"The impacts of childcare interventions on children in low- and middle-income countries: A systematic review"

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Online Appendix

This online appendix includes the following content:

Appendix A: Details on the search, the sample, and data extraction

Search

To identify childcare interventions, we searched four online databases (EconLit, Pubmed, Web of Science, and PsychINFO) for studies between 2005 and 2019 (the year of this search) evaluating interventions targeted to children aged 0-5 or their caregivers in low or middle income countries. We focus on papers from 2005 onward in order to identify trends in recent or current labor markets and care arrangements. From an initial set of 3,716 unique results, we identified 45 eligible studies that were empirical research on an early childhood development intervention in a country that was classified as low- or middle-income as of 2005, according to the World Bank classification. We excluded studies of prenatal interventions that did not measure any outcomes post-birth, as well as one-time medical or dental interventions. We included studies that evaluated impacts based on either randomized assignment of treatment, difference-in-differences, instrumental variables, or regression discontinuity.[1]

In 2021, we updated the search by reviewing papers published in 2019 and onwards that cite one of the original 45 research papers that evaluate childcare interventions. We used Google Scholar to trace paper citations. Similar to the original search, we first excluded studies that do not evaluate center-based ECD interventions, not focused on a low- and middle-income country or do not use a quasi-experimental research design. In total, we reviewed 1,236 studies published 2019 and onwards and that cite one of the original papers. We found 37 papers that examine childcare interventions, use the appropriate research design, and are conducted in an eligible country.[2]

These two searches yielded a total of 82 eligible studies on childcare interventions.

Sample

We identified 82 studies of childcare interventions in LMICs, all from the last fifteen years (2007 onward). Of the sample of 82 interventions, 45 (55 percent) sought to increase access to childcare, and 40 (49 percent) sought to improve the quality of existing childcare in some way.[3] Almost all of the studies (87 percent, or 71 studies) reported outcomes on children's development.[4] The categorization of whether the intervention is at the daycare, preschool, or kindergarten level tend to vary according to local contexts, so we categorized the programs by the age of children the intervention serve: interventions that serve children age 0 to 3 are classified as daycare, those that serve children ages 3 and up are classified as preschool and kindergarten, and those that serve a

[1] For even more detail on the search, please see Evans, Jakiela and Knauer (2021).

[2] Almost all the studies in our sample examine only the impact of childcare. One study, Rosero and Oosterbeek (2011) examines both home visits and center-based childcare. While our main sample includes all estimates from the study, if we include only the center-based childcare estimates, the total percentage of positive estimates drops from 81% to 80%. The percentage of positive estimates for children in the daycare age range, for which we have a smaller sample of estimates, drops from 79% to 75%. As the reader can see, our results remain substantively the same.

[3] These sum to more than 100 percent because 3 studies evaluated interventions that sought to both increase access and quality.

[4] Of the 11 studies that do not report child outcomes, all are interventions that improve access to childcare. They do report on maternal economic activities (employment, entrepreneurship) and maternal mental health. In addition, two of these studies report on paternal employment outcomes, and another two report household incomes.

range of ages below 3 and above 3 (such as programs that care to children ages 2 to 5) are tagged in both categories.

Of the 71 studies that report children's outcomes, the majority (51 studies or 72 percent) examine programs for children ages three and older. Twenty-one of the studies report child outcomes disaggregated by gender, and 17 studies report child outcomes disaggregated by wealth. These studies take place across most of the Global South, with studies in Asia, Africa, and Latin America (Appendix Figure 2; Appendix Table 4). The three countries with five or more studies are China (9 studies), Turkey (7 studies), and Indonesia (6 studies).

The full list of studies that included outcomes on children's development, together with the classes of outcomes they include is in Appendix Table 5, with full references in Appendix B.

Data extraction

We extracted data on the following groups of outcomes: access, learning, physical development, socio-emotional development, and later life outcomes. Studies reported a wide range of specific outcomes within each category. For example, access includes current enrollment, attendance days, and 46 other outcomes. Learning includes math scores, early grade reading assessments, expressive vocabulary, and other more than 190 outcomes (some of which are small variations on each other—e.g., receptive vocabulary in different languages). Physical development includes birthweight, body mass index, motor skills, and 80 other outcomes. Socio-emotional development includes emotional maturity, inhibitory control, and 95 other outcomes Later life outcomes include age at gainful employment, occupational status, monthly expenditures, life satisfaction, a measure of childrearing attitudes, and 11 other outcomes. Appendix Table 6 provides the number of distinct outcomes in each category. Appendix Table 7 provides a full list of outcomes in each category.

Appendix B: Full references for the 71 studies with childcare outcomes

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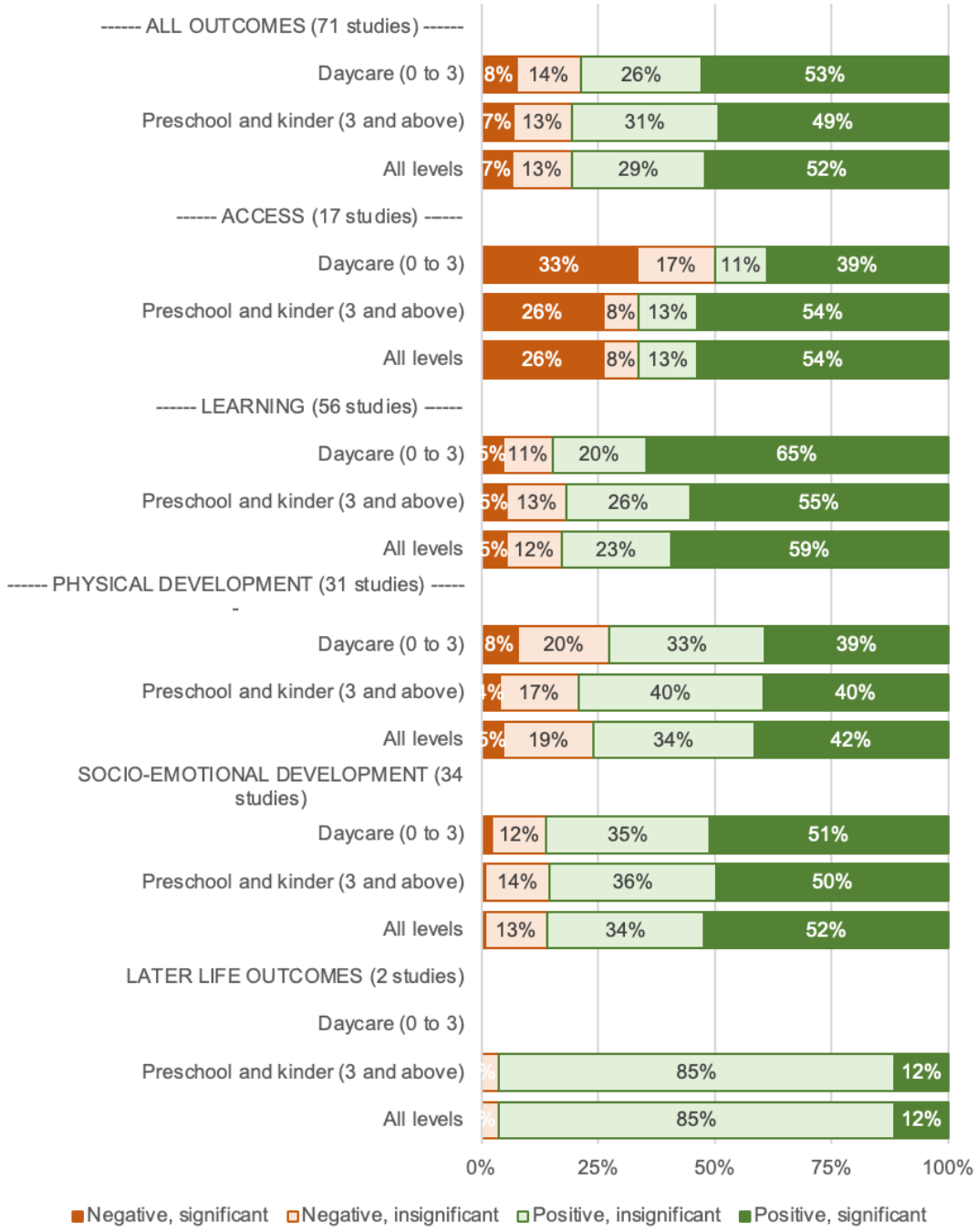
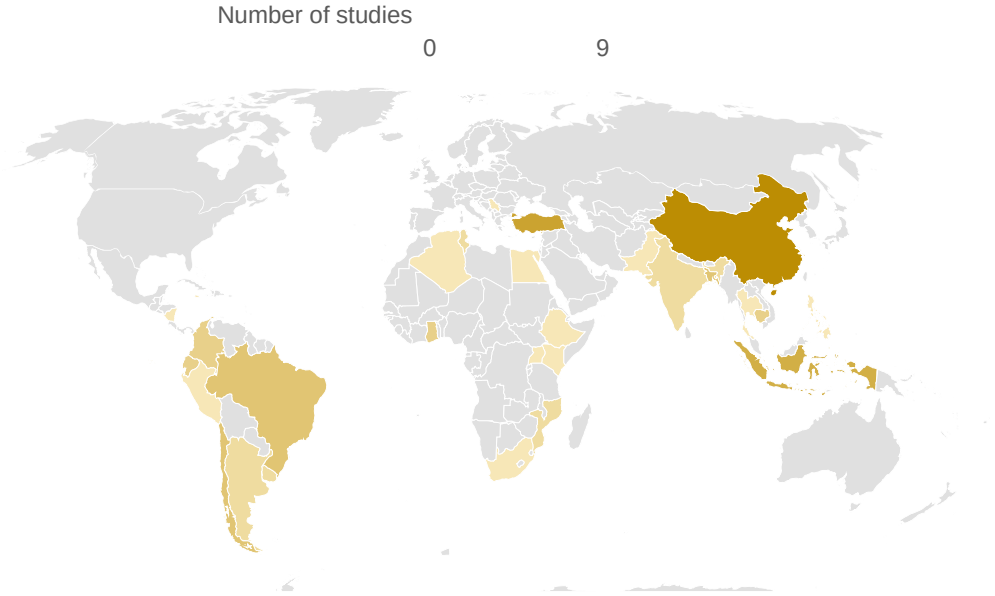
Appendix Figures and Tables

Appendix Figure 1: Distribution of child development outcomes, by proportion of outcomes



Note: We categorize the level of intervention according to age: interventions that serve ages 0-3 are tagged as daycare, those that serve 3 onwards are tagged as preschool and kindergarten, and those that serve a range that encompasses both sets (e.g., those that serve 0 to 6 years old) are tagged in both. As such, the numbers depicted in the "All levels" do not necessarily reflect the average of daycare and preschool/kindergarten. For example, all the 17 studies that report access outcomes all serve children ages 3 and above, such that the numbers reported in the preschool level and the "All levels" are the same, while the numbers reported in the daycare level shows a subset of these studies (i.e. interventions that serve younger kids in addition to those 3 and older).

Appendix Figure 2: Distribution of the 71 studies by country



Appendix Table 1: Proportion of estimates and studies by region

	Proportion positive estimates	Proportion net positive studies
All regions	81%	93%
East Asia & Pacific	69%	90%
Europe & Central Asia	100%	75%
Latin America & Caribbean	84%	100%
Middle East & North Africa	100%	100%
South Asia	85%	71%
Sub-Saharan Africa	78%	100%

Appendix Table 2: Proportion of studies by type of evaluation

	All studies	Experimental studies	Non-experimental studies
Panel A: Proportion of studies with positive impacts on children's outcomes…			
… for all levels	93% (71)	89% (37)	97% (34)
… for younger children (daycare)	80% (15)	71% (7)	88% (8)
…for older children (preschool/kindergarten)	93% (68)	89% (36)	97% (32)
Panel B: Proportion of studies that report better impacts for...			
... children with low socioeconomic status	53% (17)	63% (8)	44% (9)
…girls	71% (21)	75% (12)	67% (9)

Note: The total number of relevant studies are indicated in parentheses. For example, 71% (21) means 71% of the total 21 studies that report child outcomes by gender show more positive results for girls. Panel A shows the proportion of studies that report estimates that are more likely to be positive for each group of children. Panel B shows the proportion of studies that report estimates which are more likely to be bigger (i.e., better impacts) for the disadvantaged groups.

Appendix Table 3: Proportion of estimates by type of evaluation

	All studies	Experimental studies	Non-experimental studies
Panel A. Proportion of estimates with positive impacts on children's outcomes…			
… for all levels	81% (661)	76% (376)	87% (285)
… for younger children (daycare)	79% (197)	79% (68)	78% (129)
…for older children (preschool/kindergarten)	81% (592)	76% (369)	88% (223)
Panel B. Proportion of estimates with better impacts for…			
…children with low socioeconomic status	48% (123)	49% (37)	48% (86)
…girls	65% (126)	64% (64)	66% (62)

Note: The total number of estimates are indicated in parentheses. Panel A —We calculate the proportion by dividing the number of estimates that are positive by the total number of estimates reported in the studies. Panel B — We calculate the proportion by dividing the number of estimates for which children with low socioeconomic status see higher values (i.e. better impacts) than children with higher socioeconomic status by the total number of estimates that report impacts disaggregated by socioeconomic conditions. We do the same exercise by gender: number of estimates for which girls see higher estimates of impacts compared to boys, divided by the number of total estimates that report impacts disaggregated by gender.

Appendix Table 4: Distribution of the 71 studies by country

Country	Number of studies
China	9
Turkey	7
Indonesia	6
Brazil	4
Chile	4
Bangladesh	4
Ecuador	3
Cambodia	3
Colombia	3
Ghana	3
Uruguay	2
Argentina	2
Mozambique	2
India	2
Tunisia	2
Algeria, Egypt, Ethiopia, Jamaica, Kenya, Mauritius, Nicaragua, Pakistan, Peru, Philippines, Serbia, South Africa, Tanzania, Thailand, The Gambia, and Uganda	1 each

Appendix Table 5: Full list of 71 studies with childcare outcomes

Authors and year	Reports access outcomes?	Reports learning outcomes?	Reports physical development outcomes?	Reports socio-emotional development outcomes?	Reports later-life outcomes?	Region
Africa and van Deventer 2017	0	0	1	0	0	SSA
Ahi 2017	0	1	0	0	0	ECA
Ajzenman et al. 2022+	1	1	1	1	0	LAC
Alvarado-Suárez et al. 2022	0	1	1	1	0	LAC
Anliak 2010	0	0	0	1	0	ECA
Attanasio et al. 2022*	0	1	1	0	0	LAC
Bai et al. 2020	0	1	0	0	0	EAP
Baker-Henningham et al. 2009	0	0	0	1	0	LAC
Bastos and Straume 2016	1	0	0	0	0	LAC
Berkes et al. 2019	1	1	1	1	0	EAP
Berlinski and Galiani 2007	1	0	0	0	0	EAP
Berlinski et al. 2009*+	0	1	0	1	0	LAC
Bernal and Ramírez 2019*	0	1	1	1	0	LAC
Bernal et al. 2019*	0	1	1	1	0	LAC
Bietenbeck et al. 2019*+	1	1	0	0	0	LAC
Bilir Seyhan et al. 2019	0	0	0	1	0	SSA
Bjorvatn et al. 2022	0	1	1	1	0	ECA
Blimpo et al.2022*+	0	1	1	0	0	SSA
Bloem and Wydick 2023*	1	1	0	0	0	EAP
Bloomfield 2019+	1	0	1	0	0	EAP
Bojorque et al. 2018	0	1	0	0	0	LAC

Authors and year	Reports access outcomes?	Reports learning outcomes?	Reports physical development outcomes?	Reports socio-emotional development outcomes?	Reports later-life outcomes?	Region
Bonilla et al. 2019*	1	1	1	1	0	LAC
Borzekowski et al. 2019	0	1	1	1	0	SSA
Bouguen et al. 2014+	1	1	1	1	0	SA
Bouguen et al. 2021*+	1	1	0	1	0	EAP
Brinksman et al. 2017+	1	1	1	1	0	EAP
Celik et al. 2016	0	0	0	1	0	ECA
Chen et al. 2018	0	1	0	0	0	EAP
Chen et al. 2019	0	1	0	0	0	EAP
Chujan and Kilenthong 2021*+	0	1	1	1	0	EAP
Cortázar et al. 2020	0	1	0	0	0	LAC
Darnis and Dodd 2021	0	1	0	0	0	EAP
Dean and Jayachandran 2019	0	1	1	1	0	SA
Elmonayer 2013	0	1	0	0	0	LAC
Famelia 2018	0	0	1	0	0	EAP
Gallego et al. 2021*+	0	1	0	0	0	LAC
Hasan et al. 2021+	1	1	1	1	0	EAP
Hojman and López Bóo 2022*+	0	1	0	1	0	LAC
Jarraya et al. 2019	0	0	1	1	0	MENA
Jarraya et al. 2022	0	1	1	1	0	MENA
Jung and Hasan 2016+	1	1	0	1	0	EAP
Kagitcibasi et al. 2009	0	1	0	0	1	ECA

Authors and year	Reports access outcomes?	Reports learning outcomes?	Reports physical development outcomes?	Reports socio-emotional development outcomes?	Reports later-life outcomes?	Region
Kayili 2018	0	1	0	0	0	ECA
Kim and Sabates 2022*	0	1	0	0	0	SSA
Lassassi 2021*+	0	1	0	0	0	MENA
Lee et al. 2011	0	1	0	0	0	EAP
Lei 2019*	1	0	0	0	1	EAP
Martinez et al. 2017*+	1	1	1	1	0	SSA
Mendelsohn et al. 2020	0	1	0	0	0	LAC
Morabito et al. 2018	0	1	0	0	0	SSA
Narea et al. 2020+	0	1	0	0	0	LAC
Noboa-Hidalgo and Urzua 2012	0	1	1	1	0	LAC
Nores et al. 2019*	0	1	1	1	0	LAC
Opel et al. 2009	0	1	0	0	0	SA
Özkubat and Ulutaş 2018	0	1	0	0	0	ECA
Ozler et al. 2018	1	1	1	0	0	SA
Rodriguez and Saltiel 2020*	0	1	1	1	0	SA
Rosero and Oosterbeek 2011	0	1	1	1	0	LAC
Ryu 2020	1	0	0	0	0	LAC
Salas et al. 2010	0	1	0	0	0	LAC
Setiana et al. 2019	0	1	0	0	0	EAP
Shing et al. 2013	0	1	0	0	0	EAP
Spier et al. 2020*	0	1	1	1	0	SA

Authors and year	Reports access outcomes?	Reports learning outcomes?	Reports physical development outcomes?	Reports socio-emotional development outcomes?	Reports later-life outcomes?	Region
Veljković et al. 2021	0	1	1	0	0	ECA
Wolf 2019	0	1	0	1	0	SSA
Wolf et al. 2019a*	0	1	0	1	0	SSA
Wolf et al. 2019b*+	0	1	0	1	0	SSA
Wong Kwok Shing et al. 2013	1	1	0	0	0	EAP
Xiong et al. 2019	0	0	1	1	0	EAP
Yousafzai et al. 2018	0	1	1	1	0	SA
Zhang et al. 2014	0	0	0	1	0	EAP

Notes: Regions are EAP = East Asia and the Pacific, ECA = East and Central Asia, LAC = Latin American and the Caribbean, MENA = Middle East and North Africa, SA = South Asia, SSA = Sub-Saharan Africa. The 21 studies that report outcomes disaggregated by gender are marked by an asterisk (*). The 17 studies that report outcomes disaggregated by socioeconomic status are marked by a plus sign (+). The full references for the studies listed in this table are in Appendix B.

Appendix Table 6: Category of outcomes and the number of distinct outcomes tested in each category from the 71 studies that report child outcomes

Category	Specific outcomes
Access	48
Learning	195
Later life outcomes	16
Physical development	82
Socio-emotional development	97
Total	438

Appendix Table 7: Types of outcomes reported by the 71 studies under different categories

Category	Specific outcomes
Access	Child is in appropriate age for grade, attendance rate, attended kindergarten, attended preschool, completed primary school, cumulative number of months in an ECD program, currently enrolled at school, currently enrolled at primary school, dropout status, enrollment status, ever attended an ECD program, ever attended school, highest grade attended, schooling index (researcher-defined), years of education
Later life outcomes	Age at gainful employment, occupation level, likelihood of work, household income, income is greater than a ore-defined level, monthly expenditures, occupational status, prestige of work, professional level, ownership of a computer, ownership of a credit card, college attendance, completed education, authoritarian childrearing attitudes, quality of family relationships, life satisfaction
Learning	Ability to count and order odd and even numbers, abstract reasoning, achievement, approaches to learning (IDELA), ASQ cognitive factor, BSID (cognitive, expressive vocabulary, language, receptive vocabulary), card sorting, children' mental model of the water cycle (rated as complex vs simple), children's creativity as measured by Lines and Circles subtests of the Torrance Test of Creative Thinking, children's visual literacy rating inventory for parents, Chinese expressive vocabulary, cognition, cognitive composite score (IDELA), cognitive development and language, cognitive development index, cognitive flexibility, Cognitive flexibility-DCCS: Post-switch integrated, cognitive outcome (TADI), cognitive outcomes (Battelle), cognitive score (SFON), communication, communication and general knowledge, composite IDELA score, counting, creativity, Denver Language test score, discovery of the natural and cultural environment, draw lines and shapes, draw-a-house task, early development index, early literacy, early numeracy, EDI: Communication and General Knowledge, EDI: Language and Cognitive Development, EGMA subtasks, EGRA subtasks, emergent literacy, emergent numeracy, English test score, exam score, expressive communication, expressive vocabulary, extends reflection time, general index, general cognitive and socio-emotional results, health and nutrition knowledge, index of cognitive growth, IQ, knowledge, knows own name and its letters, language, language and cognitive development, language and hearing score, language skills, latent skills, literacy, matching characteristics with correct pictures, math test score, MDAT Language, mean vocabulary scores, memorization, memory (Woodcock Johnson), name colors, non-cognitive index, numeracy, nutritional knowledge, order rows of items, performed best in elementary, phoneme blending, phoneme identification, phoneme isolation, phoneme segmenting, phonological short-term memory, placed in top third grade section, play with blocks, point out characters after listening, problem solving, pronounce after recognition, reading, reasoning, receptive communication, receptive language, receptive vocabulary test, reducing errors in tasks, rhyme identification, rhyme production, school readiness, science test score, shapes, social science, Spanish test score, speaks in clear sentences,

	stacking cubes, standardized school readiness test scores, standardized test score, summary - cognitive index, syllable blending, syllable segmenting, total ASQ score, total cognitive abilities, TVIP, Uyghur expressive vocabulary, Uyghur receptive vocabulary, verbal and non-verbal language manifestation, visual description, visual discrimination, visual interpretation, visual memory, vocabulary, whole phoneme awareness, whole phonological awareness skills, whole rhyme awareness, whole syllable awareness, working memory, working memory-Corsi Blocks
Physical development	Anthropometrics index, arm circumference, balance, bilateral coordination, birthweight, BMI, BMI-for-age, body and motor exploration, body coordination, breathing problems in the last four weeks, BSID fine motor, BSID gross motor, BSID motor total, cough in the last four weeks, Denver Fine Motor, Denver Motor, diarrhea in the last four weeks, eating, EDI: Physical Health and Well-Being, extreme low birthweight, extreme premature, fever in the last four weeks, fine motor, fine motor coordination and visual motor integration, fine motor integration, fine motor skills, gross motor, gross motor coordination, health and nutrition knowledge, height, height-for-age, length-for-age, low birthweight, malaria in the last four weeks, manual dexterity, MDAT fine motor/perception skills, motor coordination, motor development and functioning, motor inhibition, motor skills, movement assessment, nutrition/health factor, object control, overall development index, perceived motor skills, perceived physical competence, physical health and well-being, precise motor coordination, premature, sick in the last four weeks, skin problems in the last four weeks, summary - health index, swallowing difficulties in the last four weeks, very low birthweight, very premature, visual perception (Test of gross motor development 2nd edition), visual-motor integration (Beery-Buktenica developmental test of visual-motor integration 6th edition), visuomotor precision, weigh-for-age, weight, weight-for-length
Socio-emotional development	Adaptive functioning, ADHD score, adult interaction, affect index, aggressiveness, ASQ socio-emotional factor, attention, attitudes toward learning, autonomy, behavioral regulation, children-teacher relationship, children's appropriate behaviour, children's interest and enthusiasm, cognition and executive functioning, compliance, conduct problems, decreasing problem behaviors, Denver social, discipline, EDI: Emotional Maturity, EDI: Social Competence, effort, emotional and social bonding, emotional maturity, executive function, expressive language, feeling expression, hyperactivity, inhibitory control, inhibitory control-Knock Tap, inhibitory control-Peg Tap, interaction, interaction, introvert behavior, no disruptive behavior, participation, perceived social acceptance, personal and social skills, pro-social behavior, pro-social behavior problems, prosocial, PSQ, SDQ score, SDQ: Conduct Problems, SDQ: Emotional Symptoms, SDQ: Hyperactivity and Inattention, SDQ: Peer Problems, SDQ: Pro-social Behavior, SDQ: Total Difficulties, self-regulation, social and emotional competence, social competence, social skills, socio-emotional development, socio-emotional language, socioemotional problems, socioemotional subtest, visual attention,

	WIST Appropriate, WIST Do, WIST Inappropriate, WIST Report, WIST Say, WIST Tell, WIST Total

Note: Acronyms are defined here — ADHD: Attention deficit hyperactivity disorder, ASQ: Ages and Stages Questionnaires, BSID: Bayley Scales of Infant Development, BMI: body-mass index, GMD: Gross Motor Development, EDI: Early Development Instrument, EGMA: Early Grade Mathematics Assessment, EGRA: Early Grade Reading Assessment, DCCS: Dimensional Change Card Sort, IDELA: International Development and Early Learning Assessment, MDAT: Malawi Developmental Assessment Tool, PSQ: Perceived Stress Questionnaire, SDQ: Strengths and Difficulties Questionnaire, SFON: Spontaneous Focus on Space, TADI: Test de aprendizaje y desarrollo infantil, TVIP: Test de Vocabulario en Imagenes Peabody, WIST: Word Identification and Spelling Test.

References for this Appendix

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