Early Childhood Development: Current Status and Gaps

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1. Introduction

The period between conception and a child's entry into the formal schooling system is increasingly recognized as critical for early and later life outcomes (Walker et al. 2011; Britto et al. 2016). The early childhood period is unique in terms of the pace and diversity of new skills learnt and acquired, and lays the foundation for later physical and mental wellbeing (Grantham-McGregor et al. 2007). Through an interactive and highly heterogeneous process, children acquire a remarkable share of their perceptual, motor, cognitive, language, socio-emotional, and self-regulation skills in the first years of life (Grantham-McGregor et al. 2007; Black et al. 2017; Harman et al. 2018). These skills are not only important for subsequent educational attainment, but also highly predictive of adult outcomes more broadly, including measures of general wellbeing, crime, marital status and income (Oreopoulos 2007; Kamal and Bener 2009; Heckman et al. 2013; Chan et al. 2017).

Recent work comparing long term costs and benefits of various policy programs suggests that the early childhood period may constitute the most cost-effective time interval to ensure that all children achieve their developmental potential (Heckman and Tremblay 2019), with estimated returns of up to $17.7 for each dollar invested (Chan et al. 2017). Despite this, global gaps in early childhood development remain large. More than 250 million children under age five are currently estimated to not reach their developmental potential (Li et al. 2016; Black et al. 2017); 22% of children under age 5 in LMICs experience physical growth faltering (United Nations 2018), and 37% of 3- and 4-year-olds growing up in low- and middle-income countries display deficits in their cognitive or socioemotional development (McCoy et al. 2016). All primary risk factors for early development are directly linked to poverty: exposure to infectious disease, lack of access to early life health services, lack of access to early learning materials and personal support, as well as chronic malnutrition, have been consistently associated with poor developmental outcomes in the literature (Engle et al. 2011; Walker et al. 2011; Black et al. 2017).

Governments around the globe are increasingly recognizing the benefits of investing in early childhood development (Pelletier and Neuman 2014), and early

childhood development (ECD) is now considered a foundation for sustainable development (Daelmans et al. 2017).

In this article, we first summarize the evidence on what is known regarding the current gaps in early childhood development, and then discuss the most promising intervention strategies. We conclude with some general reflections.

2. Materials and Methods

The materials presented in this article mostly represent previously published work. The primary data sources for each of the tables and figures are provided below.

3. Results

3.1. Global Gaps in Early Childhood Development

Data on children's early development at a national or global level remain remarkably scarce. In 2007, the Lancet launched its first "*Early Childhood Development Series*", which synthesized the then available evidence on child development (Grantham-McGregor et al. 2007). While it was rather obvious that large developmental gaps existed across socioeconomic groups within and across countries, comparable data on the actual skill sets or developmental levels of children under the age of three were not available. In order to create a first estimate of global gaps in early childhood development (ECD), the author team thus decided to focus on quantifying children's exposure to risk. In the ECD literature, the two most salient risk factors for healthy development are chronic malnutrition and exposure to poverty. Combining all available data, the author team estimated that 219 out of 559 million children under age five globally were at risk of poor development (Grantham-McGregor et al. 2007). With slightly better data, these numbers were revised to 249 million, or 43% of all children under the age of five globally at risk of not reaching their potential in the subsequent Lancet ECD series (Black et al. 2017).

Even though these numbers have been important in shaping global policy in this area, it is not clear how well stunting- and poverty-based estimates approximate the actual number of children displaying delays in their development. Among the primary challenges in the area of global ECD research is that, to date, "normal development" has not been defined at a global level. While the global nutrition community was able to establish a first set of reference growth tables in the early 2000s (WHO Multicentre Growth Reference Study Group 2006), the same still has to happen in the area of ECD. The lack of a global standard or reference norms makes an objective assessment of gaps challenging. There are two main reasons why global references

for early development have been difficult to establish: First, there is a substantial body of literature suggesting that children's trajectories are highly context-specific, and thus should not be directly compared. According to this logic, comparing children across different settings does not make sense conceptually—if reference tables are needed (which is still questioned by many researchers), these should be country specific, and thus only compare children to other children from the same country. "Developmental delay" would then be defined as a child developing significantly slower than others in their own environment.

Similar arguments were made up to the early 2000s in the field of nutrition. Many researchers felt that children's early growth was genetically driven, and should thus not be compared across settings with different genetic pools. This notion was, however, soundly rejected in the original 2006 WHO study (WHO Multicentre Growth Reference Study Group 2006) as well as the larger subsequent INTERGROWTH 20th century study (Villar et al. 2013). Both studies followed groups of newborns in a very diverse set of high- and low-income countries. Rather than assessing representative samples of children, these studies focused on children that lived in comparable conditions that were assessed as suitable for healthy growth. While this definition of "healthy homes" varied slightly across countries, the idea was to compare children that did not have any obvious genetic defects and had access to a safe home, clean water and sanitation. Given that adult height varies substantially across those sites—British adults are about 5cm taller than Chinese adults and about 10cm taller than Indian adults—large differences in early childhood growth were expected. However, no such differences were found, suggesting that differences in adult height emerge only in later childhood or adolescence among children growing up in safe and supportive environments. While these findings were not necessarily anticipated, they were important for the field, since they meant that comparisons of population-level outcomes across countries or regions were valid, and that a standardized set of growth references could be applied to all children globally.

As shown in Karra et al. (2016), reference populations similar to those sampled in these two highly influential studies can be created from standard survey data by restricting the analysis to households that can offer similarly safe environments to children. In the pooled Demographic and Health Survey (DHS) used in their paper, the average height for age z-score in the general population is −1.41 (SD 1.66), which implies that on average children in low- and middle-income countries (at least those countries sampled in the DHS) had heights that were almost 1.5 standard deviations below the international reference median. The overall distribution of height for age z-scores is illustrated in Figure 1: both the reference population and the actual

distribution roughly follow a normal distribution—the entire distribution of height in the actual DHS sample is, however, shifted by 1.45 z-scores to the left, and wider, with an estimated standard deviation of 1.66.

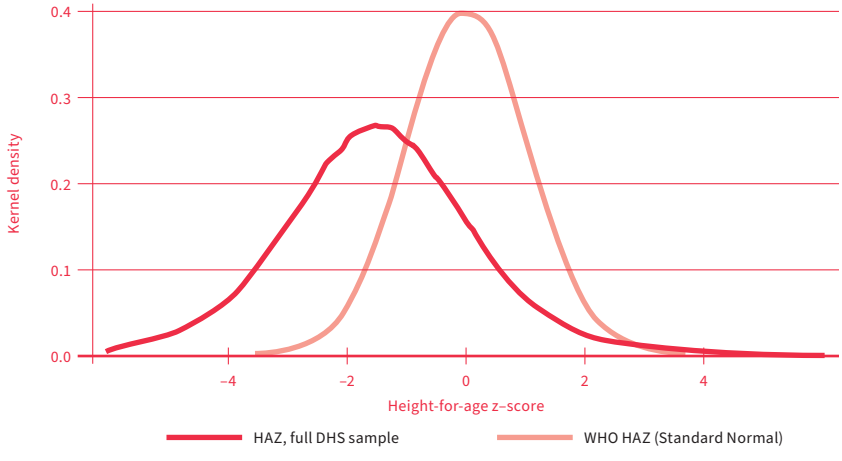

Figure 1. Height-for-age z-score distribution among children in pooled demographic and health survey files used in Karra et al. (2016). Red dotted line shows standard normal HAZ distribution in WHO reference norm sample. Pink line shows empirical distribution of HAZ in the pooled sample.

This distribution of height in the pooled sample masks a remarkable amount of heterogeneity, however. When the analysis was restricted to children who live in households that match those of well-off Western families, these gaps disappeared. As Figure 2 shows, the distribution of HAZ in this selected subsample looks rather similar to the reference population, with slightly less density at the center of the distribution and slightly wider tails. These wider tails likely capture, at least partially, errors in height measurement; they may, however, also represent slightly larger (genetic) variance in the more diverse DHS sample compared to the six sites in the original WHO study.

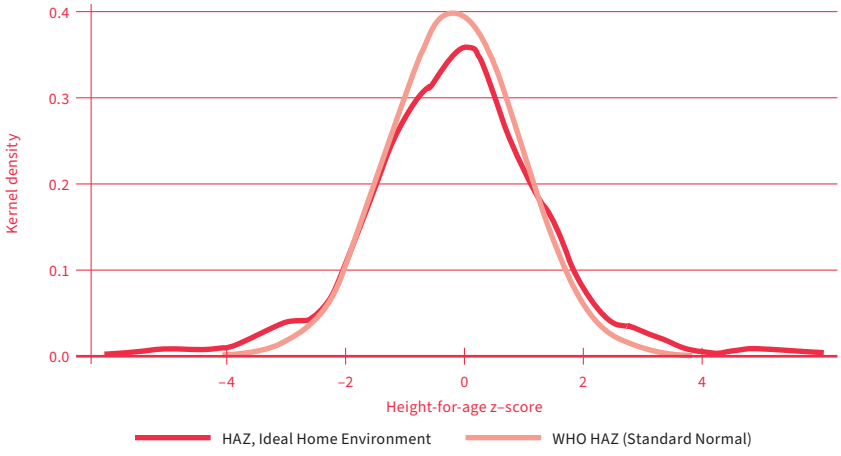

Figure 2. Height-for-age z-score distribution among children with ideal home environments in demographic and health surveys. Red dotted line shows standard normal HAZ distribution for WHO reference norms. Pink line shows empirical distribution in ideal home environments. Children in ideal home environments were defined as children with (1) access to safe water and sanitation; (2) living in households with finished floors, a television, and a car; (3) raised by highly educated mothers; (4) single births; and (5) delivered in hospitals. More details on the sample are available in Karra et al. (2016).

While similarly comprehensive and normalized data are not available yet for any other domain of early childhood development, several new tools to assess child development in low- and middle-income countries have emerged and also been used in a growing number of contexts in recent years. Most tools focus on four main domains of development: (fine and gross) motor skills, cognitive skills, language skills and socioemotional skills. Using a sample of over 10,000 healthy children from four middle-income countries, Ertem et al. show that on average the age at which children achieve developmental milestones under the age of three varies very little across sites (Ertem et al. 2018). The only domains where substantial differences were found were "self-help" or "life skills", such as brushing teeth, using toilets or dressing, which tend to be strongly influenced by local customs and habits, and likely do not reflect true differences in children's inherent ability.

Using a more diverse sample of children under age 3 living in selected high-, middle-, and low-income countries, substantial developmental differences were, however, found across sites (Fink et al. 2019). In the six low- and middle-income

countries analyzed, average cognition z-scores for children under the age of 3 was −0.52, with an SD of 1.28 (Figure 3).

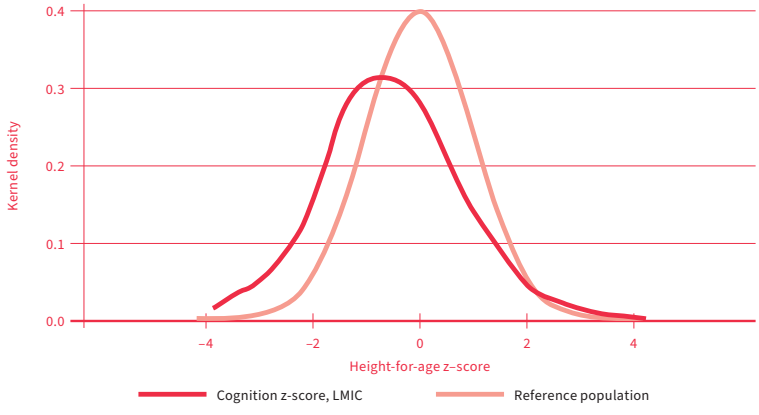

Figure 3. Based on a sample of 3447 children under the age of three used in Fink et al. (2019). Children in the LMIC sample are from Cambodia (N = 410), Ghana (N = 1512), Guatemala (N = 197), Lebanon (N = 376), Pakistan (N = 238) and Philippines (N = 714).

When the sample was restricted to children growing up with a mother who had completed high school or higher education, this gap once again disappeared (Figure 4, mean z-score −0.06, SD 1.27).

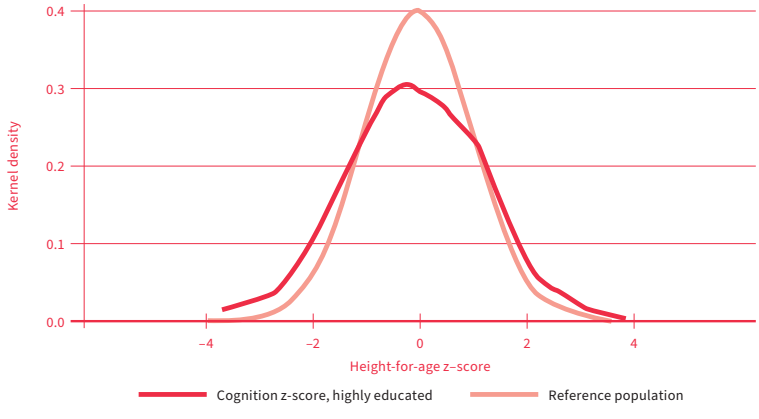

Figure 4. Based on 621 children with highly educated mothers from Cambodia (N = 20), Chile (N = 170); Ghana (N = 42), Guatemala (N = 19), Lebanon (N = 59), Pakistan (N = 11) and Philippines (N = 300).

Both the nutrition and the cognition analyses suggest that current developmental gaps in low-income settings are substantial. These gaps are neither driven by genetic nor geographical or climate-related reasons, but rather seem to be the result of (poverty-related) factors in the home environment. In general, for child health and development, maternal education is the single most important predictor of outcomes; once we compare mothers with completed secondary education or higher education, differences in health and developmental outcomes across countries become small; once differences in living conditions are also adjusted for, differences disappear completely.

Table 1 shows the global distribution of educational attainment according to the data collected by Barro and Lee (2013). While in developed countries (advanced economies), the large majority of women had at least secondary education in 2010, substantial gaps remained in several other regions, with particularly large gaps in South Asia and Sub-Saharan Africa, where secondary or higher education remained limited to a minority. Major efforts have been made in the past two decades to increase primary and secondary schooling enrollment; these efforts will undoubtedly improve children's home environment and support in the decades to come; for the time being, the lack of maternal education remains among the most critical concerns.

Table 1. Educational attainment in the female population age 15 and older in 2010. Source: Author's compilation based on data from http://www.barrolee.com/ (accessed on 9 September 2021).

Region	Percentage of Female Population Age 15 and Older with..				
	Number of Countries	..No Education	..Primary Education	..Secondary Education	..Tertiary Education
Advanced Economies	24	3.1	18.7	51.4	26.9
East Asia and the Pacific	19	13.6	26.4	45.3	14.7
Europe and Central Asia	20	1.3	7.1	69.8	21.8
Latin America and the Caribbean	25	8.5	33.6	46.3	11.6
Middle East and North Africa	18	22.7	20.9	41.2	15.2
South Asia	7	42.2	18.7	34.3	4.8
Sub-Saharan Africa	33	39.3	31.5	27.0	2.1
Total	*146*	*17.6*	*23.8*	*44.7*	*13.9*

Table 2 shows the percentage of 3- and 4-year-old children that benefit from interactions with their caregivers or other adults in their household. In most middle-income countries, adult engagement is substantial, with a large majority of adults engaging in at least four out of the six activities captured by the Multiple

Indicator Cluster Surveys (MICS). In many low-income settings, and particularly in many African countries, that is, however, not true, with quite a few countries where less than one third of caregivers indicate that they engage with these child activities on a regular basis.

3.2. Interventions to Improve Early Childhood Development

Early life interventions are increasingly recognized as key for creating the environments that children need for a healthy development (Nores and Barnett 2010; Hoddinott et al. 2013; World Bank Group 2015; Richter et al. 2017), and for ensuring children's long-term economic and general well-being (Heckman 2006). In all likelihood, the most successful model for improving child health and well-being in low-income settings is home visiting programs to support parents; such programs have been successfully implemented in Bangladesh (Hamadani et al. 2006), Colombia (Attanasio et al. 2014), Peru (Hartinger et al. 2017), Jamaica (Grantham-McGregor et al. 1991; Walker et al. 2005), Pakistan (Yousafzai et al. 2014) and South Africa (Cooper et al. 2009). The main logic of home visiting programs is that trained child development or community agents meet with mothers or parents on a weekly, biweekly or monthly basis to discuss the child's overall well-being and needs, as well as to provide practical guidance for parents on how to provide a healthy and developmentally stimulating environment for the child. Home visiting programs are typically based on a tightly structured curriculum, which contains key topics of child health and development to be covered during each home visit. Through the regular interaction with caregivers, home visiting programs are designed to improve early childhood health and development (Engle et al. 2011; Yousafzai and Aboud 2014), but can also improve maternal well-being (Carta et al. 2013; Tandon et al. 2013).

Despite their remarkably large and consistently positive impact on child well-being (Yousafzai and Aboud 2014; Aboud and Yousafzai 2015), home visiting programs have not been adopted at scale by most countries, which is mostly due to the large cost and logistical efforts associated with these programs. To date, the only countries that have attempted the rollout of home visits are Brazil and Colombia; evaluations of both programs are still ongoing; given the scale and cost of these programs, and it not clear yet whether they will be sustainable in the long term.

Table 2. Percentage of children with appropriate home stimulation in low- and middle-income countries. 95% confidence intervals in parenthesis adjusted for two-stage cluster-sampling used in Multiple Indicator Cluster Surveys (MICS). Home stimulation was defined as adults engaging in the following activities with the child in the past 3 days: reading books or looking at pictures; telling stories; singing songs; taking the child outside; playing with the child; and naming, counting, or drawing with the child. Following previous work, using data from McCoy et al. (2018), we totaled the number of activities that adults engaged in with the child, and defined adequate home stimulation as exposure to at least four out of six activities.

Percentage of Children with Appropriate Home Stimulation					
Afghanistan	73.6	(72.3, 74.9)	Malawi	30.1	(28.6, 31.6)
Algeria	79.7	(78.3, 81.2)	Maldives	97.7	(96.7, 98.6)
Argentina	84	(81.9, 86.1)	Mali	54.9	(53.4, 56.4)
Bangladesh	79.1	(78.0, 80.1)	Mauritania	45.5	(43.6, 47.4)
Belarus	96.1	(94.5, 97.7)	Mexico	77	(73.7, 80.2)
Belize	89.9	(87.5, 92.3)	Moldova	89.4	(86.9, 91.9)
Benin	28.1	(26.6, 29.6)	Mongolia	55.2	(53.1, 57.4)
Bhutan	54.5	(51.9, 57.0)	Montenegro	98.7	(97.8, 99.6)
Bosnia and Herzegovina	95.2	(93.4, 97.1)	Nepal	67.9	(65.4, 70.4)
Burundi	59.8	(59.0, 60.6)	Nigeria	63.6	(62.4, 64.8)
Cameroon	45.5	(43.3, 47.7)	Palestine	79	(77.5, 80.5)
Central African Republic	74.1	(72.3, 75.9)	Panama	73.7	(70.7, 76.8)
Congo, Rep.	59.8	(57.5, 62.2)	Paraguay	64.9	(62.0, 67.8)
Costa Rica	68.9	(63.2, 74.7)	Rwanda	43.6	(42.0, 45.3)
Cote d'Ivoire	28.9	(26.9, 30.8)	Senegal	27.9	(26.5, 29.2)
Dominican Republic	60.8	(59.1, 62.5)	Serbia	95.5	(94.2, 96.7)
El Salvador	60.6	(58.4, 62.9)	Sierra Leone	51.9	(46.6, 57.2)
Gambia	48.3	(46.2, 50.4)	Suriname	73.6	(70.7, 76.5)
Ghana	40.4	(37.7, 43.1)	Swaziland	39.7	(36.2, 43.2)
Guinea	31.2	(29.4, 33.0)	São Tomé and Principe	64.9	(61.0, 68.8)
Guinea-Bissau	33	(30.9, 35.1)	Thailand	93.9	(92.8, 95.1)
Guyana	89.5	(87.7, 91.3)	Timor-Leste	84.4	(81.8, 86.9)
Iraq	72.6	(64.9, 80.3)	Togo	62.4	(59.7, 65.1)
Jamaica	88.6	(84.7, 92.5)	Trinidad and Tobago	96.7	(94.9, 98.5)
Jordan	80.4	(78.8, 82.0)	Tunisia	71.2	(68.0, 74.4)
Kazakhstan	87.3	(84.4, 90.2)	Turkmenistan	96.2	(95.1, 97.2)
Kosovo	68.2	(64.5, 72.0)	Uganda	51.7	(50.6, 52.9)
Kyrgyzstan	73.6	(71.2, 76.1)	Ukraine	99.2	(98.7, 99.6)
Lao PDR	63.4	(60.7, 66.1)	Uruguay	93	(90.1, 95.9)
Lebanon	85	(82.4, 87.7)	Vietnam	77.7	(75.1, 80.4)
Macedonia	91.8	(89.2, 94.5)	Zimbabwe	45	(43.3, 46.7)

From a conceptual perspective, home visiting programs were designed to support children in settings where they spend most of their time with their caregivers and families. In practice, the period in which this is true will likely shorten over the coming decade. In many middle-income countries, a large majority of mothers are engaged in the informal or formal labor market now, and often return to work within a relatively short period of time (typically within less than six months). After this period, children either have to be supported by other members of the family or by formal daycare centers. These centers are emerging rapidly around the globe now and should ideally provide suitable environments to children from all socioeconomic backgrounds. From a scientific perspective, the long-term impact of daycare and preschool programs remains somewhat unclear. Despite some very positive initial findings (Garces et al. 2002), the large US Head Start program has increasingly become criticized over time, with benefits rapidly fading over time as children enter primary school (Lee and Loeb 1995; U.S. Department of Health and Human Services 2010). From a societal perspective, the main benefits of government-supported early childhood programs go beyond long-term educational benefits, since they are essential for parental labor market participation; in the long term, early center enrollment may simply become the norm. Today, one or two years of kindergarten are becoming fairly standard in many settings; it will be interesting to see whether this will be further extended to even younger children over time.

4. Discussion

In this article, we reviewed the literature and data available on early childhood development globally today. The natural, medical and social sciences have created a rather substantial body of literature over the past twenty years to document and confirm the critical importance of the early childhood period for later life outcomes. The first years of life are not only the period when children learn to walk and talk but also the period when basic neurological, cognitive and social skills are developed that shape individual lifetime trajectories. As we have shown in this chapter, there is also agreement that the development of children in low- and middle-income countries is on average delayed compared to children in high income settings. The magnitude of these delays is well documented for physical growth, where more than one in five children growing up in LMICs continue to suffer from growth faltering. For other domains of child development, including language, cognition, socio-emotional and executive functioning skills, data availability is still very limited. The few studies that have attempted developmental comparisons across sites have often found sizeable gaps between high-, middle- and low-income countries. The

good news is that these gaps are generally not found when children from safe home environments are compared: several studies show that children growing up in similarly endowed households around the globe—children living in decent houses with access to decent water, sanitation infrastructure and benefitting from engaged parents—follow roughly the same trajectories everywhere. This is of course not to say that all children develop at the same pace; it is quite obvious that some children learn to talk or walk earlier than others. The main finding of the comparative literature is simply that the distribution of developmental outcomes is very similar across countries once analysis is restricted to children growing up in similar environments. While this is good news overall, large gaps do clearly remain today, with many children growing up in highly resource-constrained environments, without access to clean water or sanitation, safe play spaces or adults that can support them in their development. Global efforts to reduce poverty and to increase education will undoubtedly have large benefits in terms of the early environment of children growing up in LMICs. Additional government support for high quality early education as well as parental support programs may also help to bring us closer to a world where all children can fully reach their developmental potential, and become adults not facing extreme poverty in the future. In countries such as Brazil, home visiting programs supporting vulnerable families in the first two years of children's lives are now standard, and can hopefully inspire other countries. Government involvement in the pre-school and kindergarten period (ages 3–5) has also increased substantially over the past decade, with a growing number of countries offering free access to early learning opportunities. Even though the quality of some of these programs is certainly not ideal yet, overall policy efforts definitely appear be following in the desired direction at a global scale.

5. Conclusions

Large gaps in children's physical, cognitive and socioemotional development are common in low- and middle-income countries today due to poverty, lack of maternal education and lack of early learning opportunities. Major governmental efforts will be required to close these gaps and to offer all children globally a chance for a healthy and productive life.

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References

Aboud, Frances E., and Aisha K. Yousafzai. 2015. Global health and development in early childhood. *Annual Review of Psychology* 66: 433–57. [CrossRef]

Attanasio, Orazio P., Camila Fernández, E. O. A. Fitzsimons, Sally M. Grantham-McGregor, Costas Meghir, and Marta Rubio-Codina. 2014. Using the infrastructure of a conditional cash transfer program to deliver a scalable integrated early child development program in Colombia: Cluster randomized controlled trial. *BMJ* 349: g5785. [CrossRef] [PubMed]

Barro, Robert, and Jong-Wha Lee. 2013. A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics* 104: 184–98. [CrossRef]

Black, Maureen M., Susan P. Walker, Lia C. H. Fernald, Christopher T. Andersen, Ann M. DiGirolamo, Chunling Lu, Dana C. McCoy, Günther Fink, Yusra R. Shawar, Jeremy Shiffman, and et al. 2017. Early childhood development coming of age: Science through the life course. *Lancet* 389: 77–90. [CrossRef]

Britto, Pia R., Stephen J. Lye, Kerrie Proulx, Aisha K. Yousafzai, Stephen G. Matthews, Tyler Vaivada, Rafael Perez-Escamilla, Nirmala Rao, Patrick Ip, and Harriet MacMillan Lia C. H. Fernald. 2016. Nurturing care: Promoting early childhood development. *Lancet* 389: 91–102. [CrossRef]

Carta, Judith J., Jennifer Burke Lefever, Kathryn Bigelow, John Borkowski, and Steven F. Warren. 2013. Randomized trial of a cellular phone-enhanced home visitation parenting intervention. *Pediatrics* 132 S2: S167–73. [CrossRef]

Chan, Margaret, Anthony Lake, and Keith Hansen. 2017. The early years: Silent emergency or unique opportunity? *Lancet* 389: 11–13. [CrossRef]

Cooper, P. J., M. Tomlinson, L. Swartz, M. Landman, C. Molteno, A. Stein, K. McPherson, and L. Murray. 2009. Improving quality of mother-infant relationship and infant attachment in socioeconomically deprived community in South Africa: Randomised controlled trial. *BMJ* 338: b974. [CrossRef]

Daelmans, Bernadette, Gary L. Darmstadt, Joan Lombardi, Maureen M. Black, Pia R. Britto, Stephen Lye, Tarun Dua, Zulfiqar A. Bhutta, and Linda M. Richter. 2017. Early childhood development: The foundation of sustainable development. *The Lancet* 389: 9–11. [CrossRef]

Engle, Patrice L., Lia C. H. Fernald, Harold Alderman, Jere Behrman, Chloe O'Gara, Aisha Yousafzai, Meena Cabral de Mello, Melissa Hidrobo, Nurper Ulkuer, Ilgi Ertem, and et al. 2011. Strategies for reducing inequalities and improving developmental outcomes for young children in low-income and middle-income countries. *The Lancet* 378: 1339–53. [CrossRef]

Ertem, Ilgi Ozturk, Vibha Krishnamurthy, Mphelekedzeni C. Mulaudzi, Yanina Sguassero, Hakan Balta, Ozlem Gulumser, Burcu Bilik, Roopa Srinivasan, Benjamin Johnson, Geliang Gan, and et al. 2018. Similarities and differences in child development from birth to age 3 years by sex and across four countries: A cross-sectional, observational study. *The Lancet Global Health* 6: e279–91. [CrossRef]

Fink, Günther, Dana Charles McCoy, and Aisha Yousafzai. 2019. Contextual and socioeconomic variation in early motor and language development. *Archives of Disease in Childhood*, 317849. [CrossRef]

Garces, Eliana, Duncan Thomas, and Janet Currie. 2002. Longer-Term Effects of Head Start. *Journal American Economic Review* 92: 999–1012. [CrossRef]

Grantham-McGregor, S. M., C. A. Powell, S. P. Walker, and J. H. Himes. 1991. "Nutritional Supplementation, Psychosocial Stimulation, and Mental Development of Stunted Children: The Jamaican Study. *The Lancet* 338: 1–5. [CrossRef]

Grantham-McGregor, Sally, Yin Bun Cheung, Santiago Cueto, Paul Glewwe, Linda Richter, Barbara Strupp, and Group International Child Development Steering. 2007. Developmental potential in the first 5 years for children in developing countries. *Lancet* 369: 60–70. [CrossRef]

Hamadani, Jena D., Syed N. Huda, Fahmida Khatun, and Sally M. Grantham-McGregor. 2006. Psychosocial stimulation improves the development of undernourished children in rural Bangladesh. *Journal Nutrition* 136: 2645–52. [CrossRef]

Harman, Jennifer L., Jillian Wise, and Victoria W. Willard. 2018. Early intervention for infants and toddlers: Applications for pediatric oncology. *Pediatric Blood & Cancer* 65: e26921. [CrossRef]

Hartinger, Stella, Claudio Franco Lanata, Jan Hattendorf, Jennyfer Wolf, Ana Isabel Gil, Mariela Ortiz Obando, Magaly Nóblega, Hector Verastegui, and Daniel Mäusezahl. 2017. Impact of a child stimulation intervention on early child development in rural Peru: A cluster randomised trial using a reciprocal control design. *Journal of Epidemiology and Community Health* 71: 217–224. [CrossRef] [PubMed]

Heckman, James J. 2006. Skill formation and the economics of investing in disadvantaged children. *Science* 312. [CrossRef] [PubMed]

Heckman, James, and Richard Tremblay. 2019. The Case for Investing in Early Childhood. In *A Snapshot of Research by University of Chicago, USA & University of Montreal, Canada*. Sydney: The Smith Family Research and Development.

Heckman, James, Rodrigo Pinto, and Peter Savelyev. 2013. Understanding the Mechanisms through Which an Influential Early Childhood Program Boosted Adult Outcomes. *American Economic Review* 103: 2052–86. [CrossRef] [PubMed]

Hoddinott, John F., Harold Alderman, Jere R. Behrman, Lawrence Haddad, and Susan Horton. 2013. The economic rationale for investing in stunting reduction. *Maternal & Child Nutrition* 9 S2: 69–82. [CrossRef]

Kamal, Madeeha, and Abdulbari Bener. 2009. Factors contributing to school failure among school children in very fast developing Arabian Society. *Oman Medical Journal* 24: 312–7. [CrossRef]

Karra, Mahesh, Subu Subramanian, and Günther Fink. 2016. Height in healthy children in low- and middle-income countries: An assessment. *The American Journal of Clinical Nutrition*. [CrossRef]

Lee, Valerie E., and Susanna Loeb. 1995. Where Do Head Start Attendees End up? One Reason Why Preschool Effects Fade out. *Educational Evaluation and Policy Analysis* 17: 62–82. [CrossRef]

Li, Chunling, Maureen M. Black, and Linda Richter. 2016. Risk of poor development in young children in low-income and middle-income countries: An estimation and analysis at the global, regional, and country level. *The Lancet*. [CrossRef]

McCoy, Dana Charles, Evan D. Peet, Majid Ezzati, Goodarz Danaei, Maureen M. Black, Christopher R. Sudfeld, Wafaie Fawzi, and Günther Fink. 2016. Early Childhood Developmental Status in Low- and Middle-Income Countries: National, Regional, and Global Prevalence Estimates Using Predictive Modeling. *PLoS Medicine* 13: e1002034. [CrossRef]

McCoy, Dana Charles, Carmel Salhi, Hirokazu Yoshikawa, Maureen Black, Pia Britto, and Günther Fink. 2018. Home- and center-based learning opportunities for preschoolers in low- and middle-income countries. *Children and Youth Services Review* 88: 44–56. [CrossRef]

Nores, Milagros, and W. Steven Barnett. 2010. Benefits of early childhood interventions across the world: (Under) Investing in the very young. *Economics of Education Review* 29: 271–82. [CrossRef]

Oreopoulos, Philip. 2007. Do dropouts drop out too soon? Wealth, health and happiness from compulsory schooling. *Journal of Public Economics* 91: 2213–29. [CrossRef]

Pelletier, David, and Michelle J. Neuman. 2014. Advancing the nutrition and early childhood development agenda: Indicators and guidance. *Annals of the New York Academy of Sciences* 1308: 232–44. [CrossRef] [PubMed]

Richter, Linda M., Bernadette Daelmans, Joan Lombardi, Jody Heymann, Florencia Lopez Boo, Jere R. Behrman, Chunling Lu, Jane E. Lucas, Rafael Perez-Escamilla, Tarun Dua, and et al. 2017. Investing in the foundation of sustainable development: Pathways to scale up for early childhood development. *Lancet* 389: 103–18. [CrossRef]

Tandon, S. Darius, Julie A. Leis, Tamar Mendelson, Deborah F. Perry, and Karen Kemp. 2013. Six-Month Outcomes from a Randomized Controlled Trial to Prevent Perinatal Depression in Low-Income Home Visiting Clients. *Maternal and Child Health Journal*. [CrossRef]

U.S. Department of Health and Human Services. 2010. *Head Start Impact Study*; Final Report. Edited by Administration for Children and Families. Washington, DC: U.S. Department of Health and Human Services.

United Nations. 2018. 2018 Global Nutrition Report. In ed United Nations. Available online: https://globalnutritionreport.org/reports/global-nutrition-report-2018/ (accessed on 9 September 2021).

Villar, J., D. G. Altman, M. Purwar, J. A. Noble, H. E. Knight, P. Ruyan, L. Cheikh Ismail, F. C. Barros, A. Lambert, A. T. Papageorghiou, and et al. 2013. The objectives, design and implementation of the INTERGROWTH-21st Project. *BJOG: An International Journal of Obstetrics & Gynaecology* 120: 9–26. [CrossRef]

Walker, Susan P., Susan M. Chang, Christine A. Powell, and Sally M. Grantham-McGregor. 2005. Effects of early childhood psychosocial stimulation and nutritional supplementation on cognition and education in growth-stunted Jamaican children: Prospective cohort study. *Lancet* 366: 1804–807. [CrossRef]

Walker, Susan P., Theodore D. Wachs, Sally Grantham-McGregor, Maureen M. Black, Charles A. Nelson, Sandra L. Huffman, Helen Baker-Henningham, Susan M. Chang, Jena D. Hamadani, Betsy Lozoff, and et al. 2011. Inequality in early childhood: Risk and protective factors for early child development. *The Lancet* 378: 1325–38. [CrossRef]

WHO Multicentre Growth Reference Study Group. 2006. *WHO Child Growth Standards: Length/height-For-Age, Weight-For-Age, Weight-For-Length, Weight-For-Height and Body Mass Index-For-Age: Methods and Development*. Geneva: World Health Organization.

World Bank Group. 2015. *Investing in Early Childhood Development—Review of the World Bank's Recent Experience*. Washington, DC: World Bank.

Yousafzai, Aisha, and Frances Aboud. 2014. Review of implementation processes for integrated nutrition and psychosocial stimulation interventions. *Annals of the New York Academy of Sciences* 1308: 33–45. [CrossRef]

Yousafzai, Aisha K, Muneera A Rasheed, Arjumand Rizvi, Robert Armstrong, and Zulfiqar A Bhutta. 2014. Effect of integrated responsive stimulation and nutrition interventions in the Lady Health Worker programme in Pakistan on child development, growth, and health outcomes: A cluster-randomised factorial effectiveness trial. *Lancet* 384: 1282–93. [CrossRef]