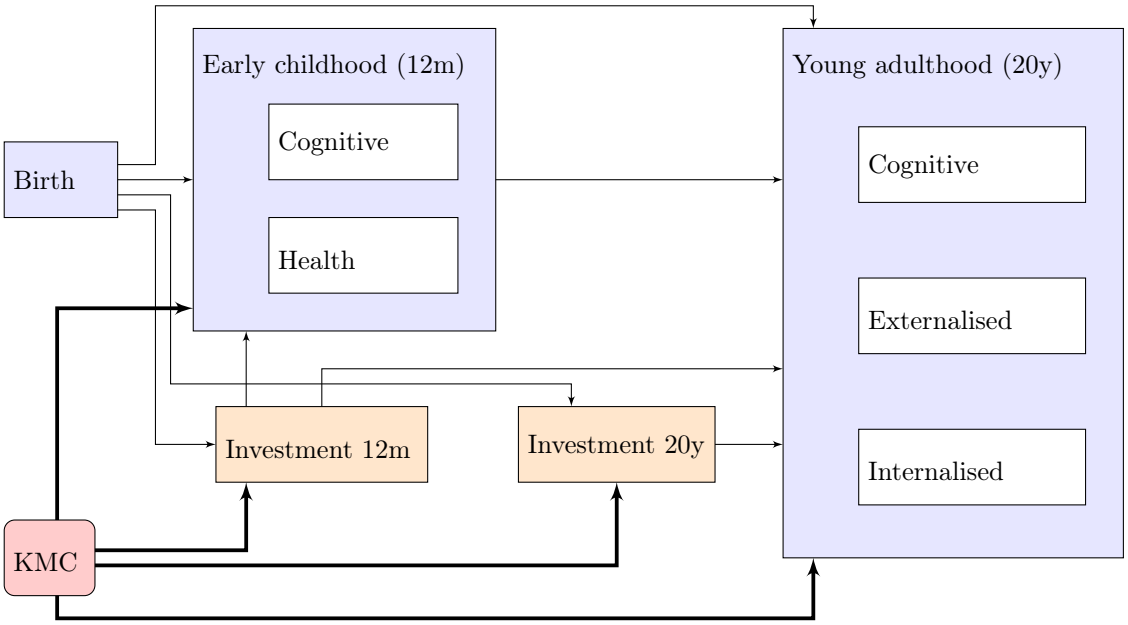
4.2 Skills formation model and mediation analysis

To identify the drivers that can explain the impact that the KMC intervention has on young adulthood outcomes, we focus on a specific mechanism (parental investments during the early years), and a some specific outcomes (cognitive and socioemotional abilities). Our structural model follows the conceptual framework summarized in Figure 2. We assume that parents care for their children's skills, although we do not explicitly model parents' objective function. However, we implicitly assume that parents want to to mitigate risks from school violence, and the capabilities to lead a purposeful life or success in the labor market in adulthood. Parental investment might also affect (positively or negatively) parents utility directly. As parental investment has a time component, it affects parental time allocation and therefore can imply a cost.

We assume that an initial set of individual and family characteristics and variables are associated with health status and skills. These initial endowments are translated into early childhood skills (at 12 months) in conjunction with household investments. The KMC program can affect the 12 months outcomes or parental investment. Early childhood skills, along with parental investments later in life (which

can also be impacted by KMC), result in a final set of skills in young adulthood (at 20 years of age).

Figure 2: Model sketch: potential channels



The model we consider is made of two sets of equations. The first set relates the outcomes of interests, as represented by a vector of latent factors, to lagged values of the same, to parental investment and to other variables (possibly including the KMC program) both observed and unobserved.

$$\theta_{i1}^{h} = \theta_{i}^{0\gamma_{1h0}} * \prod_{j=1}^{J_1} (I_{1j}^{i})^{\alpha_{1h1j}} * e_{1}^{\psi_{1h}^{i}} \qquad \forall h \in \{1, ..., H_1\} \tag{2}$$

$$\theta_{i2}^{h} = \theta_{i}^{0\gamma_{2h0}} * \prod_{\tilde{h}=1}^{H_1} (\theta_{i1}^{h})^{\gamma_{2h1\tilde{h}}} * \prod_{j=1}^{J_1} (I_{i1}^{j})^{\alpha_{2h1j}} * \prod_{j=1}^{J_2} (I_{i2}^{j})^{\alpha_{2h2j}} * e^{\psi_{2h}^{i}} \qquad \forall h \in \{1, ..., H_2\} \tag{3}$$

where θ_{it}^{h} is the outcome factor h at period t and I_{it}^{j} is the investment factor j at period t, which can be early childhood ($t = 1$, or 12 months) or early adulthood ($t = 2$, or 20 years). ψ_{th}^{i} is given by:

$$\psi_{th}^{i} = A_{th}^{i} + \kappa_{th}^{i} + \varepsilon_{th}^{i} \tag{4}$$

The first component in 4, A_{th}^{i}, includes all observable individual and family variables such as mother's education, gender, the presence of older siblings, the mother's age and multiple pregnancies. The second and third terms, together, capture unobserved shocks, skills and investments; κ_{th}^{i} is potentially correlated with observed investments, and $\varsigma_{t,h}^{i}$ captures idiosyncratic shocks (uncorrelated with the investments).

Equations (2) and (3) represent the 'production functions' of human development in the two periods, which in our model are assumed to be Cobb-Douglas in the various inputs considered. In the empirical application below, we will focus on the second period, represented by equation (3).

The second set of equations specifies the determinants of parental investment, again both observed and unobserved, which can be related to the unobserved components of the outcome equation.

$$\ln(I_{1j}^i) = \beta_{1j0} + \beta_{1j1} Z_1^i + \beta_{1j2} \ln(\theta_0^i) + \varpi_{1j}^i \qquad \forall j \in \{1, ..., J_1\} \tag{5}$$

$$\ln(I_{2j}^i) = \beta_{2j0} + \beta_{2j1} Z_2^i + \beta_{2j2} \ln(\theta_0^i) + \sum_{h=1}^{H_1} \beta_{2j3h} \ln(\theta_{1h}^i) + \varpi_{2j}^i \qquad \forall j \in \{1, ..., J_2\} \tag{6}$$

These equations can be derived, with some assumptions on parental preferences and resources constraints from a maximization problem parents face when choosing to allocate resources between individual consumption and leisure and investment in child development. The possibility that the unobserved components of investment are correlated with the unobserved component of the production function makes parental investment endogenous, which in turn makes it difficult to identify its causal impact on the outcomes of interest.

The equations above assume that both the outcome and the investment functions are log-linear in their arguments, which is consistent with the specifications that would be generated by some specific assumptions about the parents' objective function and the production function of human capital. Such specifications, however, impose strong assumptions, such as the unitary elasticity of substitution across different inputs.

In the first period considered (12 months or $t = 1$) the observable variables we consider are mostly parental background items, including mother's education. At $t = 2$, (or 20 years) we also include a family history of mental illness, as this is relevant to the behavior disorders captured by the internalized and externalized skills. Furthermore, in adulthood, past income influences the family's potential income and, thus, parents' available time to interact with their children.

In the equations above, Z_1^i are variables that are assumed to enter the investment equations but are excluded from the outcomes equations, so that they can be used as instrument to identify the causal impact of parental investment on the relevant outcomes. We consider as instruments of early childhood investments father's education and household's income-per-capita at birth. We argue that these characteristics –predetermined at the time of the investment choices– are valid instruments.

4.3 Estimation

We estimate the measurement system and the structural model jointly via maximum likelihood. As the samples for the measurement systems differ, we include all available data and assume 'missing at random'. Hence, we follow a Full Information Maximum Likelihood approach (Rosseel, 2012).

In practice, we are assuming all disturbances to be jointly normally distributed, conditional on exogenous variables. Observations are grouped according to missing data patterns, and the log-likelihood of the observed information for each group is computed. Finally, the log-likelihood of all patterns is added-up. In other words, each observation contribution to the likelihood corresponds only to its available information.

Endogeneity is considered directly in the ML approach by allowing disturbances ε_t^i to be correlated with ϖ_t. This is equivalent to a control function approach. Standard errors are calculated from the information matrix using White-Huber robust standard errors.

A remaining concern is non-random attrition. Using the same data, Cortés et al. (2022) applied an inverse probability weighting to correct for non-random attrition (Busso et al., 2014). We follow these authors with parallel exercises to check for the robustness of our results. Moreover, because of the 11 respondents with no information on investment, health, and skills at 12 months, we estimate the measurement systems of early childhood and young adulthood separately.[6]

If we find an impact on a given skill in adulthood, we can decompose the channels by determining if there are impacts on skills in childhood and investments in both childhood and adulthood. We can determine whether there is empirical support for a channel using a mediation analysis by estimating alternative versions of the model. Our main interest is the mediation analysis to understand how parental investments affect individual skills *through* the KMC intervention. Therefore, we concentrate only on those parental investments and individual skills that are causally affected by KMC according to the results of second step. For this reason, we take a simpler route. Rather than estimating the full-scale model, we estimate different versions in which certain links between variables (arrows in Figure 2) are activated following the results of the estimation of the impacts (from step 2 above).

[6] An alternative is to consider the sample that has complete information on all measurements in all three sets. In such a scenario, only 156 observations would be available. Our sample of 429 potentially reduces further to 418 observations, if we restrict ourselves to the individuals with variables that allow the construction of childhood and adulthood factors, but not necessarily information on childhood investment.

5 Results

In this section, we report our results, which we obtain, as discussed above, by estimating jointly the measurement system (which also delivers the impacts on outcomes and mediators of interest and the extend to which the outcomes of interest depend on certain controls) and the structural model we estimate. We start discussing the extent to which initial skills (and other variables) are predictive of young adulthood outcomes. We then report the impact that the KMC program had on several outcomes and possible mediators. Finally, we report the results obtained estimating the structural model and perform a mediation exercise with the goal to identify the mechanisms through which the program obtained certain long run effects.

5.1 A descriptive analysis of the dynamics of skills formation

Table 3: The predictive value of early childhood skills

	(1) School Violence	(2) Externalised (R)	(3) Internalised (R)	(4) Cognitive
Cognitive 12m	0.035	-0.177***	0.114	0.335***
	(0.065)	(0.065)	(0.121)	(0.110)
Health 12m	-0.079	0.088	0.003	0.549***
	(0.112)	(0.136)	(0.212)	(0.174)
Health at birth	0.012	-0.067	0.171	0.448***
	(0.100)	(0.114)	(0.179)	(0.167)
Mother Education: Secondary	-0.032	0.034	0.094	0.032
	(0.082)	(0.104)	(0.160)	(0.153)
Mother Education: Above Secondary	-0.106	0.007	0.218	0.341**
	(0.092)	(0.115)	(0.173)	(0.168)
Girl	-0.156**	0.122	-0.254**	-0.188
	(0.074)	(0.085)	(0.124)	(0.131)
Weight at elegibility age (grs)	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Multiple pregnancy	-0.093	0.084	0.233	0.070
	(0.072)	(0.094)	(0.145)	(0.143)
Has older siblings	-0.023	0.090	0.099	-0.063
	(0.063)	(0.072)	(0.115)	(0.116)
Mother age	0.002	-0.008	0.005	0.006
	(0.005)	(0.007)	(0.010)	(0.009)
G: below 1801grs and hospitalized	0.111	-0.113	-0.026	-0.003
	(0.098)	(0.127)	(0.190)	(0.183)
G: 1801-2001 grs	0.086	-0.151	-0.112	-0.254
	(0.090)	(0.131)	(0.189)	(0.181)
Constant	0.106	0.218	0.486	0.717
	(0.453)	(0.556)	(0.809)	(0.752)

Notes: The three models were jointly estimated under maximum likelihood with the measurement system for skills in childhood and young adulthood (N=272, assuming missings at random). (R) Reversed scale so a higher value refers to a 'better' behaviour. Significance: * 0.1, ** 0.05, *** 0.01

We present some descriptive evidence about the associations between the outcomes measured during early childhood and those measured in young adulthood. These results are reported in Table 3. As we discussed above, at age 20, the outcomes of interest we consider are cognitive skills and externalizing and internalizing

socio-emotional skills. At age 12 months, we have information on the health factor, the cognitive factor, health at birth and a variety of other variables. In the first column of Table 3, we report the results for externalizing socioemotional skills. We notice that cognitive skills are strong predictors of such socio-emotional skills, although, perhaps surprisingly, the coefficient is negative. None of the other variables considered attracts a coefficient significantly different from zero.

In the second column of Table 3 we report the results for internalizing skills. We find that this skills are not very predictive. The only variable with a coefficient significantly different from zero, is the gender dummy, indicating that girls have lower values of the internalizing skill factor.

Finally, in the third column, we report the results for cognitive skills at age 20. In this case, we find that cognition at age 12 moths, along with health at 12 months and health at birth all attract a positive and significant coefficient. At the same time, an indicator for mother's education is also significant and positive.

To summarize this Table indicates that early conditions in the first year of life, are predictive of long run development. This is particularly true for cognitive skills and externalizing socio-emotional skills. Internalizing skills at 20, at least the way they are measured in this context, are not predicted by early cognition, health or other background variables.

5.2 KMC impacts on skills and investments

As discussed above, the impact of the KMC interventions on the various factors considered are obtained as a by-product of the measurement system, where the mean of the factor η_{it}^h is determined by the following equation:

$$\eta_{it}^h = \beta^{ht} Z_{it} + \delta^{\eta_{it}^h} \text{KMC}_i + u_i \tag{7}$$

for individual factor h or in period $t \in \{1, 2\}$ (η_{it}^h represents either the I_{it}^j or the θ_{it}^h), conditional on the set of covariates Z^i. These include weight blocks used in the randomization and variables for which the sample was unbalanced at baseline (multiple pregnancies and weight at eligibility). Other variables, such as the gender or age of the mother, are also included, possibly to improve the estimates' precision. The parameters of interest are the average treatment effects $\delta^{\eta_{it}^h}$, that are identified by the RCT design.

The entire system of equations (measurement in 1, and impact in 7) are jointly estimated for each period t using maximum likelihood. To consider multiple hypothesis testing, we derive as well p-values from the Romano-Wolf procedure (Romano and Wolf, 2005). In the appendix, we present an alternative estimation procedure using predicted factors from 1.

Panel A of Table 4 presents the estimated impacts of the intervention on skills in young adulthood. In addition, in Figure 4, we plot the distribution of the predicted skills. There is evidence of an improvement in externalizing skills equal to 0.177 of a standard deviation, which is strongly significant. A Kolmogorov-Smirnov test shows as well a different distribution for this skill between KMC and the control (p-val=0.013).

The improvement in externalizing skills is also reflected in a reduction in involvement in violent episodes at school, which is equal to 0.159 and is strongly significant. We find no evidence of a significant impact of KMC on internalizing or cognitive skills.

With respect to young adulthood investments, we find no impact of KMC. We report these results in Table A3 in the Appendix.

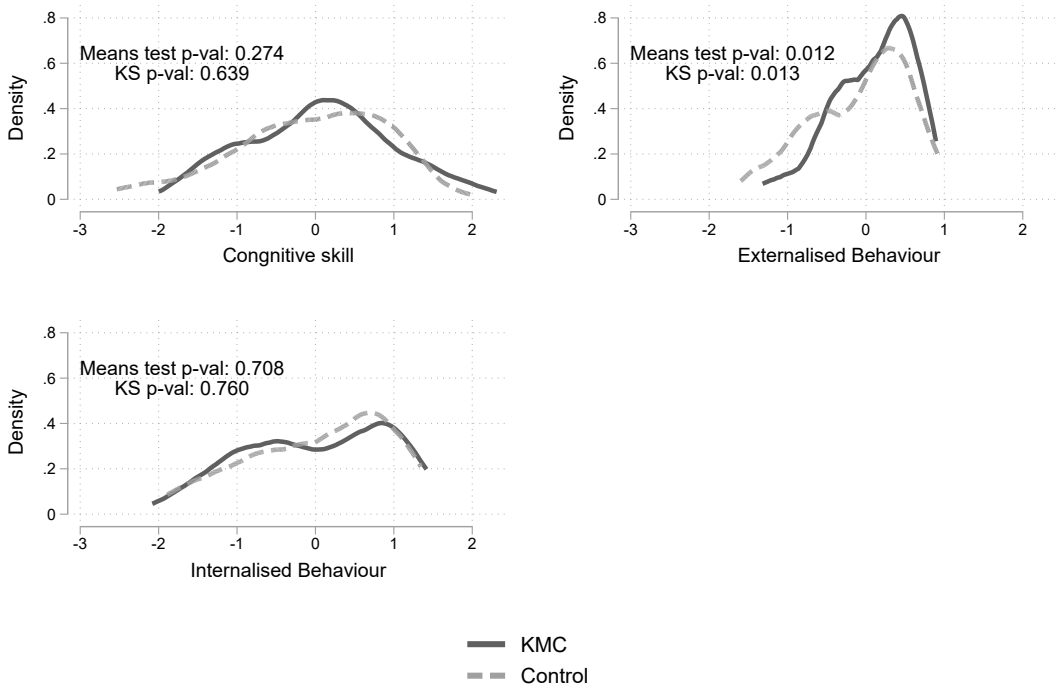
For childhood, Panel B of Table 4 shows no evidence of differential means of health or cognitive skills between treatment and control groups. As for the investments, we find a 0.22 of a SD impact on the first factor of investment. However, a Kolmogorov-Smirnov test shows no evidence of a differential distribution for this variable (p-val=0.198). We do not find any impact on the second component of investment

Table 4: KMC impacts

Panel A. Young adulthood				
	School violence	*Skills at 20y:* Externalised (R)	Internalised (R)	Cognitive
	(1)	(2)	(3)	(4)
KMC Treated	−0.159***	0.177**	−0.075	0.142
	(0.057)	(0.074)	(0.114)	(0.111)
E[Y|T=0]	0.4	-0.194	0.003	-0.32
SD[Y]	0.465	0.546	0.868	0.903
IQR[Y]=p75-p25	1	0.838	1.404	1.353
Impact SDs	-0.342	0.324	-0.087	0.157
Romano-Wolf P-val	0.038	0.067	0.574	0.279
Panel B. Early childhood				
	Skills at 12m: Health	Cognitive	*Investments at 12m:* Home Z1	Home Z2
	(1)	(2)	(3)	(4)
KMC Treated	0.001	0.111	0.222**	−0.034
	(0.035)	(0.076)	(0.104)	(0.088)
E[Y|T=0]	-0.088	-0.216	-0.134	-0.134
SD[Y]	0.342	0.486	0.909	0.909
IQR[Y]=p75-p25	0.466	0.515	1.17	1.17
Impact SDs	0.004	0.204	0.277	-0.038
Romano-Wolf P-val	0.849	0.258	0.054	0.618

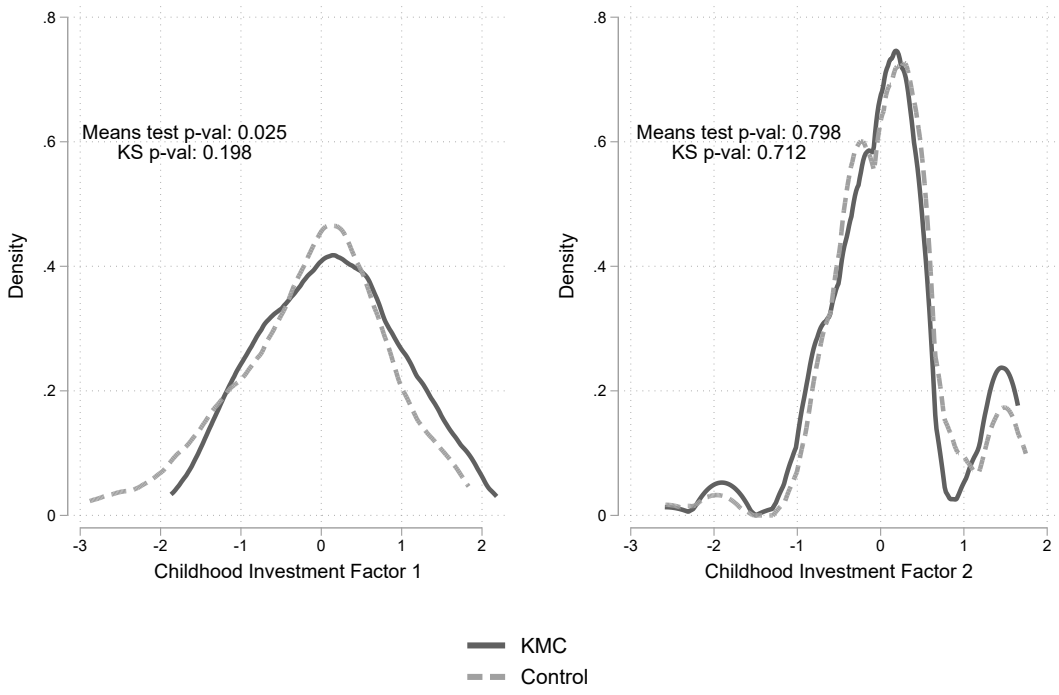
Notes: Regressions include as controls the weight at eligibility, the mother's age at birth, and dummies for: RCT blocks (block 1 [B], block 2, block 3), mother education (primary [B], secondary, tertiary), the presence on information on the father, whether the individual is female, if the child was birth from a multiple pregnancy, and if the child has older siblings. Romano-Wolf p-values are computed after 1,000 replications, jointly considering the three skills in young adulthood. (R): reversed scale, so a higher value is a 'better' behavior. Significance based on robust standard errors (in parentheses): *p<0.1; **p<0.05; ***p<0.01.

Figure 3: Distribution of predicted skills at young adulthood



Notes: These are the predicted latent factors from the measurement system model estimated with lavaan 0.6.

Figure 4: Distribution of predicted investments at childhood



Notes: These are the predicted latent factors from a IRT-2PL model estimated with ltm 1.1-1.

6 Understanding Impacts: A Mediation Analysis

In this section, we perform a mediation analysis using the model described above to interpret the KMC impacts described in the previous section. The most noticeable long-run impact shown in the previous section is that on externalizing skills and involvement in violence. As a possible mediator, we also notice the impact on certain types of investment during early childhood. It is on these variables and the possible relation between them we now focus.

While the version of the model we sketched in Section 4.2 is very complex, we find that many of the possible channels considered there are not active, in that the coefficients that represent them are not significantly different from zero. Furthermore, estimation of the whole model, with five different factors of investment (3 in young adulthood and 2 in early childhood) which are potentially endogenous is very challenging. Identification would require a large number of exclusion restrictions on plausible instruments. Therefore, we decided to focus on a much more restrictive version of the model, where we consider investment in childhood and its impact (among other measures) on externalizing skills in adulthood.

The model we consider, therefore, is made of two equations. The first is the production function of externalizing skills, which we allow to be a function of several inputs, including parental investment in early childhood (as represented by its first components). When including the three components of parental investment in early adulthood or the second component during childhood, none of these variables resulted significant in determining young adulthood externalizing skills, as can be verified in the Appendix. Therefore we set those parameters to zero.

The second equation is that for the first component of parental investment during early childhood. Again, as the second component does not seem to be relevant for externalizing skills during adulthood, we do not consider it. We include among the determinants of investment father's education and household income during early childhood, which are assumed not to enter the production function of externalizing skills in young adulthood, therefore allowing the identification of the parameter of early childhood investment, which consider as endogenous.

Table 5 presents the results we obtain for two versions of the model we are considering. As mentioned above, these are obtained estimating jointly the measurement system for the relevant factors and the relationships between their (conditional) means that allow to estimate the structural parameters. In Panel A, we report the estimates of two versions where different links are activated. In particular, in the second version of the model, we let the KMC indicator to affect directly externalizing skills, while in the first version of the model this parameter is set to zero.

In the production function of externalizing skills, parental investment in the

first year of life plays a big role, attracting a coefficient of 0.398, which is highly significant. When we add the KMC indicator in the second version of the model, we note that its coefficient, unlike in Table 4, is not statistically different from zero. This is an indication that parental investment in the early years seems a plausible mediator of the effect of KMC on eternalizing skills.

Panel B decomposes the observed KMC impacts into the proportion that is explained by the induced impact on parental investment and, in the second version of the model, its direct effect. We find that the mediation through investment explains 56.5% if the total impact.

Table 5: Estimates of the structural model

Panel A: Model estimates				
	Model 1		Model 2	
	Estimate	Std.Err	Estimate	Std.Err
Childhood Investment 1				
Health at Birth	-0.062	0.079	-0.059	0.083
Father Education: Secondary	0.142	0.144	0.143	0.15
Father Education: Above Secondary	0.508***	0.179	0.516***	0.186
Log income pc in 1993	0.288***	0.102	0.317***	0.104
KMC Treated ($a1$)	0.252***	0.09	0.211**	0.098
Mother Education: Secondary	0.31**	0.148	0.307**	0.149
Mother Education: Above Secondary	0.245	0.183	0.225	0.182
No information on the father	-0.705**	0.325	-0.694**	0.327
Girl	0.096	0.098	0.095	0.098
Multiple Pregnancy	-0.416***	0.136	-0.41***	0.136
Older Siblings	-0.184*	0.106	-0.176*	0.106
Age of the Mother	-0.003	0.009	-0.003	0.009
Externalised 20y				
Cognitive 12m	-0.203**	0.085	-0.202**	0.085
Health 12m	0.057	0.126	0.051	0.127
Childhood Investment 1 ($f1$)	0.398***	0.153	0.303*	0.159
KMC Treated ($f3$)			0.103	0.086
Family History of Mental Illness	-0.272***	0.104	-0.279***	0.105
Mother Education: Secondary	-0.115	0.129	-0.07	0.126
Mother Education: Above Secondary	-0.248	0.163	-0.181	0.16
No information on the father	0.472*	0.284	0.358	0.28
Girl	0.065	0.093	0.074	0.091
Multiple Pregnancy	0.224*	0.123	0.18	0.124
Older Siblings	0.226**	0.095	0.204**	0.093
Age of the Mother	-0.006	0.007	-0.005	0.007
Panel B: Effect decomposition				
Investment during childhood	0.1*	0.051	0.064	0.045
Direct effect			0.103	0.086
Total Explained Effect ($a1 \times f1 + f3$)	0.1*	0.051	0.167**	0.075
As a percentage of total impact †	56.5		94.4	

Notes: † Total impact on externalized 20y is of -0.174. Intercepts, variances, and covariances estimates of the model are omitted in the table. For the case of fathers for whom no information on their education level is available, dummies are set at 0. We included a dummy variable that indicates if this is the case (*No information on the father*=1 for 7 observations). All models are estimated over the 269 observations sample using maximum likelihood with missing at random with the R package lavaan 0.6-17. The optimization method used was NLMINB. Standard errors were derived from the Hessian matrix. Significance: * 0.1, ** 0.05, *** 0.01

Table 6 decomposes the results by gender.[7] The first column of the table reports the average, for each of the two sub-sample, for the two factors considered: parental investment and externalizing skills. We notice that the parental investment factor is considerable lower for males while the externalizing skills are higher for males. Two further results are worth noticing. First, there are large differences between males and females. The impact of KMC on women is considerably smaller than that on men and not significantly different from zero. Second, for females, the coefficient on the parental investment factor is not significantly different in the production function of externalizing skills in young adulthood. For males, instead, this factor has a large impact and, being affected by the KMC substantially (which again is not the case for females) accounts for almost 80% of the overall impact of KMC on externalizing skills.

These results suggest that, for some reasons, KMC increases parental investment in early childhood for boys but not for girls. As a consequence, the long run effect on externalizing skills in young adulthood is mainly seen in boys and not in girls. The lack of an effect in girls is compounded by the fact that, in addition to KMC not changing early parental investment for them, the latter does not seem to be particular important for externalizing skills for girls.

Table 6: Decomposition of the effect by groups

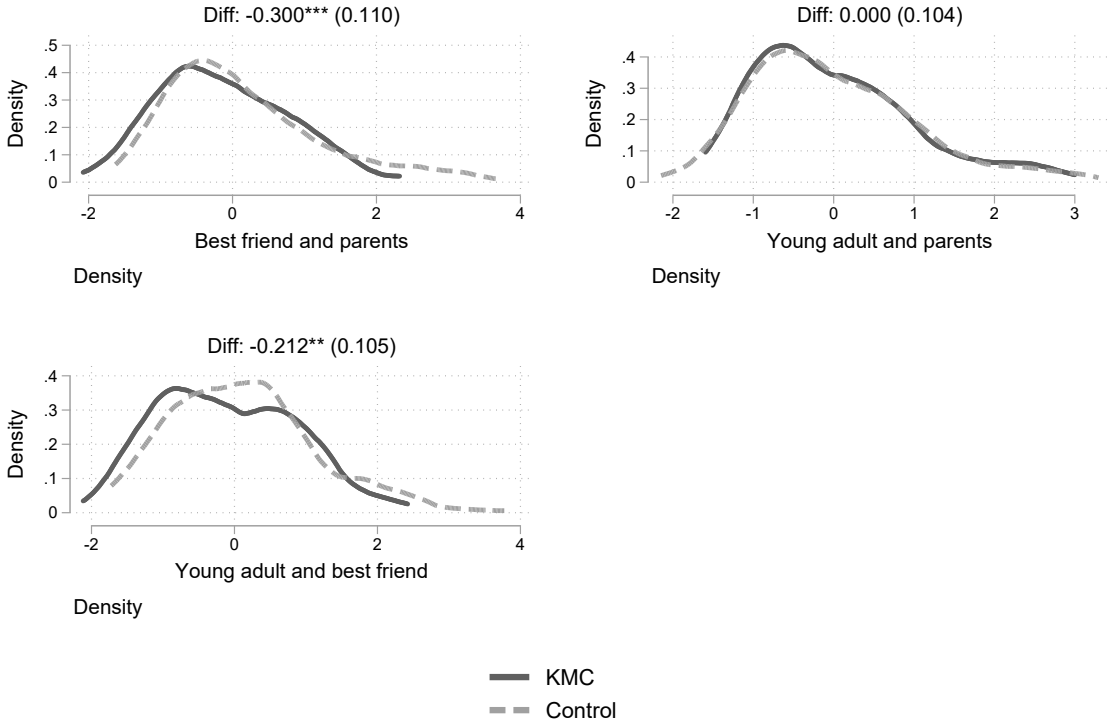
		(1)	(2)	(3)	(4)
		Model 1		Model 2	
	Average	Estimate	Std.Err	Estimate	Std.Err
Panel A. Males					
Childhood Investment 1	-0.035				
KMC Treated ($a1$)		0.303**	0.126	0.281*	0.152
Externalised 20y	0.042				
Childhood Investment 1 ($f1$)		0.573***	0.214	0.537**	0.235
KMC Treated ($f3$)				0.046	0.154
Derived effects from the model					
Investment childhood 1 ($a1 \times f1$)		0.174**	0.086	0.151	0.108
Total Explained Effect ($a1 \times f1 + f3$)		0.174**	0.086	0.196*	0.116
As a percentage of total impact (+0.22) †			78.4		88.3
Panel B. Females					
Childhood Investment 1	0.037				
KMC Treated ($a1$)		0.173	0.128	0.174	0.125
Externalised 20y	-0.042				
Childhood Investment 1 ($f1$)		0.119	0.229	0.047	0.24
KMC Treated ($f3$)				0.082	0.105
Derived effects from the model				-0.008	0.042
Investment childhood 1 ($a1 \times f1$)		0.02	0.045	0.09	0.098
Total Explained Effect ($a1 \times f1 + f3$)		0.02	0.045	0.09	0.098
As a percentage of total impact (+0.133) †			15		67.7

Notes: † Total impact on externalized 20y is computed for the specific sub-population. Intercepts, variances, and covariances estimates of the model are omitted in the table. For the case of fathers for whom no information on their education level is available, dummies are set at 0. A dummy variable that indicates if this is the case is the case (*No information on the father*=1 for 7 observations). All models are estimated over the 418 observations sample using maximum likelihood with missing at random (86 missing patterns) with the R package lavaan 0.6-11. The optimization method used was NLMINB. Standard errors were derived from the Hessian matrix. Significance: * 0.1, ** 0.05, *** 0.01

[7] In results not reported, we confirm that, even when considering different production and investment functions by gender, the impact of the second factor of early childhood parental investment does not seem to have an effect on externalizing skills in early adulthood, although for females the coefficient is larger and significant at 10%.

A remaining concern is non-random attrition. Using the same data, Cortés et al. (2022) applied an inverse probability weighting to correct for non-random attrition (Busso et al., 2014). We follow these authors and in the appendix present model estimates with such weights.

Figure 5: Differences on responses to the behaviors check list between young adults, their best friends, and their parents



Notes: Each index is the standardised result of summing up the absolute differences between each of the described groups on the ABCL areas of substance use, depressive behaviors, anxiety, somatic behaviors, avoidance, attention deficit, antisocial behaviors, inattention and hyperactivity. The difference is obtained from a linear regression of the index controlling for gender, multiple pregnancy, the presence of older siblings, education and age of the mother, weight at eligibility, history of mental disorders in the family, and the randomisation block. Standard error in parentheses, and significance is denoted as follows: * 0.1 , ** 0.05, *** 0.001. See table A4 in the appendix for the detailed regression.

7 Parental knowledge

One of the main findings of the literature devoted to the KMC program is the strengthening bonding between parents and their children. One of the potential mechanisms behind the improved externalizing skills of the youth could be attributed to this stronger connection. We can assess the importance of this bond by taking advantage of the ABCL test design that derives the same measures from different respondents: the subjects of the experiment, their parents and their best friend. The comparison of the answers of the individual, his or her best friend and his or

her parents allows us to test the accuray of parental knowledge about their own children. In addition to the internalized (depression, anxiety) and externalized (antisocial) behaviors discussed above, the test includes information on substance use, hyperactivity and attention deficit.

We compute the aggregate absolute difference of the inventory measures, between the three potential sources of information. Figure 5 presents, for KMC and control, the distribution of the standardized sum of absolute differences on the ABCL indexes according to the source of information. We find that the magnitude of the differences between respondents' perception and their parents is similar for KMC and TC groups. However, the difference between best friends and parents is smaller in the KMC group than in the control group in 0.3 standard deviations [p-val<0.001]. The same is true with the HOME measures of investment that are considered in our investment 20y indicator, which includes measures such as time spent between the children and the paternal figure, or the provision of advice regarding sexuality. The distance between best friend and young adult reports is reduced in 0.2 standard deviations [p-val<0.05].

We interpret this evidence as better knowledge of KMC parents about their children than for those in the control group. It is expected that adolescence report more behavior problems than their parents (Barker et al., 2007). There is clear evidence that better parental knowledge results in less delinquent behavior during adolescence (Laird et al., 2008). Here, the differences between best-friend and parents can be because (i) there is a differential behavior of young adults depending on their context, or due to (ii) extra monitoring behavior by parents. As we do not observe differences between respondents and their parents' perceptions, monitoring is an unlikely channel. Rather than that, it seems that the behavior of respondents outside the household becomes closer to their home behavior.

8 Discussion and Conclusions

Prematurity, with its numerous implications, is associated with limitations in behavioral and social functioning (Nosarti et al., 2010). We have shown that Kangaroo Mother Care (KMC) reduces externalizing behavior (i.e., less aggression) in young adults born prematurely. This outcome is unexpected for a technology originally designed as a cost-saving alternative to the traditional method of using incubators, a solution that has been in place for almost a century. Such improvement is reflected in important outcomes, including a one-third reduction in the prevalence of school violence participation. Moreover, it is interesting to observe that the effects on violent behavior are stronger in males than in females. This is surprising because, in most of the literature, interventions tend to yield stronger results for females

than for males (Lundberg et al., 2007; Baranov et al., 2020; Lundberg et al., 2007; Lundberg, 2005; Duflo, 2003).

We also observe that KMC has a positive effect on some aspects of parental behavior during early childhood. Again this is result is stornger for boys than girls and is translated in a sizable and significant increase in one of the factors representing 'parental investment'.

We have used a structural analysis which considers outcomes of externalizing skills in young adults as a function, among other things, of parental investment in early childhood. One first important result we have presented is that early factors do have an impact twenty years later, confirming the importance of the early years and its long run impacts. Furthermore, we argue that, within this model, the increase in parental investment in early childhood explains a large fraction of the long run impact of KMC on externalizing skills.

The evidence we present suggests that the time invested in initial skin-to-skin contact enhances bonding, plausibly resulting in additional parental investments during the first year of age. Such parental investments in early childhood are not reflected in basic anthropometrics or cognitive skills but are manifested in better externalizing skills. This intuition is confirmed by the fact that the closeness of the relationship between parents and their children nearly twenty years later is also reflected in a KMC parents having better knowledge about their children than NICU parents.

KMC is not associated with improvements in cognitive or internalized skills, as measured in young adulthood, which contrasts with predictions made in the parental investment literature (Bernal and Keane, 2010). This outcome is not uncommon in the ECI literature, where some cognitive gains appear to be short-lived. However, we cannot rule out gains in specific components of the index. An alternative measure to assess such an impact could be school attainment. Yet, at the time of the survey, most individuals were still studying at both secondary and tertiary levels, which limits our ability to assess impacts on outcomes such as wages (Charpak et al., 2017).

The central mechanism that we highlight, involving additional parental time roughly three weeks of close skin-to-skin contact on average indicates that policies related to providing time are crucial for the development of socio-emotional skills. The most common strategy is parental leave. Rossin (2011); Ruhm (2000); Tanaka (2005) have shown that access to maternal leave is associated not only with a reduced incidence of preterm births but also with improvements in other health outcomes, such as infant mortality. Parental investments play a significant role in these findings; for instance, there is evidence of a higher probability of completing vaccination schemes and longer breastfeeding (Daku et al., 2012; Berger et al., 2005). Our res-

ults indicate that, in addition to these outcomes, we can also expect improvements in the formation of socio-emotional skills. Such results might contribute to explaining long-term findings related to wages and educational attainment (Carneiro et al., 2015; Dustmann and Schönberg, 2012).

Our results also suggest that parental time investments help parents better understand their children. The economic literature already recognizes the importance of parenting in shaping preferences and human development (Cobb-Clark et al., 2019; Doepke and Zilibotti, 2017). However, research on how parents acquire information about their children's characteristics and how this information can be used to make better parental investments is still limited (Doepke et al., 2019).

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Appendices

A Additional tables

Table A1: Comparison of derived factors with different samples

Variable	Sample		Correl	KMC impact coefficient			
				Main sample		Full sample	
	Main	Largest	Coef	Coef	t-stat	Coef	t-stat
Childhood investment 1	272	734	1.000	0.265	2.098	0.269	2.130
Childhood investment 2	272	734	0.655	-0.036	0.282	-0.228	1.831
Y. adulthood investment 1	272	436	0.993	-0.005	0.041	-0.012	0.124
Y. adulthood investment 2	272	436	0.989	0.066	0.543	0.127	1.314
Health at birth	272	734	0.999	0.144	2.260	0.173	2.991
Cognitive 12m	272	734	0.999	0.104	0.820	0.155	1.251
Health 12m	272	734	1.000	0.066	0.521	0.103	0.820
Cognitive 20y	271	433	0.996	0.187	1.488	0.084	0.864
Externalized 20y	269	431	0.996	-0.313	2.503	-0.210	2.174
Internalized 20y	268	430	0.997	0.038	0.308	-0.005	0.055

Notes: This table compares latent factors using Bartlett predictions for the version based on the main sample (272 observations) and the version using the largest possible sample. It shows the number of observations, the correlation coefficient of the measures on the common sample, and how both versions are related to the KMC: regression coefficient and the associated t-statistic are presented, estimated with linear regressions that control for weight at eligibility, randomization blocks, and with robust standard errors. For comparison, derived latent factors were standardized.

Table A2: Observed variables and predicted factors characteristics

	Treatment E		Statistics					
Variable	**Coeff**	**SE**	**N**	**Mean**	**SD**	**P5**	**P50**	**P95**
Base variables and controls								
Mother Education: Secondary	0.026	(0.048)	429	.55	.5	0	1	1
Mother Education: Above Secondary	−0.032	(0.042)	429	.26	.44	0	0	1
HH monthly income per capita at 1993 (USD of 2018)	1.070	(14.819)	429	233	153	80	186	479
Kangaroo (D)	1.000	(0.000)	429	.52	.5	0	1	1
Presented direct School Violence	−0.097**	(0.044)	429	.3	.46	0	0	1
Weight at eligibility age (grs)	−49.538**	(22.128)	429	1697	231	1285	1700	2000
Age of the mother	−0.684	(0.559)	429	28	5.8	20	27	38
Number of personal injury reports, $r =$ 500 m	0.062	(0.099)	415	.0017	1	-1.2	-.24	2.2
Has family history of mental disorders	−0.019	(0.036)	429	.16	.37	0	0	1
Girl	−0.031	(0.048)	429	.56	.5	0	1	1
Multiple pregnancy	0.055	(0.036)	429	.17	.37	0	0	1
Has older siblings	−0.041	(0.048)	429	.51	.5	0	1	1
Age of the mother	−0.684	(0.559)	429	28	5.8	20	27	38
Divorced parents	0.017	(0.031)	263	.068	.25	0	0	1
Father education no-info	0.017	(0.019)	272	.026	.16	0	0	0
Father Education: Secondary	−0.093	(0.060)	272	.55	.5	0	1	1
Father Education: Above Secondary	0.110**	(0.051)	272	.24	.43	0	0	1
Components of Birth								
Health at Birth	−0.023	(0.059)	418	0	.6	-1.2	.15	.68
Height at Birth	−1.675	(2.832)	429	420	29	370	420	460
Birth weight	−43.184*	(24.790)	429	1719	258	1200	1800	2000
Gestational Age	−0.055	(0.244)	429	34	2.5	30	34	38
Acute Fetal Distress	−0.033	(0.048)	429	.53	.5	0	1	1
Hospitalized after birth	0.059	(0.047)	429	.6	.49	0	1	1
Total hospitalization days (including days with the mother)	−0.889	(1.216)	429	12	13	1	6	39
Required intensive care	0.034	(0.034)	429	.14	.35	0	0	1
Toxaemia	−0.000	(0.048)	429	.42	.49	0	0	1
Components of Early Childhood								
Cognitive 12m	0.048	(0.053)	418	0	.53	-.87	.072	.59
A. Locomotor	1.959	(1.403)	382	107	13	83	108	121
B: Personal-Social	0.590	(1.183)	383	104	11	85	104	121
C: Language	0.586	(1.129)	383	99	11	83	100	115
D: Eye and Hand Co-ordination	0.498	(0.946)	383	100	9	88	104	108
E: Performance	0.672	(0.823)	383	99	7.8	88	100	104
Health 12m	0.018	(0.031)	418	0	.32	-.47	-.0095	.53
weight for height at 3 months	0.876	(1.168)	385	111	12	92	110	130
weight for age at 3 months	−1.283	(1.388)	388	92	14	72	92	114
height for age at 3 months	−0.900*	(0.496)	388	94	5	87	94	101
weight for height at 6 months	0.573	(0.955)	385	103	9.4	89	103	119
weight for age at 6 months	0.209	(1.215)	386	87	12	69	86	107
height for age at 6 months	−0.068	(0.426)	386	94	4.2	86	93	100
weight for height at 9 months	−0.209	(0.973)	366	99	9.2	85	98	114
weight for age at 9 months	0.591	(1.186)	369	84	11	68	84	104
height for age at 9 months	0.788	(0.502)	368	94	4.7	87	94	101
weight for height at 12 months	0.357	(0.872)	382	96	8.5	84	95	111
weight for age at 12 months	0.510	(1.085)	389	84	11	68	84	101
height for age at 3 months	0.146	(0.405)	384	94	3.9	87	94	1.0e+02

Source: Own calculations

Table A2: (Continued)

	Treatment E		Statistics					
Variable	**Coeff**	**SE**	**N**	**Mean**	**SD**	**P5**	**P50**	**P95**
Components of Young Adulthood								
Cognitive 20y	0.068	(0.090)	429	.0013	.93	-1.6	.12	1.4
WASI Matrix Reasoning	0.360	(0.478)	428	17	4.9	8	18	24
WASI Perceptual Reasoning.	1.282	(1.648)	428	86	17	59	87	113
CVLT Long-delay cued recall correct	0.179**	(0.090)	424	-.34	.93	-2	0	.5
TAP Omissions	−1.493	(1.104)	412	51	11	30	53	66
TAP Median RT	−0.778	(0.980)	412	58	9.9	42	58	75
TAP Standard deviation of RT	−0.067	(0.983)	412	56	9.9	40	56	71
TAP Total Performance	−0.373	(1.045)	411	-15	11	-35	-13	-.71
Externalized 20y	−0.088**	(0.039)	429	-.0013	.41	-.54	-.093	.76
ABCL Clinical Antisocial (score) Best friend	−1.147	(1.430)	399	65	14	50	62	92
ABCL Clinical Hyperactivity (binary) Best friend	−3.121**	(1.510)	399	64	15	50	58	93
ABCL Clinical Antisocial (score) Self-report	−4.538***	(1.567)	425	68	16	50	65	97
ABCL Clinical Hyperactivity (binary) Self-report	−1.055	(1.525)	425	67	16	50	62	95
hyperactivity-impulsivity puntaje T Conners auto	−0.316	(1.111)	426	61	11	44	61	81
Defiance-agression puntaje T Conners auto	−1.687	(1.183)	426	55	12	41	52	79
Internalized 20y	−0.014	(0.086)	429	-.0036	.89	-1.3	-.18	1.6
ABCL Clinical Depressive (score) Self-report	0.349	(1.587)	425	68	16	50	62	98
ABCL Clinical Anxiety (binary) Self-report	0.237	(1.541)	425	75	16	54	79	97
ABCL Clinical Somatic (score) Self-report	−1.550	(1.656)	425	74	17	50	76	98
ABCL Clinical Avoidant (binary) Self-report	−0.020	(1.709)	425	69	18	50	65	98
ABCL Clinical Depressive (score) Best friend	−1.045	(1.545)	399	65	15	50	58	95
ABCL Clinical Anxiety (binary) Best friend	−2.375*	(1.435)	399	75	14	54	76	98
ABCL Clinical Somatic (score) Best friend	−0.479	(1.621)	399	64	16	50	62	95
ABCL Clinical Avoidant (binary) Best Friend	0.448	(1.796)	399	71	18	50	65	99

Source: Own calculations

Table A3: KMC impact on adulthood investments

	Dependent variable:		
	Home 20Y Z1	Home 20Y Z2	Home 20Y Z3
	(1)	(2)	(3)
KMC Treated	−0.060	0.025	−0.038
	(0.093)	(0.097)	(0.055)
Weight at Elegibility	−0.106	−0.087	0.059
	(0.066)	(0.069)	(0.039)
RCT Block 2	−0.342**	−0.119	−0.088
	(0.152)	(0.159)	(0.090)
RCT Block 3	−0.248	0.014	−0.218**
	(0.153)	(0.161)	(0.091)
Mother education: secondary	0.458***	0.046	−0.029
	(0.127)	(0.133)	(0.075)
Mother education: tertiary	0.846***	0.232	−0.029
	(0.140)	(0.147)	(0.083)
No information on the father	−0.077	−0.339	0.218
	(0.287)	(0.300)	(0.170)
Girl	0.031	0.141	0.059
	(0.091)	(0.096)	(0.054)
Multiple Pregnancy	0.071	0.202	−0.019
	(0.129)	(0.135)	(0.076)
Older Siblings	−0.282***	−0.109	−0.005
	(0.097)	(0.101)	(0.057)
Mother Age	0.004	−0.003	0.003
	(0.008)	(0.009)	(0.005)
Constant	−0.216	−0.078	−0.041
	(0.301)	(0.315)	(0.179)
E[Y|T=0]	-0.02	-0.114	-0.067
SD[Y]	0.82	0.793	0.445
IQR[Y]=p75-p25	1.1	1.031	0.663
Impact SDs	-0.088	0.046	-0.102
Romano-Wolf P-val	0.996	0.996	0.964

Notes: *p<0.1; **p<0.05; ***p<0.01. Romano-Wolf p-values computed after 1,000 replications considering jointly three investments in young adulthood.

Table A4: Differences in responses to the behaviors checklist between young adults, their best friends, and their parents

	(1) Par - BF	(2) Par - YA	(3) BF - YA
Kangaroo (D)	-0.300***	0.000399	-0.212**
	(0.110)	(0.104)	(0.105)
G: below 1801grs and hospitalized	-0.101	-0.0738	-0.146
	(0.177)	(0.182)	(0.171)
G: 1801-2001 grs	0.0190	-0.148	-0.160
	(0.169)	(0.173)	(0.176)
Weight at elegibility age (grs)	-0.000210	-0.0000567	0.000183
	(0.000371)	(0.000425)	(0.000337)
LesioPers	-0.000282	0.000410	0.0000812
	(0.000333)	(0.000321)	(0.000309)
Has family history of mental disorders	0.0442	0.0437	0.0731
	(0.156)	(0.147)	(0.139)
Girl	-0.0498	0.0113	0.0472
	(0.110)	(0.107)	(0.108)
Multiple pregnancy	-0.0220	0.0682	-0.0849
	(0.130)	(0.145)	(0.147)
Has older siblings	0.0826	-0.0215	-0.0390
	(0.118)	(0.111)	(0.109)
Mother Education: Secondary	-0.246	-0.0847	-0.287**
	(0.155)	(0.139)	(0.138)
Mother Education: Above Secondary	-0.351**	-0.286*	-0.378**
	(0.161)	(0.159)	(0.151)
Age of the mother	0.00175	0.00208	-0.00773
	(0.00994)	(0.00983)	(0.0100)
Constant	0.769	0.138	0.372
	(0.773)	(0.818)	(0.724)
Observations	368	385	378

Notes: **Par- BS:** Best friend and parents; **Par - YA:** Young adult and parents; **BF - Y:** Young adult and best friend. Standard errors are presented in parentheses. Significance: * 0.1, ** 0.05, *** 0.01

Table A5: Estimates of the structural model using attrition weights

	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1		Model 2		Model 3	
	Estimate	Std.Err	Estimate	Std.Err	Estimate	Std.Err
Childhood Investment 1						
Health at Birth	-0.068	0.082	-0.068	0.082	-0.044	0.09
Father Education: Secondary	0.126	0.141	0.128	0.14	0.111	0.151
Father Education: Above Secondary	0.468***	0.167	0.471***	0.166	0.411**	0.194
Log income pc in 1993	0.275**	0.12	0.273**	0.12	0.351***	0.103
KMC Treated ($a1$)	0.258***	0.093	0.257***	0.092	0.218**	0.104
Mother Education: Secondary	0.314**	0.147	0.313**	0.147	0.32**	0.15
Mother Education: Above Secondary	0.257	0.177	0.257	0.177	0.243	0.174
No information on the father	-0.699**	0.345	-0.698**	0.344	-0.713**	0.354
Girl	0.119	0.102	0.119	0.102	0.115	0.102
Multiple Pregnancy	-0.422***	0.144	-0.422***	0.144	-0.411***	0.145
Older Siblings	-0.181*	0.109	-0.182*	0.109	-0.162	0.107
Age of the Mother	-0.003	0.009	-0.003	0.009	-0.003	0.009
Childhood Investment 2						
Health at Birth			-0.146*	0.088	-0.123	0.098
Father Education: Secondary			0.173	0.137	0.148	0.125
Father Education: Above Secondary			0.263	0.161	0.312**	0.14
Log income pc in 1993			0.038	0.086	0.01	0.081
KMC Treated ($a2$)			-0.055	0.082	-0.06	0.082
Mother Education: Secondary			0.062	0.139	0.07	0.138
Mother Education: Above Secondary			-0.065	0.176	-0.072	0.175
No information on the father			-0.529*	0.318	-0.533*	0.313
Girl			0.078	0.084	0.08	0.084
Multiple Pregnancy			0.274*	0.149	0.272*	0.149
Older Siblings			0.166*	0.09	0.157*	0.089
Age of the Mother			0.007	0.008	0.007	0.008
Externalised 20y						
Cognitive 12m	0.204**	0.08	0.206**	0.082	0.19**	0.078
Health 12m	-0.033	0.126	-0.026	0.127	-0.045	0.124
Childhood Investment 1 ($f1$)	-0.39**	0.184	-0.396**	0.187	-0.013	0.292
Childhood Investment 2 ($f2$)			0.023	0.055	-0.657	0.68
KMC Treated ($f3$)					-0.195	0.131
Family History of Mental Illness	0.262**	0.117	0.264**	0.117	0.243**	0.115
Mother Education: Secondary	0.104	0.147	0.102	0.147	0.054	0.167
Mother Education: Above Secondary	0.239	0.186	0.24	0.187	0.086	0.225
No information on the father	-0.462**	0.213	-0.452**	0.212	-0.61	0.395
Girl	-0.046	0.097	-0.044	0.099	-0.024	0.107
Multiple Pregnancy	-0.219	0.137	-0.227	0.141	0.154	0.312
Older Siblings	-0.228**	0.1	-0.233**	0.103	-0.051	0.19
Age of the Mother	0.006	0.008	0.006	0.008	0.012	0.01
Panel B: Derived effects from the model						
Investment childhood 1 ($a1 \times f1$)	-0.1	0.061	-0.102*	0.061	-0.003	0.064
Investment childhood 2 ($a2 \times f2$)			-0.001	0.004	0.039	0.062
Direct effect ($f3$)					-0.195	0.131
Total Explained Effect ($a1 \times f1 + a2 \times f2 + f3$)	-0.1	0.061	-0.103*	0.062	-0.158**	0.076
As a percentage of total impact †	54.3		56		85.9	
Panel C: Estimation statistics						
Iterations	134		145		167	
Number of free parameters	122		137		142	
Model Test User Model:						
Test statistic	5690.903		5735.102		5797.206	
Degrees of freedom	822		853		895	
P-value (Chi-square)	0		0		0	
Root Mean Square Error of Approximation:	0.148		0.145		0.142	
Standardized Root Mean Square Residual:	0.099		0.098		0.097	

Notes: † Total impact on externalized 20y is of -0.174. Intercepts, variances, and covariances estimates of the model are omitted in the table. For the case of fathers for whom no information on their education level is available, dummies are set at 0. A dummy variable that indicates if this is the case is the case (*No information on the father*=1 for 7 observations). All models are estimated over the 418 observations sample using maximum likelihood with missing at random (86 missing patterns) with the R package lavaan 0.6-12. The optimization method used was NLMINB. Standard errors were derived from the Hessian matrix. Following Cortés et al. (2022), we use inverse probability weighting to correct for non-random attrition (Busso et al., 2014). Significance: * 0.1, ** 0.05, *** 0.01

Table A6: Estimates of the structural model using five Griffiths measures

	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1		Model 2		Model 3	
	Estimate	Std.Err	Estimate	Std.Err	Estimate	Std.Err
Childhood Investment 1						
Health at Birth	-0.094	0.078	-0.096	0.078	-0.063	0.085
Father Education: Secondary	0.128	0.144	0.13	0.143	0.102	0.158
Father Education: Above Secondary	0.462***	0.178	0.465***	0.177	0.424**	0.194
Log income pc in 1993	0.253**	0.105	0.25**	0.104	0.31***	0.105
KMC Treated ($a1$)	0.226**	0.091	0.225**	0.091	0.199**	0.1
Mother Education: Secondary	0.388**	0.152	0.387**	0.152	0.399**	0.155
Mother Education: Above Secondary	0.356*	0.186	0.356*	0.186	0.343*	0.187
No information on the father	-0.69**	0.32	-0.688**	0.32	-0.713**	0.323
Girl	0.067	0.099	0.067	0.099	0.066	0.099
Multiple Pregnancy	-0.428***	0.144	-0.428***	0.144	-0.413***	0.145
Older Siblings	-0.186*	0.108	-0.187*	0.108	-0.172	0.107
Age of the Mother	-0.008	0.009	-0.008	0.009	-0.008	0.009
Childhood Investment 2						
Health at Birth			-0.146*	0.079	-0.138*	0.074
Father Education: Secondary			0.159	0.144	0.15	0.12
Father Education: Above Secondary			0.277	0.177	0.299*	0.152
Log income pc in 1993			0.023	0.095	0.008	0.086
KMC Treated ($a2$)			-0.04	0.091	-0.041	0.091
Mother Education: Secondary			0.095	0.141	0.097	0.137
Mother Education: Above Secondary			-0.068	0.17	-0.069	0.167
No information on the father			-0.514*	0.294	-0.513*	0.289
Girl			0.095	0.09	0.097	0.09
Multiple Pregnancy			0.256*	0.132	0.253*	0.132
Older Siblings			0.126	0.098	0.121	0.097
Age of the Mother			0.009	0.009	0.009	0.009
Externalised 20y						
Griffiths Locomotor	-0.002	0.051	0.001	0.051	-0.007	0.051
Griffiths Personal Social	0.033	0.059	0.032	0.059	0.024	0.058
Griffiths Language	0.081	0.053	0.082	0.053	0.087*	0.053
Eye and Hand Coordination	-0.015	0.06	-0.014	0.06	-0.022	0.059
Griffiths Performance	0.052	0.063	0.05	0.063	0.057	0.062
Health 12m	0.016	0.128	0.027	0.129	0.002	0.126
Childhood Investment 1 ($f1$)	-0.43**	0.173	-0.442**	0.175	-0.086	0.265
Childhood Investment 2 ($f2$)			0.037	0.052	-0.623	0.514
KMC Treated ($f3$)					-0.14	0.119
Family History of Mental Illness	0.228**	0.105	0.233**	0.105	0.215**	0.103
Mother Education: Secondary	0.147	0.148	0.145	0.149	0.104	0.169
Mother Education: Above Secondary	0.29	0.185	0.294	0.186	0.137	0.226
No information on the father	-0.474	0.292	-0.46	0.294	-0.623	0.395
Girl	-0.078	0.098	-0.076	0.098	-0.025	0.111
Multiple Pregnancy	-0.25*	0.135	-0.262*	0.138	0.095	0.263
Older Siblings	-0.218**	0.101	-0.226**	0.103	-0.071	0.15
Age of the Mother	0.003	0.008	0.002	0.008	0.011	0.011
Panel B: Derived effects from the model						
Investment childhood 1 ($a1 \times f1$)	-0.097*	0.053	-0.1*	0.053	-0.017	0.053
Investment childhood 2 ($a2 \times f2$)			-0.001	0.004	0.026	0.06
Direct effect ($f3$)					-0.14	0.119
Total Explained Effect ($a1 \times f1 + a2 \times f2 + f3$)	-0.097*	0.053	-0.101*	0.053	-0.132*	0.076
As a percentage of total impact †	55.7		58.0		75.9	
Panel C: Estimation statistics						
Iterations	134		148		149	
Number of free parameters	122		124		129	
Model Test User Model:						
Test statistic	5690.903		5516.603		5578.057	
Degrees of freedom	822		786		828	
P-value (Chi-square)	0		0		0	
Root Mean Square Error of Approximation:	0.148		0.154		0.15	
Standardized Root Mean Square Residual:	0.099		0.095		0.094	

Notes: † Total impact on externalized 20y is of -0.174. Intercepts, variances, and covariances estimates of the model are omitted in the table. For the case of fathers for whom no information on their education level is available, dummies are set at 0. A dummy variable that indicates if this is the case is the case (*No information on the father*=1 for 7 observations). All models are estimated over the 418 observations sample using maximum likelihood with missing at random (86 missing patterns) with the R package lavaan 0.6-12. The optimization method used was NLMINB. Standard errors were derived from the Hessian matrix. In this exercise, we do not compute a single index covering the five Griffiths dimensions. Rather, we include the indices directly into the regression. Significance: * 0.1, ** 0.05, *** 0.01

Table A7: Estimates of the structural model with 20Y investment

	(1)	(2)
	Model 3	
	Estimate	Std.Err
Panel A: Direct effects from the model		
Childhood Investment 1		
Health at Birth	-0.038	0.087
Father Education: Secondary	0.121	0.157
Father Education: Above Secondary	0.462**	0.196
Log income pc in 1993	0.351***	0.102
KMC Treated ($a1$)	0.214**	0.098
Mother Education: Secondary	0.317**	0.15
Mother Education: Above Secondary	0.233	0.183
No information on the father	-0.719**	0.328
Girl	0.094	0.098
Multiple Pregnancy	-0.409***	0.136
Older Siblings	-0.168	0.106
Age of the Mother	-0.003	0.009
Childhood Investment 2		
Health at Birth	-0.132*	0.079
Father Education: Secondary	0.179	0.125
Father Education: Above Secondary	0.335**	0.151
Log income pc in 1993	0.019	0.081
KMC Treated ($a2$)	-0.038	0.066
Mother Education: Secondary	0.1	0.132
Mother Education: Above Secondary	-0.035	0.162
No information on the father	-0.511*	0.289
Girl	0.065	0.087
Multiple Pregnancy	0.25**	0.121
Older Siblings	0.155*	0.094
Age of the Mother	0.01	0.008
Young Adulthood Investment		
Health at Birth	-0.033	0.088
Father Education: Secondary	0.178	0.159
Father Education: Above Secondary	0.357*	0.197
Log income pc in 1993	0.215**	0.101
KMC Treated ($a1$)	-0.038	0.066
Mother Education: Secondary	0.132	0.152
Mother Education: Above Secondary	0.335*	0.186
No information on the father	0.032	0.333
Girl	0.139	0.099
Multiple Pregnancy	0.199	0.137
Older Siblings	-0.192*	0.107
Age of the Mother	-0.003	0.009
Externalised 20y		
Cognitive 12m	0.192**	0.083
Health 12m	-0.071	0.125
Childhood Investment 1 ($f1$)	-0.089	0.238
Childhood Investment 2 ($f2$)	-0.566	0.506
Young adulthood Investment ($f4$)	0.053	0.089
KMC Treated ($f3$)	-0.157	0.105
Family History of Mental Illness	0.261**	0.102
Mother Education: Secondary	0.089	0.147
Mother Education: Above Secondary	0.134	0.184
No information on the father	-0.615	0.385
Girl	-0.044	0.101
Multiple Pregnancy	0.081	0.238
Older Siblings	-0.071	0.152
Age of the Mother	0.012	0.01
Panel B: Derived effects from the model		
Investment childhood 1 ($a1 \times f1$)	-0.019	0.052
Investment childhood 2 ($a2 \times f2$)	0.022	0.042
Direct effect ($f3$)	-0.157	0.105
Total Explained Effect ($a1 \times f1 + a2 \times f2 + f3$)	-0.155**	0.073
As a percentage of total impact †	84.2	
Panel C: Estimation statistics		
Iterations	164	
Number of free parameters	157	
Model Test User Model:		
Test statistic	6240.222	
Degrees of freedom	929	
P-value (Chi-square)	0	
Root Mean Square Error of Approximation:	0.145	
Standardized Root Mean Square Residual:	0.099	

Notes: † Total impact on externalized 20y is of -0.174. Intercepts, variances and covariances estimates of the model are omitted in the table. All models are estimated over the 418 observations sample using maximum likelihood with missing at random (86 missing patterns) with the R package lavaan 0.6-11. The optimization method used was NLMINB. Standard errors were derived from the Hessian matrix. Significance: * 0.1, ** 0.05, *** 0.01

Table A8: School violence and externalized behavior

Dependent variable: Was involved in episodes of school violence				
	(1)	(2)	(3)	(4)
Externalized 20y (-)		-0.124**	-0.108**	-0.070
		(0.050)	(0.050)	(0.050)
Kangaroo (D)	-0.143**		-0.124**	-0.133**
	(0.059)		(0.059)	(0.058)
Crime around the school				0.079***
				(0.030)
Has family history of mental disorders				0.234***
				(0.085)
Weight at elegibility age (Kg)	0.109	0.134	0.098	0.118
	(0.175)	(0.175)	(0.175)	(0.170)
Multiple pregnancy	-0.067	-0.083	-0.059	-0.060
	(0.072)	(0.072)	(0.072)	(0.077)
G: below 1801grs and hospitalized	0.138	0.105	0.129	0.136
	(0.091)	(0.089)	(0.090)	(0.088)
G: 1801-2001 grs	0.110	0.069	0.098	0.057
	(0.089)	(0.087)	(0.089)	(0.089)
Constant	0.108	0.020	0.124	0.077
	(0.313)	(0.309)	(0.312)	(0.303)
Observations	268	268	268	263
R^2	0.038	0.038	0.055	0.116
$E[Y]$			31.5%	

Notes: Crime around the school is measured as the number of personal injury reports within 500 meters of the secondary school where the children study or studied. The externalized factor was derived from the measurement system and was reverted so a higher number implies less aggressive behavior. Robust Standard errors in parentheses. Significance: * 0.1, ** 0.05, *** 0.01

B Details on the estimation of factors for parental investments

As a first step, we obtain summary indexes corresponding to estimated latent factors based on the sub-scales of the HOME inventories. Tables B1 and B2 show the parameter estimates of the IRT-2PL models for early childhood and young adulthood measures of parental investment. We notice that we have 6 summary indexes for parental investment during childhood and 7 indexes for parental investment during young adulthood.

In the second step, the resulting summary indexes are subject to an exploratory factor analysis using the principal components. Results are presented in table B3 for the early childhood stage and in table B4 for the young adulthood stage. We decided to retain 2 factors in childhood and 3 in young adulthood based on their eigenvalues. alternative methods resulted in a similar number of factors (1 more or less) with similar groups or subscales.

The exploratory factor analysis was not performed on the original binary items as the questions are not meant to measure the same object, but are a checklist of characteristics that could be potential substitutes. For instance: Item 57 says *adolescents are allowed to have some privacy*, and item 60 says *adolescent can have a disagreement with parent without harsh reprisals*; both are part of the acceptance subscale, but they measure completely different characteristics of the parent-children relationship. Yet, if a principal component analysis is considered, results are not informative. For instance, for young adulthood, 17 factors are retained (eigenvalue above 1) but these factors only explain 65% of total variance.

The last step involves the estimation of the IRT-2PL models considering the groups detected with the factor analysis. Tables B5 and B6 presents the final parameter estimates.

1. The measures or questions, m_{tk}^{It} with $k \in \{1, ..., K_t^I\}$ of each of the two HOME inventories we use are organized in a given number of sub-scales as explained above. We start with this structure, six sub-scales for $t = 1$ and 7 for $t = 2$, and for each measure m_{tk}^{Ii} within its own sub-scale, we fit a latent trait model under the item response theory (IRT) two-parameter logistic model (2PL) (Rizopoulos, 2006). Specifically, we estimate:

$$logit\left[Pr(m_{tk}^{Ii} = 1|\hat{I}_{tj}^{i})\right] = \beta_{tk}(\hat{I}_{tj}^{i} - \alpha_{tk}) \quad \forall k \in \{1, ..., K_t^I\}, \text{ for some } \hat{I}_{tj}^{i} \in \{\hat{I}_{t1}^{i}, ..., \hat{I}_{t\hat{J}_t}^{i}\} \quad (8)$$

where $\hat{I}_{tj}^{i}$ correspond to the latent factors to be estimated, α_{kt} is the easiness parameter, β_{tk} is the discrimination parameter. Given the estimated parameters, we predict the summary indexes $\hat{I}_{tj}^{i}$. We are using the $\hat{I}$ and $\hat{J}_t$ notation

to emphasize that the latent factors in this step are provisional and do not necessarily correspond to the investment levels in equations 2 and 3; similarly, the number of latent factors in this stage will differ from the definite number retained in step 2.

2. A factor analysis is performed over the summary indexes to determine if some of the dimensions can be grouped. This will yield the number of dimensions, J_t, for parental investments for each $t = 1, 2$ as well as estimation of the individual latent factors (I^i_{tj}) which we will work in steps 2 and 3.

3. The estimated parental investment levels for each individual, I^i_{tj}, result from the use of the IRT-2PL model using all the questions of the grouped dimensions.

B.1 IRT-2PL all dimensions

Table B1: IRT-2PL all dimensions for children

Factor	Item	X^2	Pr(>X^2)	Dffclt value	Dffclt std.err	Dffclt z.vals	DScrmn value	DScrmn std.err	DScrmn z.vals
	Item 1	19.6165	0.0119	-2.1496	0.3501	-6.1409	1.9132	0.5599	3.4173
	Item 2	93.3848	<0.0001	-1.4026	0.2615	-5.363	1.2498	0.3074	4.0655
	Item 3	13.0284	0.1109	2.1279	0.6274	3.3917	1.0425	0.4107	2.5385
$\hat{I}_1$ **child:**	**Item 4**	20.8915	0.0074	-2.329	0.4337	-5.3707	1.7056	0.5205	3.2769
log.Lik = -747.0815	**Item 5**	19.6594	0.0117	-1.1516	0.1387	-8.3033	2.6177	0.7064	3.7056
AIC = 1538.163	**Item 6**	12.7898	0.1193	-1.5119	0.1476	-10.2432	3.5817	1.1238	3.1871
BIC = 1617.652	**Item 7**	9.1509	0.3297	-6.3086	5.1563	-1.2235	0.2839	0.2371	1.197
max(grad) = 0.0044	**Item 8**	8.8475	0.3553	-2.0965	0.3039	-6.8992	2.5107	0.797	3.1502
	Item 9	1.5495	0.9919	-2.0904	4.7034	-0.4444	24.8776	2834.067	0.0088
	Item 10	24.2277	0.0021	-2.6669	0.6417	-4.1563	1.2695	0.4239	2.9947
	Item 11	6.9258	0.5447	-2.0995	0.2906	-7.225	3.1871	1.1616	2.7438
	Item 12	158.1943	<0.0001	-10.2171	29.4759	-0.3466	0.4925	1.3553	0.3634
	Item 13	0.8928	0.9988	-2.1499	135.5803	-0.0159	12.459	402.3071	0.031
$\hat{I}_2$ **child:**	**Item 14**	7.7823	0.455	2.4211	69.113	0.035	-31.7376	473.6149	-0.067
log.Lik = -578.7726	**Item 15**	160.5419	<0.0001	1.4035	1.4491	0.9685	-1.1126	0.8631	-1.2891
AIC = 1189.545	**Item 16**	69.2893	<0.0001	2.6309	3.0477	0.8633	-1.8789	1.442	-1.3029
BIC = 1247.355	**Item 17**	16.2924	0.0384	-148.4075	4570.7295	-0.0325	0.0256	0.7884	0.0325
max(grad) = 0.00066	**Item 18**	234.364	<0.0001	-2.5471	2.1619	-1.1782	-0.4213	0.3288	-1.2813
	Item 19	191.0739	<0.0001	4.8559	9.5076	0.5107	0.1276	0.2466	0.5173
	Item 20	80.9481	<0.0001	-8.8668	10.5642	-0.8393	0.3106	0.3799	0.8174
$\hat{I}_3$ **child:**	**Item 21**	10.4017	0.238	-1.3702	0.0718	-19.0842	15.2796	78.6415	0.1943
log.Lik = -519.274	**Item 22**	17.6946	0.0236	-1.3364	0.0782	-17.0843	11.6077	24.3389	0.4769
AIC = 1062.548	**Item 23**	85.2676	<0.0001	-4.9393	2.8652	-1.7239	0.5256	0.3284	1.6006
BIC = 1105.906	**Item 24**	217.0526	<0.0001	3.3321	2.3188	1.437	-0.3819	0.2797	-1.3655
max(grad) = 0.0032	**Item 25**	145.9993	<0.0001	57.0411	512.4323	0.1113	-0.0326	0.2928	-0.1113
	Item 26	19.5179	0.0123	-1.8703	0.2973	-6.2902	1.5779	0.388	4.0671
	Item 27	22.6557	0.0038	-1.5257	0.223	-6.8427	1.7138	0.3864	4.4348
$hatI_4$ **child:**	**Item 28**	15.185	0.0556	-0.9125	0.2728	-3.3451	0.735	0.1911	3.8467
log.Lik = -1237.909	**Item 29**	31.3055	0.0001	-6.0205	5.8458	-1.0299	-0.1757	0.1714	-1.025
AIC = 2511.819	**Item 30**	32.6447	0.0001	-0.353	0.1192	-2.9626	1.6122	0.3469	4.6474
BIC = 2576.855	**Item 31**	21.1374	0.0068	-2.1939	0.7409	-2.9611	0.5365	0.1889	2.8398
max(grad) = 0.0014	**Item 32**	13.0339	0.1107	-1.5031	0.2	-7.5142	2.2155	0.5726	3.8691
	Item 33	36.5184	<0.0001	0.432	0.1093	3.9514	2.0686	0.5513	3.7524
	Item 34	20.6071	0.0083	0.6481	0.1589	4.0791	1.2478	0.2857	4.3677
	Item 35	93.5093	<0.0001	-2.9359	0.9636	-3.0467	0.8468	0.3347	2.5299
$\hat{I}_5$ **child:**	**Item 36**	104.8945	<0.0001	-3.1785	1.1122	-2.8578	1.3575	0.6935	1.9573
log.Lik = -642.4993	**Item 37h**	25.9544	0.0011	-0.2119	0.1028	-2.0607	4.8238	5.1892	0.9296
AIC = 1308.999	**Item 38h**	10990.2158	<0.0001	1.5277	0.228	6.7002	7.9899	10.5322	0.7586
BIC = 1352.356	**Item 39h**	115.8523	<0.0001	-2.1735	0.5194	-4.1847	0.9241	0.2677	3.4519
max(grad) = 0.12	**Item 40h**	161.5819	<0.0001	-0.401	0.2001	-2.004	0.7513	0.1922	3.9088
$\hat{I}_6$ **child:**	**Item 41h**	102.8527	<0.0001	-0.6623	0.2157	-3.0702	0.8635	0.2341	3.6891
log.Lik = -678.9899	**Item 42h**	72.673	<0.0001	1.0061	0.1332	7.552	2.7069	0.7783	3.4778
AIC = 1377.98	**Item 43h**	84.2683	<0.0001	-1.6362	0.7086	-2.3092	0.4478	0.1925	2.3265
BIC = 1414.111	**Item 44h**	109.8004	<0.0001	-1.6869	0.3986	-4.232	1.0825	0.3346	3.2349
max(grad) = 0.00066	**Item 45h**	5.7615	0.6739	1.0798	0.3053	3.5371	11.4042	24.4988	0.4655

Table B2: IRT-2PL all dimensions for adults

Factor	Item	X^2	Pr(>X^2)	Dffclt value	Dffclt std.err	Dffclt z.vals	DScrmn value	DScrmn std.err	DScrmn z.vals
$\hat{I}_1$ **adult: log.Lik = -735.4263 AIC = 1498.853 BIC = 1549.436 max(grad) = 0.0057**	p1 home	31.2283	0.0001	-0.4485	0.6141	-0.7303	0.2462	0.1903	1.2942
	p2 home	25.6309	0.0012	-1.8057	0.3062	-5.8975	1.8904	0.5875	3.2178
	p3 home	16.5336	0.0353	-1.7064	0.2839	-6.0098	1.7677	0.5021	3.5203
	p4 home	54.7299	<0.0001	-2.7584	1.2208	-2.2595	0.4794	0.2246	2.1342
	p5 home	17.3866	0.0263	-2.0434	0.3252	-6.2835	2.0345	0.6098	3.3361
	p6 home	20.3583	0.0091	-1.1689	0.1531	-7.633	3.5741	1.7035	2.0981
	p7 home	36.2598	<0.0001	-2.4938	0.9039	-2.7589	0.6159	0.246	2.5037
$\hat{I}_2$ **adult: log.Lik = -1430.051 AIC = 2900.102 BIC = 2972.364 max(grad) = 0.001**	p8 home	25.3995	0.0013	2.0784	1.0539	1.9721	0.3611	0.1813	1.9915
	p9 home	13.8847	0.0848	0.3081	0.1627	1.8937	0.9794	0.2431	4.0293
	p10 home	23.9373	0.0023	1.775	0.4007	4.4302	1.1342	0.3398	3.3378
	p11 home	13.9261	0.0837	-2.5044	0.6479	-3.8652	0.9116	0.2872	3.1736
	p12 home	14.4478	0.0708	0.0018	0.1608	0.0115	0.9132	0.2317	3.9417
	p13 home	18.6976	0.0166	-0.6164	0.1368	-4.5053	1.6517	0.3832	4.3098
	p14 home	14.2678	0.075	-1.4441	0.1956	-7.3836	2.9994	1.2178	2.463
	p15 home	21.2445	0.0065	-0.2298	0.1925	-1.1933	0.7585	0.2065	3.6736
	p16 home	17.7204	0.0234	0.0017	0.1664	0.0103	0.8718	0.2218	3.9305
	p17 home	17.2569	0.0275	0.7722	0.2453	3.148	0.7971	0.215	3.7077
$\hat{I}_3$ **adult: log.Lik = -1210.607 AIC = 2461.214 BIC = 2533.476 max(grad) = 0.029**	p18 home	49.3707	<0.0001	0.6166	0.2166	2.8465	1.0334	0.3742	2.7615
	p19 home	28.795	0.0003	1.9075	0.5658	3.3715	0.9544	0.3597	2.6534
	p20 home	16.2158	0.0394	-2.6985	1.727	-1.5625	0.4023	0.2699	1.4905
	p21 home	15.9979	0.0424	3.5282	1.6704	2.1122	0.6999	0.3818	1.8333
	p22 home	31.529	0.0001	0.755	0.4664	1.6188	0.4322	0.22	1.9644
	p23 home	41.9155	<0.0001	1.2785	0.3475	3.6791	1.083	0.3822	2.8333
	p24 home	22.8694	0.0035	2.732	1.7241	1.5846	-0.3713	0.2428	-1.5293
	p25 home	4.5436	0.8051	17.2631	42.9324	0.4021	-0.144	0.3603	-0.3996
	p26 home	10.7141	0.2184	-1.6028	0.5209	-3.0768	1.0473	0.4573	2.2902
	p27 home	9.6136	0.2932	-24.8834	98.0522	-0.2538	0.1253	0.496	0.2527
$\hat{I}_4$ **adult: log.Lik = -773.6408 AIC = 1571.282 BIC = 1614.639 max(grad) = 0.0011**	p28 home	36.2638	<0.0001	-5.67	5.4938	-1.0321	0.2733	0.2559	1.0678
	p29 home	132.5155	<0.0001	-3.5443	1.9219	-1.8442	0.7449	0.344	2.1653
	p30 home	24.487	0.0019	5.3534	40.4886	0.1322	0.0261	0.196	0.1334
	p31 home	22.137	0.0047	0.4905	1.6394	0.2992	0.0965	0.1946	0.4961
	p32 home	58.0757	<0.0001	-0.4117	0.2243	-1.8358	-1.0841	0.281	-3.8577
	p33 home	1.8519	0.9852	-0.5805	6.1357	-0.0946	-16.0917	78.4956	-0.205
$\hat{I}_5$ **adult: log.Lik = -1172.457 AIC = 2384.913 BIC = 2457.176 max(grad) = 0.00015**	p34 home	13.813	0.0868	-4.0222	2.9636	-1.3572	0.2439	0.1809	1.3483
	p35 home	31.6903	0.0001	-3.073	0.9283	-3.3105	0.9648	0.364	2.6508
	p36 home	35.795	<0.0001	-2.1037	0.5575	-3.7737	0.8187	0.2513	3.2577
	p37 home	11.1413	0.1938	-4.2648	2.1453	-1.9879	0.4342	0.2299	1.8889
	p38 home	6.4864	0.5929	-6.0464	6.3592	-0.9508	0.1735	0.1834	0.9461
	p39 home	0.0484	1	26.9204	103.2536	0.2607	-0.0576	0.2212	-0.2603
	p40 home	8.9822	0.3438	-2.2967	0.5749	-3.9948	0.9078	0.2715	3.3438
	p41 home	6.0789	0.6384	-0.6682	0.0882	-7.5746	6.3175	13.0413	0.4844
	p42 home	44.2169	<0.0001	-0.0048	0.1215	-0.0399	1.4052	0.3253	4.3198
	p43 home	40.6673	<0.0001	-1.9068	0.3524	-5.4101	1.3849	0.3685	3.7578
$\hat{I}_6$ **adult: log.Lik = -1233.626 AIC = 2499.252 BIC = 2557.062 max(grad) = 0.01**	p44 home	14.844	0.0623	1.8414	0.9677	1.903	0.3488	0.1778	1.9617
	p45 home	18.625	0.017	2.212	1.3345	1.6576	0.3043	0.1809	1.6824
	p46 home	17.8344	0.0225	-1.4394	0.5464	-2.6341	0.4957	0.1796	2.7599
	p47 home	20.8613	0.0075	-0.0942	0.124	-0.7602	1.3755	0.2918	4.7133
	p48 home	30.3113	0.0002	-0.458	0.0977	-4.6895	3.4407	1.2394	2.7761
	p49 home	41.0148	<0.0001	-0.0114	0.1048	-0.1086	1.9007	0.4119	4.6143
	p50 home	13.843	0.086	-1.7684	0.4064	-4.3509	0.9217	0.2484	3.7112
	p51 home	33.2342	0.0001	2.4091	1.1405	2.1123	0.3914	0.1879	2.0831
$\hat{I}_7$ **adult: log.Lik = -710.3119 AIC = 1456.624 BIC = 1521.66 max(grad) = 0.022**	p52 home	26.4428	0.0009	-0.5567	0.1014	-5.4928	3.0846	0.8625	3.5764
	p53 home	22.6788	0.0038	-0.9535	0.1171	-8.142	3.1041	0.7046	4.4055
	p54 home	17.4581	0.0257	-1.7397	0.2345	-7.4171	1.9051	0.4309	4.4212
	p55 home	11.496	0.1751	-1.877	0.2312	-8.1176	2.4279	0.6328	3.8365
	p56 home	4.251	0.8338	-1.6135	0.2136	-7.5534	5.9754	4.9047	1.2183
	p57 home	15.8496	0.0446	-1.8776	0.4425	-4.2427	0.8341	0.2233	3.7356
	p58 home	12.3677	0.1355	-2.5577	0.5948	-4.2999	0.9536	0.2723	3.5027
	p59 home	13.7853	0.0875	-1.7129	0.2374	-7.2152	1.8241	0.4119	4.4285
	p60 home	10.3218	0.2432	-2.0759	0.2869	-7.2359	2.0978	0.5451	3.8485

B.2 Factor analysis over the summary indexes

Table B3: Factor analysis for children

Panel A. Principal factors (unrotated)

Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Comp1	2.17878	1.00714	0.3631	0.3631
Comp2	1.17164	.311992	0.1953	0.5584
Comp3	.859647	.143462	0.1433	0.7017
Comp4	.716185	.145253	0.1194	0.8210
Comp5	.570932	.06811	0.0952	0.9162
Comp6	.502822	.	0.0838	1.0000

Number of obs = 274; Number of params = 11
LR test: independent vs. saturated: chi2(15) = 215.82; Prob>chi2 = 0.0000

Panel B. Principal components (eigenvectors)

Variable	**Factor I1**	**Factor I2**	**Unexplained**
$\hat{I}_1$: responsivity	**0.4545**	0.1390	.5274
$\hat{I}_2$: acceptance	-0.0146	**0.7090**	.4106
$\hat{I}_3$: organization	0.0883	**0.6780**	.4444
$\hat{I}_4$: learning materials	**0.4935**	-0.0977	.4582
$\hat{I}_5$: involvement	**0.5387**	-0.0868	.3588
$\hat{I}_6$: variety	**0.5017**	-0.0353	.4501

Table B4: Factor analysis for adults' investments

Panel A. Principal components (unrotated)

Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Comp1	2.01425	.917824	0.2878	0.2878
Comp2	1.09643	.124489	0.1566	0.4444
Comp3	.97194	.0576289	0.1388	0.5832
Comp4	.914312	.202374	0.1306	0.7138
Comp5	.711938	.040589	0.1017	0.8156
Comp6	.671349	.0515701	0.0959	0.9115
Comp7	.619779	.	0.0885	1.0000

Number of obs = 274

Panel B. Principal components (eigenvectors)

Variable	**Factor I1**	**Factor I2**	**Factor I3**	**Unexplained**
$\hat{I}_1$: physical environment	**0.4688**	0.2714	-0.1428	.4568
$\hat{I}_2$: learning materials	**0.4760**	0.1283	-0.2886	.4446
$\hat{I}_3$: modeling	**0.3781**	-0.2295	-0.6185	.2824
$\hat{I}_4$: foster self-sufficiency	0.0075	**0.8903**	0.0408	.1292
$\hat{I}_5$: regulatory activity	0.4159	0.0349	**0.4939**	.4132
$\hat{I}_6$: family companionship	0.3135	-0.1606	**0.4611**	.5671
$\hat{I}_7$: acceptance	0.3734	-0.1939	**0.2355**	.624

B.3 IRT-2PL grouped

Table B5: Grouped analysis for investments early childhood

	Item		X^2	Pr(>X^2)	Dffclt value	Dffclt std.err	Dffclt z.vals	DScrmn value	DScrmn std.err	DScrmn z.vals
	Responsivity									
	Item 1	Parent permits child to engage in messy play	12.9011	0.1153	-3.0077	0.6794	-4.4268	1.1249	0.3306	3.4031
	Item 2	Parent spontaneously vocalizes to child at least twice	13.0862	0.1089	-2.1874	0.5508	-3.9715	0.6916	0.1872	3.6943
	Item 3	Parent responds verbally to childs vocalizations or verbalizations	8.9356	0.3478	1.8497	0.3115	5.9388	1.2782	0.2854	4.4793
	Item 4	Parent tells child name of object or person during the visit	6.9024	0.5472	-2.8926	0.6172	-4.6868	1.2319	0.356	3.4606
	Item 5	Parents speech is distinct, clear, and audible	9.2244	0.3237	-2.1096	0.4549	-4.6372	0.8649	0.2128	4.064
	Item 6	Parent initiates verbal interchanges with Visitor	10.0607	0.2608	-2.4275	0.4576	-5.305	1.2129	0.3043	3.9858
Factor I_1:	Item 7	Parent converses freely and easily	15.1037	0.0572	-2.3019	0.502	-4.5855	0.8745	0.2212	3.9545
log.Lik = -3228.164	Item 8	Parent spontaneously praises child at least twice	8.76	0.3629	-3.211	0.7785	-4.1247	1.1809	0.3808	3.101
AIC = 6580.327										
BIC = 6804.341	Item 9	Parents voice conveys positive feelings toward child	8.4808	0.388	-2.9577	0.5859	-5.0477	2.4341	1.102	2.2087
max(grad) = 0.021										
	Item 10	Parent caresses or kisses child at least once	8.4616	0.3897	-3.5338	1.0196	-3.4658	0.8806	0.3033	2.9037
	Item 11	Parent responds positively to praise of child offered by Visitor	11.6945	0.1654	-2.3949	0.3596	-6.6595	2.4556	0.8339	2.9448
	L. materials									
	Item 26	Muscle activity toys or equipment	9.9807	0.2664	-2.2209	0.4011	-5.5364	1.1814	0.2767	4.2702
	Item 27	Push or pull toy	9.8515	0.2756	-1.9358	0.3419	-5.6611	1.1351	0.2491	4.5565
	Item 28	Stroller or walker, kiddie-car, scooter, or tricycle	9.8511	0.2756	-1.1098	0.3532	-3.1423	0.5806	0.1578	3.6803
	Item 29	Cuddly toy or role-playing toys	7.8313	0.4501	4.9739	3.5929	1.3844	0.2135	0.155	1.3779
	Item 30	Learning facilitators–mobile, table and chair, high chair, play pen	10.5873	0.2262	-0.3587	0.1198	-2.995	1.5261	0.2485	6.1418
	Item 31	Simple eye-hand coordination toys	6.4473	0.5973	-1.7541	0.4347	-4.0357	0.6939	0.1772	3.9154
	Item 32	Complex eye-hand coordination toys	10.8407	0.2109	-2.2887	0.4534	-5.0484	1.0266	0.2495	4.114
	Item 33	Toys for literature and music	16.1832	0.0398	0.6048	0.1599	3.7814	1.0841	0.2018	5.3711
	Item 34	Parent provides toys for child to play with during visit	20.7041	0.008	0.4814	0.0982	4.9005	2.4828	0.4457	5.5705
	Involvement									
	Item 35	Parent talks to child while doing household work	8.5966	0.3775	-3.4599	1.0525	-3.2874	0.6932	0.2365	2.9314
	Item 36	Parent consciously encourages developmental advance	13.1315	0.1074	-3.6655	1.0558	-3.4719	1.1125	0.4139	2.688
	Item 37h	Parent invests maturing toys with value via personal attention	17.1144	0.0289	-0.2041	0.09	-2.2681	2.8643	0.5519	5.1894
	Item 38h	Parent structures childs play periods	7.9369	0.4397	2.4977	0.496	5.0355	1.336	0.3725	3.5868
	Item 39h	Parent provides toys that challenge child to develop new skills	8.1929	0.4149	-1.7864	0.2965	-6.0248	1.2217	0.2545	4.8007
	Item 40h	Parent keeps child in visual range, looks at often	22.932	0.0035	-0.8185	0.5101	-1.6048	0.3298	0.1438	2.2945
	Variety									
	Item 41h	Father provides some care daily	16.1738	0.04	-0.6502	0.1962	-3.3138	0.8668	0.1771	4.8956
	Item 42h	Parent reads stories to child at least three times weekly	11.6656	0.1668	1.0016	0.1182	8.4717	2.8553	0.6222	4.5893
	Item 43h	Child eats at least one meal a day with mother and father	13.7732	0.0879	-2.8321	1.6585	-1.7076	0.25	0.1429	1.7499
	Item 44h	Family visits relatives or receives visits once a month or so	12.9029	0.1152	-1.8183	0.3553	-5.1174	0.9682	0.218	4.4417
	Item 45h	Child has three or more books of his/her own	6.9077	0.5466	1.2168	0.1293	9.4086	3.2158	0.7961	4.0395
	Acceptance									
	Item 12	No more than one instance of physical punishment during past week	23.6	0.0027	-10.0155	23.5109	-0.426	0.5033	1.1231	0.4481
	Item 13	Family has a pet	16.4	0.0371	3.4881	2.3261	1.4995	-1.501	0.7257	-2.0684
	Item 14	Parent does not shout at child	11700000	<0.0001	-2.4988	100.9601	-0.0248	30.6081	590.8924	0.0518
Factor I_2:	Item 15	Parent does not express overt annoyance with or hostility to child	25.4	0.0013	-4.0362	2.9045	-1.3896	0.3227	0.2195	1.4703
log.Lik = -1090.309										
AIC = 2236.618	Item 16	Parent neither slaps nor spanks child during visit	13.9	0.0852	-2.1717	2.8411	-0.7644	3.263	2.4105	1.3537
BIC = 2337.786										
max(grad) = 0.017	Item 17	Parent does not scold or criticize child during visit	7.53	0.4808	150.2944	3459.8641	0.0434	-0.0253	0.5819	-0.0434
	Item 18	Parent does not interfere with or restrict child more than three times during visit	20.1	0.0101	7.4689	10.8217	0.6902	0.1386	0.1984	0.6986
	Item 19	At least ten books are present and visible	95.7	<0.0001	-1.056	0.4965	-2.127	-0.6426	0.2337	-2.7492
	Organization									
	Item 20	Child care, if used, is provided by one of three regular substitutes	5.85	0.6645	12.8944	21.1491	0.6097	-0.212	0.3425	-0.6191
	Item 21	Child is taken to grocery store at least once a week	5.6	0.6915	1.3708	39.1614	0.035	-19.4955	279.605	-0.0697
	Item 22	Child gets out of house at least four times a week	18.9	0.0156	1.3382	3.8775	0.3451	-8.1354	11.7418	-0.6929
	Item 23	Child is taken regularly to doctors office or clinic	69.1	<0.0001	4.2321	2.3728	1.7836	-0.6248	0.3104	-2.0129
	Item 24	Child has a special place for toys and treasures	77.3	<0.0001	-2.5467	1.3374	-1.9043	0.511	0.2367	2.1592
	Item 25	Childs play environment is safe	45.8	<0.0001	-4.9855	3.7743	-1.3209	0.3836	0.273	1.405

Table B6: Grouped analysis for investments young adulthood

	Item		X^2	Pr(>X^2)	Dffclt value	Dffclt std.err	Dffclt z.vals	DScrmn value	DScrmn std.err	DScrmn z.vals
	I Physical Environment									
	Item 1	Adolescents room has at least two pictures or decorations appealing to an adolescent.	5.1371	0.7428	-0.4681	0.6143	-0.762	0.2351	0.1529	1.5376
	Item 2	House or apartment has no potentially dangerous structural or health hazards.	5.9662	0.651	-1.699	0.2348	-7.2366	2.2004	0.5938	3.7054
	Item 3	Home has at least 100 square feet of living space per person.	13.4376	0.0977	-2.0204	0.3671	-5.5031	1.3061	0.326	4.0062
	Item 4	Home and immediate surroundings are not overly noisy.	6.0051	0.6467	-10.4759	15.4762	-0.6769	0.1207	0.1789	0.6748
	Item 5	House or apartment is clean.	10.2344	0.249	-2.4728	0.4821	-5.1289	1.4173	0.4032	3.5152
	Item 6	The interior of the house or apartment is not dark or perceptually monotonous.	9.7584	0.2824	-1.7277	0.3039	-5.6856	1.3127	0.3109	4.2225
Factor I_1:										
log.Lik = -3357.613	Item 7	Immediate external environment is esthetically pleasing and contains no obvious health or safety hazards.	17.8858	0.0221	-2.0033	0.4886	-4.1	0.8013	0.2193	3.6546
AIC = 6823.227										
BIC = 7018.336										
max(grad) = 0.0002	**II Learning Materials**									
	Item 8	Adolescent has access to materials for arts and crafts and/or collections.	7.7115	0.4621	2.2968	1.2058	1.9048	0.325	0.168	1.9342
	Item 9	Adolescent has library card or name on library list.	12.5912	0.1267	0.3871	0.2095	1.8473	0.7251	0.191	3.7972
	Item 10	Adolescent has access to at least 20 developmentally appropriate books.	13.1741	0.106	1.9982	0.4732	4.2229	0.9583	0.2775	3.453
	Item 11	Home has at least 2 types of reference materials (e.g., dictionary, encyclopedia, CD).	8.7538	0.3635	-2.6481	0.6793	-3.8981	0.8485	0.2562	3.3124
	Item 12	Adolescent has access to a musical instrument.	10.9678	0.2035	0.0026	0.198	0.0132	0.6984	0.1837	3.8011
	Item 13	Adolescent has access to desk or other suitable place for reading or studying.	18.6985	0.0166	-0.5856	0.1241	-4.7202	1.8311	0.3706	4.9414
	Item 14	Adolescent has access to home computer.	14.3096	0.074	-1.739	0.2626	-6.6227	1.7693	0.4374	4.0453
	Item 15	Adolescent has access to at least 2 appropriate board games.	12.8489	0.1172	-0.2032	0.17	-1.1956	0.8767	0.1977	4.4345
	Item 16	Adolescent has access to at least 2 pieces of appropriate equipment for physical development or organized sports activities.	8.4448	0.3913	0.003	0.1811	0.0168	0.7809	0.1924	4.0585
	Item 17	At least one full shelf of books is visible in the home.	12.9235	0.1145	0.8546	0.2761	3.0954	0.7028	0.1885	3.7294
	III Modeling									
	Item 18	Parent has read at least four books during past year.	15.2265	0.0549	0.713	0.2172	3.2828	0.8517	0.2054	4.1468
	Item 19	Parent obtains and reads a newspaper daily or a weekly news magazine.	12.1513	0.1446	1.8029	0.3949	4.565	1.0314	0.2806	3.6757
	Item 20	Parent regularly participates in church activities.	4.1856	0.84	-2.9576	1.3943	-2.1212	0.3647	0.1744	2.0907
	Item 21	Parent participates in an adolescent-oriented organization.	8.2574	0.4087	3.8263	1.5731	2.4323	0.6364	0.2911	2.1863
	Item 22	Parent has friends with whom s/he regularly interacts outside of work.	7.1786	0.5175	0.8728	0.4983	1.7516	0.3703	0.1601	2.3124
	Item 23	Parent regularly engages in fitness activities at least 2 days a week.	14.9563	0.06	2.2868	0.8221	2.7816	0.5234	0.197	2.6575
	Item 24	Parent has not lost temper with adolescent more than once during past week.	12.9012	0.1153	-10.4874	18.7474	-0.5594	0.0938	0.1678	0.5592
	Item 25	None of the adults in the home displays obvious signs of recent alcohol or non-prescriptive drug consumption.	6.4344	0.5987	-4.7443	2.2154	-2.1416	0.5485	0.2772	1.9788
	Item 26	Parent uses complex sentence structure and some long words in conversing.	6.4182	0.6005	-2.5662	0.8354	-3.0717	0.5804	0.2017	2.8779
	Item 27	Parent does not violate rules of common courtesy (ignoring Visitor, derogatory comments, or hitting child) during the visit.	6.5436	0.5866	-6.7919	4.8271	-1.407	0.4733	0.3558	1.3301

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Grouped analysis for investments young adulthood (cont.)

	Item		X^2	Pr(>X^2)	Dffclt value	Dffclt std.err	Dffclt z.vals	DScrmn value	DScrmn std.err	DScrmn z.vals
	V Regulatory Activities									
	Item 34	Family has a TV, and it is used judiciously, not left on continuously.	6.6257	0.5775	-3.9218	2.6427	-1.484	0.2507	0.1701	1.4742
	Item 35	Parent periodically discusses the hazards of alcohol and drug abuse with adolescent.	5.9808	0.6494	-5.1254	2.6594	-1.9273	0.5286	0.295	1.7919
	Item 36	Parent has provided guidance or advice to adolescent during the past year concerning responsible sexuality and physical hygiene.	13.1109	0.1081	-2.7168	0.874	-3.1087	0.604	0.2113	2.8593
	Item 37	Adolescent has weekly routine household responsibilities.	14.0205	0.0812	-4.5516	2.3389	-1.9461	0.4055	0.218	1.8603
Factor I_2:	Item 38	Family has a fairly regular and predictable daily schedule.	5.5973	0.6922	-3.8615	2.4426	-1.5809	0.2748	0.1757	1.5634
log.Lik = -3196.889										
AIC = 6501.778	Item 39	Parent requires adolescent to sleep at home on school nights.	4.0274	0.8546	-12.5746	20.398	-0.6165	0.1234	0.2009	0.6145
BIC = 6696.887										
max(grad) = 0.0071	Item 40	When parent is not available to adolescent at home, reasonable procedures have been established for check in with parents, or their designee, on weekends and after school.	2.8792	0.9417	-3.5195	1.3682	-2.5724	0.5468	0.2289	2.3886
	Item 41	Parent establishes rules for adolescents behavior with peers and asks questions to determine whether the rules are being followed.	5.8024	0.6694	-1.1416	0.2215	-5.153	1.1584	0.2544	4.5526
	Item 42	Parent has had contact with at least 2 of the adolescents friends in the last month.	15.7548	0.046	-0.0161	0.1821	-0.0883	0.7688	0.1939	3.9648
	Item 43	Parent knows signs of drug usage and remains alert to possible experimentation or abuse.	5.7008	0.6807	-3.108	0.9739	-3.1912	0.7112	0.2531	2.8099
	VI Family Companionship									
	Item 44	Family member has arranged for adolescent to go to a scientific, historical, or art museum during the past year.	11.53	0.1734	1.7093	0.8114	2.1066	0.3763	0.1702	2.2111
	Item 45	Family member has arranged for adolescent to attend some type of live musical or theater performance during the past year.	9.6579	0.2899	1.5614	0.6586	2.3709	0.4393	0.1769	2.4826
	Item 46	Family member has arranged for adolescent to go on a trip of more than 50 miles from home during the past year.	14.6089	0.0672	-1.7598	0.7666	-2.2956	0.3991	0.1679	2.3764
	Item 47	Father regularly engages in outdoor activity with the adolescent at least once every two weeks.	10.0236	0.2634	-0.187	0.2321	-0.806	0.5925	0.1885	3.1435
	Item 48	Adolescent spends some time with father (or father figure) 4 days a week.	6.6817	0.5713	-1.3101	0.4771	-2.7457	0.5372	0.187	2.8725
	Item 49	Adolescent eats at least one meal per day, on most days, with mother and father.	8.2423	0.4102	-0.0365	0.2558	-0.1428	0.5154	0.1773	2.9068
	Item 50	Family visits or receives visits from relatives or friends at least once a month.	6.8728	0.5504	-2.8572	1.0516	-2.717	0.5181	0.2028	2.5551
	Item 51	Family member has taken adolescent to a live organized athletic or sporting event during the past year.	9.258	0.321	1.9554	0.7397	2.6434	0.4896	0.1873	2.6135
	VII Acceptance									
	Item 52	Parent mentions a particular skill, strength, or accomplishment of adolescent during interview.	10.3636	0.2404	-0.6703	0.1295	-5.1764	1.7345	0.3861	4.4918
	Item 53	Parent shows some positive emotional response to praise of adolescent by visitor.	16.373	0.0373	-1.0702	0.1412	-7.5795	2.0935	0.4628	4.5231
	Item 54	Parent does not ridicule or express hostility or refer to the adolescent in a derogatory manner during the visit.	3.9427	0.8623	-1.6728	0.2125	-7.8705	2.0139	0.4534	4.4422
	Item 55	Parent talks to adolescent during the visit (beyond correction and introduction).	8.1038	0.4234	-1.8408	0.2223	-8.2807	2.4288	0.6052	4.0133
	Item 56	During the visit, when speaking of or to the child, the parents voice conveys positive feeling.	0.2308	1	-1.5109	0.2638	-5.7275	9.0111	15.274	0.59
	Item 57	Parent allows adolescent to have some privacy.	8.3782	0.3974	-1.5738	0.3123	-5.0397	1.0448	0.2463	4.2415
	Item 58	Parent encourages adolescent to contribute to the conversation during visit.	3.5023	0.899	-3.1607	1.0132	-3.1195	0.7242	0.264	2.7436
	Item 59	Parent responds appropriately and positively to adolescents questions or comments during the visit.	5.8859	0.66	-1.7518	0.2553	-6.8617	1.6954	0.3902	4.3447
	Item 60	Adolescent can have a disagreement with parent without harsh reprisals.	2.1746	0.9752	-1.9218	0.2403	-7.998	2.4252	0.638	3.8014
	IV Fostering Self-Sufficiency									
Factor I_3:	Item 28	Parent has discussed current events with adolescent during past 2 weeks.	36.2638	<0.0001	-5.67	5.4938	-1.0321	0.2733	0.2559	1.0678
log.Lik = -773.6408										
AIC = 1571.282	Item 29	Parent teaches adolescent basic cooking or cleaning skills.	132.5155	<0.0001	-3.5443	1.9219	-1.8442	0.7449	0.344	2.1653
BIC = 1614.639										
max(grad) = 0.0011	Item 30	Parent has taught adolescent how to deal with health and safety emergencies.	24.487	0.0019	5.3534	40.4886	0.1322	0.0261	0.196	0.1334
	Item 31	Parent has arranged for special instruction outside of school for adolescent.	22.137	0.0047	0.4905	1.6394	0.2992	0.0965	0.1946	0.4961
	Item 32	Parent has assisted adolescent with homework and school assignments during past 2 weeks.	58.0757	<0.0001	-0.4117	0.2243	-1.8358	-1.0841	0.281	-3.8577
	Item 33	Parent has established rules about homework and checks to see if homework is completed.	1.8519	0.9852	-0.5805	6.1357	-0.0946	-16.0917	78.4956	-0.205