REVIEW

Risk and protective factors in early childhood development: a scoping review

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Abstract

Objectives: mapping evidences on risk and protective factors associated with early childhood development in Brazilian children.

Methods: a scoping review was conducted. The databases used were: PubMed, Embase, BVS, Cochrane, APA PsycNet, ProQuest Library, and gray literature, searched on 04/23/2024, covering publications from 2015 to 2024. Searched descriptors: "Child preschool" OR Infant OR pediatric OR pediatric) AND ("child development" OR "mental health" OR "child guidance") AND ("Protective Factors" OR "Risk Factors"). Extracted information included the main author, year of publication, study design, study location, participants (number and age), and identified risk and protective factors. Out of a total of 6,812 documents, 24 were included.

Results: a total of 43 risk factors and 15 protective factors in early childhood development were identified. The most frequently cited risk factors were socioeconomic vulnerability (n=10), low parental schooling (n=3), males (n=5) and teenage pregnancy (n=2). In contrast, the most cited protective factors included a supportive environment (n=3), higher family income (n=2), and higher maternal schooling (n=2).

Conclusion: early childhood development in Brazilian children is positively influenced by factors such as a supportive family environment, higher income and maternal schooling. On the other hand, low parental schooling, teenage pregnancy and males, negatively impact in this development.

Key words *Child development, Risk factors, Protective factors, Child behavior, Child health*

Introduction

Early childhood comprises the period of life from birth to 72 months of age.[1] This phase is marked by the development of various skills that are essential for the development of more complex potentialities and abilities in adult life, such as autonomy.[2] This stage of life offers a window of opportunities for the future, since the brain has a high degree of plasticity, which contributes to a greater capacity for transformations due to the stimuli and experiences lived.[2]

Early childhood development (ECD) can be negatively impacted by various factors, including the economic vulnerability of families, depression, maternal stress and exposure to violence.[3] On the other hand, other factors can help full development: breastfeeding, the introduction to reading and storytelling in the first months, among others, generating benefits and favor adequate development in early childhood.[4]

The number of children at risk of not achieving their full development in low- and middle-income countries is approximately 43%, almost 250 million children under the age of five.[5] Recently, a project entitled "*Primeira Infância Para Adultos Saudáveis* (PIPAS)" (Early Childhood for Healthy Adults), which covered 13 Brazilian State capitals, with a sample of 13,425 children aged zero to 59 months, found that 10.1% of the children aged zero to 35 months and 12.8% of the children aged 36 months and over were more likely not to reach their full potential development.[6] Concern with the ECD data has led several nations, including Brazil, to develop public policies and programs to promote child development.

To this end, Brazil has implemented programs such as the "*Marco Legal da Primeira Infância*" (Lei nº 13.257/2016) (Legal Framework for Early Childhood -Law No. 13.257/2016), has brought advances in protecting Brazilian children's rights up to the age of six, establishing principles and guidelines for the formulation and implementation of public policies aimed at early childhood.[1] Likewise, the "*Primeira Infância Melhor* (PIM) (Improved Early Childhood), an intersectoral public policy program of the State of Rio Grande do Sul, which aims to support the full development of children's physical, psychological, intellectual and social capacities from pregnancy to the age of five.[7]

Considering that delays and problems related to ECD affect children all over the world, it is essential to know which factors are related to it. Understanding and identifying the factors related to early childhood allows for the implementation of specific interventions and treatment plans for this age group.[8] In addition, there are economic reasons for investing in ECD: according to studies by economist James Heckman, for every dollar invested in programs for vulnerable children aged zero to five, there is a 13% return on investment per year.[9]

When searching the main databases on the subject, no up-to-date systematic or scope reviews were found on the subject of risk and protective factors for ECD in Brazilian children. Therefore, this study aims to map the evidence on the risk and protective factors associated with ECD in Brazilian children in their first six years of life.

Methods

This scoping review was developed based on the methodology proposed by Arksey and O'Malley (2005) and Joanna Briggs, following the PRISMA-ScR guide guidelines.[10] Unlike the systematic review, the scoping review aims to map and explore literature in a broader way, providing an overview of the current perspective on a topic.[11] The scoping review protocol was registered on the Open Science Framework platform on August 30, 2021 (Risk and protection factors in early childhood development: a scoping review, public domain document). The guiding question for this study was: What are the risk and protective factors for ECD in the Brazilian context?

We included observational studies (cross-sectional, case-control and cohort) and intervention studies (clinical trials). We selected studies conducted with a Brazilian population aged zero to 72 months with typical development and published between 2015 and 2024, with no language restrictions. Bearing in mind that several domains make up human development, we included studies that assessed at least one of the following domains: cognitive, motor, language, neuropsychomotor and socio-emotional development.[12] We excluded articles in the format of preprints, abstracts without full papers, guidelines, case reports, books and systematic reviews (as they do not only include studies with the Brazilian population). We also excluded studies with clinical population groups, i.e. children diagnosed with atypical development (disorders, syndromes, diseases, etc.). Studies included with these children could hinder data analysis, overshadowing the results related to typical development, since they often have specific needs and characteristics.

To identify the studies, we searched the following electronic databases on April 23, 2024: PubMed, Embase, Cochrane Library, VHL, American Psychological Association (APA Psyc Net), ProQuest Library and Grey Literature. The search strategy included MeSH terms, synonyms, related terms and free terms related to ECD (Table 1). This search strategy was adapted for each electronic database. Duplicate studies were excluded.

The references identified in the electronic databases were exported to Rayyan software. Duplicate documents were removed, the titles and abstracts of the documents were evaluated and the evaluators' decision to include or exclude them was registered in this software.

The documents were selected independently in two stages by two previously trained researchers. In the first stage, the titles and abstracts of the documents were evaluated according to the eligibility criteria. Subsequently, the full texts of the documents considered potentially eligible in the screening stage were read and evaluated. Disagreements were resolved by consensus between the researchers.

Data extraction from the included articles was carried out using a data collection form designed for this scoping review. The data was mapped independently by the reviewers. Data was extracted on the main author, the year and State in which the study was conducted. Study design, number of participants and age range, instruments used to assess child development, study outcome and finally risk and protective factors (Table 2).

Results

We identified 6,812 documents in the electronic search (databases). After removing duplicates, the number declinded to 6,085. Of the articles, 6,014 were excluded based on the title and abstract, for the following reasons: not related to the topic (n=3,568), type of study (n=132), year of study (n=1,293), concept (n=142), context (n=20) and population (n=852). Seven articles were not found after searching institutional libraries, websites and trying to contact the authors. 71 studies were left and read entirety, of which 24 were included in this scoping review as they met the eligibility criteria. The reasons for excluding articles during the full-text reading stages are shown in Figure 1.

Characteristics of the articles

Of the 24 articles included, they were conducted in the States of São Paulo (n=6), Rio Grande do Sul (n=5), Pará (n=3), Ceará (n=2), Minas Gerais (n=2), Sergipe (n=1), Maranhão (n=1), Goiás (n=1), Mato Grosso do Sul (n=1), Santa Catarina (n=1), Paraíba (n=1), Paraná (n=1), one of which was conducted in two States, SP and MA. The cross-sectional design was the most frequent one (n=12), followed by longitudinal and cohort studies (n=9), case-control (n=1), descriptive correlational (n=1) and cross-sectional (n=1). The number of participants varied from 16 in a longitudinal study to 3,566 in a cross-sectional observational study. Participants' age ranged from zero to 72 months.

Assessment (outcome)

A considerable number of the articles covered in this review used the term "neuropsychomotor development" as the study outcome (n=6). Of these, one study used nutritional status as an outcome in addition to neuropsychomotor development (n=1) and another study used the outcome "neuropsychomotor development" subdivided into: personal-social subarea, gross motor skills and language. Other studies had motor, cognitive and language development as outcomes (n=5) or only cognitive and language development (n=1). Some studies assessed only motor and cognitive development (n=3). Only motor development (n=1), fine and gross motor (n=1) and perceptual-motor skills (n=1). The term "development and well-being" was also used in one study (n=1). One study had mental and behavioral disorders and delayed socio-emotional development as outcomes (n=1). Communication, broad motor coordination, fine motor coordination, problem solving and personal/social development was used in one study as an outcome (n=1).

Table 1

Electronic data search strategy. Brazil, 2025.

Electronic Base	Search Strategy
PubMed	((((((Child preschool[MeSH Terms]) OR(Infant[MeSH Terms])) OR(Infant*[Title/Abstract])) OR(pediatric[Title/Abstract])) OR(paediatric[Title/Abstract])) AND ((((((child development [MeSH Terms]) OR(child development[Title/Abstract])) OR(mental health[MESH])) OR (Mentalhealth[TIAB])) OR (child guidance[TIAB])) OR (child guidance[MeSH])))) AND((Protective Factors[MeSH]) OR (Risk Factors[MeSH])).
Embase	(mh:(child, preschool)) OR (mh:(pré-escolar)) OR (mh:(Preescolar)) OR (Infant$)
Cochrane	("Child preschool" OR Infant* OR pediatric OR paediatric) AND ("child development" OR "mental health" OR "child guidance") AND ("Protective Factors" OR "Risk Factors")
Apa PsycNet	("Child preschool" OR Infant* OR pediatric OR paediatric) AND ("child development" OR "mental health" OR "child guidance") AND ("Protective Factors" OR "Risk Factors")
BVS	("Child preschool" OR Infant* OR pediatric OR paediatric) AND ("child development" OR "mental health" OR "child guidance") AND ("Protective Factors" OR "Risk Factors")

PubMed=National Library of Medicine ; Embase= Elsevier Base; Cochrane= Biblioteca Cochrane; BVS= *Biblioteca Virtual de Saúde*; APA PsycNet= American Psychological Association.

Table 2

Summary of information extracted from studies included in the scope review (n=24). Brazil, 2025.

ID	Author / Year/ State	Outline	Participants and age range	Instrument used to assess development	Assessment (Outcome)	Risk Factors	Protection Factors
1.	Araújo *et al.*[26]/ 2020/ SP	Cross-sectional observational	259 children between eight to tem months	Bayley Scales of Infant and Toddler Development - Third Edition (BAYLEY-III) e Affordances in the Home Environment for the Motor Development - Infant Scale (AHEMD-IS)	Cognitive, language and motor development	Not mentioned	Suitable environment with quality resources (p<0.001) Absence of RIHL - Risk indicators for hearing loss (p<0.001)
2.	Araújo *et al.*[27]/ 2017/SP	Cross-sectional observational	154 infants and their caregivers; age range eight to ten months	BAYLEY-III and AHEMD-IS	Cognitive, language and motor development	Presence of RIHL - Risk indicators for hearing impairment (motor (p=0.0001), cognitive (p=0.001) and language (p=0.0304))	Not mentioned
3.	Araújo *et al.*[28]/ 2017/PR	Cross-sectional observational	77 children between six to 36 months of age	Denver II Test Anthropometric measurements	Neuropsychomotor development Nutritional status	Low birth weight (OR=181.0; 95%CI=1.902–17,229.589; p=0.025), monthly family income (OR=9.90; 95%CI=1.11–87.92; p=0.040), absence of father (OR=34.51; 95%CI=1.033–1,153.490, p=0.048)	Father's presence (quantitative data not available)
4.	Boo *et al.*[4]/ 2018/ CE	Cross-sectional observational	2.755 children between zero to 28 months og age	Denver II test and Home Observation of the Environment – HOME	Development and well-being	Low birth weight (p<0.01; p<0.05), nutrition problems (p<0.05), male (p<0.01) and premature childbirth (p<0.01)	Positive parenting practices (reading books and counting numbers (p<0.01), high maternal schooling (p<0.01; p<0.05), higher monthly income (p<0.01)
5.	Borba e Valentini[34]/ 2015/RS	Longitudinal Study (5-month follow-up with a two-month interval between assessments)	40 infants aged zero to 18 months, 20 of which were born of teenage mothers (15-19 years old) and 20 to adult mothers (25-39 years old)	Alberta Infant Motor Scale (AIMS), Bayley Scale of Infant Development II	Cognitive and motor development	Babies born of teenage mothers scored lower than babies born to adult mothers on one motor skill (supine position) (p=0.046)	Partner support (quantitative data not available)
6.	Caetano *et al.*[40]/ 2021/ SP	Cohort Study (6-month follow-up)	1.292 children aged four to five	Child Behavior Checklist (CBCL) and of ages and stages Questionnaires: Socioemotional (ASQ:SE)	Behavioral mental disorders (internalizing and externalizing) and delays in socioemotional development	Stressful family relationships: (Parental stress (3.97 (2.13-7.41) p<0.001), parental psychopathology (depression and/or anxiety) (2.96 (2.21-3.96) p<0.001)) and lower share capital (0.99 (0.98-1.00) p=0.04)	Not mentioned
7.	Correia *et al.*[41]/ 2019/CE	Cross-sectional observational	3.566 children aged 2 - 72 months	Ages and Stages Questionnaire ASQ-BR	Five domains of development (communication, gross motor coordination, fine motor coordination, problem solving and personal/social)	Male (95%CI=25.8–30.5 p<0.001) family income/social class (p<0.05), food insecurity (p=0.02)	Higher monthly income. The increase in the monthly income quintile was associated with a reduced risk of delay in the communication, gross motor and fine motor domains and delay in any domain (p<0.05).

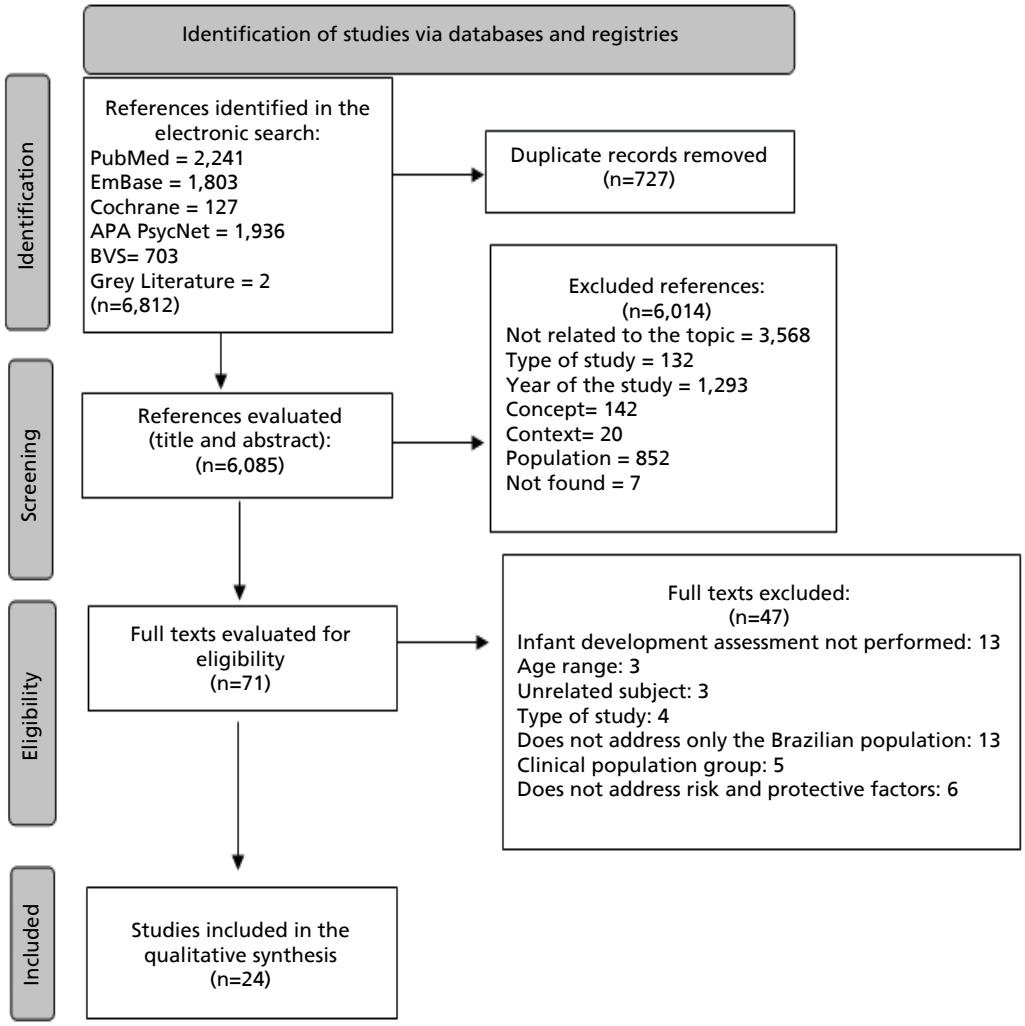
8.	Costa *et al.*[33] /2015/PA	Cross-sectional observational	319 children 36-48 months of age	Denver II Test and questionnaire on Biopsychosocial Characteristics of Children (QBCC)	Neuropsychomotor development	Poverty (χ^2 =8.588; df=1; p<0.003), low maternal and paternal education (χ^2= 13.83; df=3; p=0.003), adolescent mothers (χ^2= 8.78; df=3; p=0.03)	Parents' schooling
9.	Rocha Neves *et al.*[22]/2016/ MG	Cross-sectional observational	92 children 24-36 months of age	Anthropometric indices World Health Organization (WHO) BAYLEY-III, ITERS-R, HOME	Growth and cognitive/ language development	69,6% of the children's environment was considered risky (infrastructure (p=0.022), interaction and trust between neighbors (p=0.006)	Not mentioned
10.	Gonçalves *et al.*[16]/ 2019/ RS	Cross-sectional comparative	571 children from four to six years old	Early Development Instrument (EDI);	Physical Health and Well-being; Social Competence; Emotional Maturity; Language and Cognitive Development; and (Communication Skills and General Knowledge.	Male (OR=1.67; 95%CI=1.00-2.78; p=0.05), family income (OR=1.86; 95%CI=1.01-3.41; p=0.04 and OR=2.28; 95%CI=1.14-4.57; p=0.02), leaving PIM before 55 months of age (OR=2.19; 95%CI=1.15-4.18; p=0.01)	Not mentioned
11.	Negrão *et al.*[29]/ 2020/SP	Prospective cohort (2-year follow-up)	1.006 children, from zero to 24 months	BAYLEY-III	Children's cognitive, and motor development	Concomitant exposure to alcohol and tobacco during pregnancy (RR=2.81, 95%CI=1.65-4.77, p<0.001) when compared to the no consumption group	Not mentioned
12.	Nunes *et al.*[30] / 2020/ RS	Longitudinal study (2-year follow-up)	42 babies from zero to 24 months of age	PREAUT (*Programme de Recherche et Evaluation sur l'autisme*); infant development risk indicators (IRDI); M-CHAT (TEA); BAYLEY-III, Prechtl's General Movements Assessment (GMA).	Cognitive, language and motor development	There was no association between complications during pregnancy; medication during pregnancy; alcohol and smoking during pregnancy; complications at childbirth; need for ICU admission and developmental risk.	There was no association between the type of breastfeeding (p=0.16)
13.	Oliveira *et al.*[31] / 2017/ SE	Longitudinal study (6-month follow-up)	16 infants from zero to six months of age	Denver II test.	Neuropsychomotor development	Not mentioned	Breastfeeding (quantitative data not available)
14.	Pamplona *et al.*[37] / 2019/ PA	Case-control study	118 children from zero to 12 months of age	Denver II test.	Neuropsychomotor development	Vertical transmission from HIV-1 infected mothers (33.3% had delays in neuropsychomotor development)	Prenatal (p=0,0001)
15.	Pantoja *et al.*[23] / 2018/ PA	Cross-sectional observational and qualitative	50 children aged 24 -36 months	Denver II test, HOME (Family environment)	Neuropsychomotor development	Quality of stimulation of the family environment (p<0.01) and socioeconomic and social conditions accommodation where the babies live (treated water, availability of electricity, private bathroom) (p<0.01)	Better quality of family environment (p<0.01)
16.	Pereira *et al.*[35]/ 2017/ GO	Cross-sectional observational	61 children between four and six years old	Denver II test, Child Biological Characterization Guide at Preschool Age	Neuropsychomotor development	Normal childbirth (p=0.010), shorter height at birth (p=0.007) and shorter height at preschool age (p=0.030); and low monthly family income (p=0.009)	Not mentioned

17.	Pereira *et al.*,[25] / 2016/RS	Prospective cohort study (4 months follow-up)	49 infants aged two to 12 months	Alberta Infant Motor Scale (AIMS), Bayley AHEMD-IS (Family environment) (DAIS) (maternal practices)	Cognitive and motor development	Low family income (p=0,002)	Maternal practices and knowledge (p=0.001) Biological factors (female) (p=0.001) Home environment (accessibility to toys, adequate physical space) (p<0.001) Child's attendance at daycare (p<0.001)
18.	Pereira *et al.*,[17]/ 2015/ MS	Descriptive and correlational study	57 babies from zero to three months	Operationalized Portage Inventory (OPI)	Motor development	Maternal age (teenagers and over 35 years old) (p=0.046)	Not mentioned
19.	Santos *et al.*,[18] / 2020/ SC	Cross-sectional study nested within cohort	199 cchildren aged four to five years old	Pre-Literacy Skills and Knowledge test (THCP ®)	Perceptual-motor skill	Not attending school (OR=4.61; 95% CI=1.21-17.49) Monthly family income <5 MW (OR=4.28; 95%CI=1.49-12.26) Male (OR=2.10; 95%CI=1.14-3.88)	Not mentioned
20.	Schiavo e Perosa[38]/ 2020/ SP	Prospective longitudinal study (14 months ollow-up)	139 babies from six to 14 months old	Denver II test	Neuropsychomotor development Gross motor sub-area and personal-social sub-area Gross motor sub-area Language	Maternal depressive symptoms in the pre- and postnatal care (OR=6.12; 95%CI=1.53-24.4; p=0.01) Maternal insecurity at first care (OR=3.40; 95%CI=1.06-10.9; p=0.04) Being hospitalized after birth (OR=3.75; 95%CI=1.12-12.5; p=0.03) Did not breastfeed for the first hour (OR=32.4; 95%CI=1.58-665.3; p=0.02),	Positive perception of the baby (OR=0.28; 95% CI=0.10-0.79; p=0.01) Mother who finds pleasure in performing the maternal role (OR=0.06; 95%CI=0.00-0.83; p=0.03) Did not smoke during pregnancy (OR=0.06; 95%CI=0.00-0.83; p=0.03) Mothers with higher schooling (OR=19.1; 95%CI=1.038-353.8; p=0.04)
21.	Silva *et al.*,[39]/ 2015/ PB	Sectional study	112 children from six to 18 months old	Denver II test	Neuropsychomotor development	Age greater than 12 months (OR=4.3; 95%CI=2.4-7.4), Normal childbirth (OR=4.4; 95%CI=1.6-11.7) Use of phototherapy (OR=7.9; 95% CI=1.6-38.8), Daycare center not monitored by the Family Health Strategy (FHS) (RC=2.9; 95%CI= 1.3-6.7)	Not mentioned
22.	Tella *et al.*,[32]/ 2018/ SP	Cross-sectional study nested in a cohort	444 infants aged six to nine months old	BAYLEY-III	Cognitive, language and motor development	Low income (p=0.03) Fewer years of maternal schooling (p=0.03)	Not mentioned
23.	Pinheiro *et al.*,[19]/ 2024/ MG	Prospective cohort study (12 month follow-up)	449 children from zero to 12 months old	SYWC-BR	Cognitive, language and motor development	Children born by cesarean section were 1.56 times more likely to have developmental delays than children born by vaginal birth (95%CI=1.04–3.48). children whose mother had depressive symptoms were 1.91 times more likely to have developmental delays (95%CI=1.01–3.10). Gestational exposure to SARS-CoV-2 did not predict suspected developmental delay.	Not mentioned

24.	Bortagarai *et al.*,[36] 2021/ RS	Longitudinal (22 months follow-up)	165 in stage 1 (babies aged three – four months and 29 days), 130 stage 2 (babies aged eight – nine months and 29 days) and 102 stage 3 (babies aged 11 – 12 months and 29 days) Age ranges from zero to 18 months	Denver II test PREAUT	Fine and gross motor development	Fine Motor Skills (FMS) Stage 1 Females are three times more likely to experience delays in FMS (3.22(1.42-7.28) Living with up to 4 people at home (2.92(1.20-5.53) psychic risk in PREAUT signals (PRS) 2.60(1.22-5.53) Stage 2 Professionally active mothers (2.42(1.07-5.45) Cesarean section 3.17(1.24-8.11) Parents who participate in the routine 11.80(1.70-81.91) Feeding difficulty 3.18(1.39-7.25) PREAUT PRS 8.04(2.99-21.66) Stage 3 Cesarean section 4.88(1.34-17.74) Intercurrences during pregnancy 4.01(1.33-12.03) Males 5.38(1.69-17.11) Mothers without professional activity 7,535(2.34-24.24) Lower number of prenatal consultations 9.04(2.57-31.75) Gross Motor Skills (GMS) Stage 1 Low maternal schooling 3.63(1.92-6.88) Lack of pregnancy planning 3.04 (1.04-3.81) PREAUT PRS 2.82 (1.49-5.37) Stage 2 Medication during pregnancy 4.15(1.51-11.41) PREAUT PRS 4.13(1.59-10.71) Stage 2 Not having a sibling 9.32(1.47-59.08) Needing mechanical ventilation at birth 4.91(1.21-19.87)	Not mentioned

Figure 1

Flowchart of the process of searching, reviewing and selecting articles. Brazil, 2025.



BVS= *Biblioteca Virtual de Saúde*; APA PsycNet= American Psychological Association.

Finally, one study assessed: physical health and well-being, social competence, emotional maturity, language and cognitive development and communication skills and general knowledge (n=1).

Developmental assessment

Most of the studies used the Developmental Screening Tests (Denver II) scale (n=10) and the Bayley Scales of Infant and Toddler Development - Third Edition (BAYLEY III) (n=8). The Denver II scale assesses the ability of children from zero to six years of age in four areas of child development: personal-social, fine motor-adaptive, gross motor and language. The Brazilian version of this instrument showed good psychometric properties: excellent reliability and good evidence of concurrent validity, sensitivity and specificity, making it a reliable and valid instrument.[12] The Bayley III scale is indicated for assessing five developmental domains in children between one and 42 months of age, involving: cognition, language, motor behavior, socio-emotional and adaptive, the scale was translated and cross-culturally adapted in Brazil and showed high convergent validity and good internal consistency.[13] The Alberta Infant Motor Scale (AIMS) instrument was used in two studies (n=2). The AIMS assesses the children's motor skills from ages zero to 18 months and has good consistency, content, criterion and constructed reliability. It is considered suitable for use with Brazilian children.[14] The Ages and Stages Questionnaire (ASQ-BR) was used in two studies (n=2). The ASQ-BR is a screening instrument for assessing development in the domains of communication, motor skills, problem solving and personal-social skills in children up to five years old. It has good internal consistency and psychometrically sound results.[15] The Early Development Instrument (EDI) scale (n=1) assesses various developmental domains and showed adequate psychometric properties and good test-retest reliability in all domains.[16] The *Inventário Portage Operacionalizado* (IPO)(Operationalized Portage

Inventory) is an instrument translated into Brazilian Portuguese and adapted for Brazilian children that assesses five areas of development[17] (n=1). The *Teste de Habilidades e Conhecimento Pré-Alfabetização* (THCP) (Pre-Literacy Skills and Knowledge Test), a validated instrument that assesses the children's cognitive and motor skills at ages 4 to 7 years[18] and the Brazilian version of the Survey of Well-being of Young Children (SWYC-BR), an instrument that assesses the overall development of children aged 1 to 65 months, validated in Brazil[19] were used in one study each. Two studies used the Bayley scale and AIMS together to assess infant development. Two studies used the PREAUT scale (*Programme de Recherche et Evaluation sur l'autisme*) in addition to the Bayley III and Denver II tests.

Growth assessment

Some studies not only assessed development, but also infant growth (n=2). For this, the anthropometric index according to the World Health Organization (WHO) was used, encompassing data such as height, weight, and among others, thus providing information on the children's nutritional status.[20]

Quality of the family environment and early childhood education

The quality of the home environment was assessed using the Toddler HOME Inventory (IT)[21] (n=3),[4,22,23] and the Affordances in the Home Environment for the Motor Development - Infant Scale (AHEMD-IS)[24] (n=3).[25,26,27] In addition, one study assessed the quality of early childhood education using the Infant/Toddler Environment Rating Scale Revised (ITERS-R).[22]

Place of data collection

The studies included in this review, data were collected at home (n=2), hospitals, outpatient clinics, maternity hospitals and specialized centers (n=5), schools and early childhood education city centers (n=8), others data were collected either at home and in schools or daycare centers (n=2), in basic health units (n=1), basic health units and home (n=1), home and maternity hospital (n=2), hospitals and basic health units (n=1), through telephone calls (n=1). Only one study did not mention where the data was collected (n=1).

Training professionals to administer the questionnaires

The Bayley III, Denver II and AIMS tests should be applied properly by trained professionals. In most of the studies in which these tests were applied, the professionals were trained or trained and calibrated (n=9).[22,23,25,26,28,29,30,31,32] Seven studies did not mention whether the professionals were trained (n=7).[17,18,27,33,34,35,36] Five studies did not mention who administered the questionnaire (n=5).[4,19,37,38,39] Questionnaires that did not involve the use of specific tests, such as the ASQ, OPI, THCP and EDI, were administered by trained researchers and answered by parents or guardians (n=4).[16,33,40,41] To assess anthropometric indices, trained researchers took the measurements (n=2).[22,28]

Risk factors

Forty-six risk factors were identified that compromise early childhood development. These factors were divided into: socioeconomic level, individual, maternal and family characteristics and environmental factors (Table 3). The most cited risk factor was vulnerable socioeconomic status (n=10), followed by individual characteristics, were males (n=5) and low birth weight (n=2). Some characteristics in relation to the child's mother were also considered a risk factor, including having had a normal/vaginal birth (n=2), having had a cesarean (n=2) and being a teenage mother (n=2). With regards to family characteristics, the most cited risk factors were depressive symptoms (n=3) and low maternal and paternal schooling (n=3). Some other risk factors mentioned in the included studies are related to individual characteristics such as: nutritional problems, lower height at birth, prematurity, not attending school, and among others. As for maternal characteristics: being a carrier of human immunodeficiency virus (variant 1) (HIV-1), consumed alcohol and tobacco during pregnancy, fewer prenatal consultations and unplanned pregnancy were also considered risk factors. Family factors were mentioned, such as the absence of the father and food insecurity, as well as environmental aspects, such as infrastructure and quality of stimulation in the family environment, which is related to the responsiveness of the caregiver, acceptance of the child, organization of the environment and materials for learning, parental involvement in the child's routine and variety of experiences, linked to the child's social contact.

Protective factors

Fifteen protective factors were identified, which were also divided into: socio-economic level, individual, maternal and family characteristics and environmental factors (Table 4). Among them, the most cited was the quality of the family environment, which is related to the physical space (safe, adequate and large, involving type of floor, stairs, steps), the variety of stimuli (playing regularly, playing with the child, social contact) and the variety of toys (number of toys used, such as hanging toys, dolls, rocking chairs, balls) available to the child (n=3). [21,24] Having a higher monthly income was also considered a protective factor for early childhood development (n=2),

Table 3

Risk factors assessed by studies (n=46). Brazil, 2025.

Category	Risk Factors	Article
Socioeconomic status	Low family income	Araújo *et al.*,[28] Caetano *et al.*,[40] Correia *et al.*,[41] Gonçalves *et al.*,[16] Pereira *et al.*,[35] Pereira *et al.*,[25] Tella *et al.*,[32]
	Poverty[1]	Costa *et al.*,[33]
	Worse socioeconomic conditions	Pantoja *et al.*,[23]
	Monthly family income <5MW	Santos *et al.*,[18]
	Males	Boo *et al.*,[4] Correia *et al.*,[41] Gonçalves *et al.*,[16] Santos *et al.*,[18] Bortagarai *et al.*,[36]
	Low Birth weight [2]	Araújo *et al.*,[28] Boo *et al.*,[4]
	Nutritional problems[3]	Boo *et al.*,[4]
	Premature birth	Boo *et al.*,[4]
	Shorter height at birth	Pereira *et al.*,[35]
	Shorter height at preschool age	Pereira *et al.*,[35]
Individual characteristics	Children older than 12 months	Silva *et al.*,[39]
	Being hospitalized after birth	Schiavo and Perosa[38]
	Not breastfeeding in the first hour of life	Schiavo and Perosa[38]
	Neonatal phototherapy[4]	Silva *et al.*,[39]
	Females	Bortagarai *et al.*,[36]
	Psychic risk in PREAUT signs	Bortagarai *et al.*,[36]
	Feeding difficulties[5]	Bortagarai *et al.*,[36]
	Not having a sibling	Bortagarai *et al.*,[36]
	Needing mechanical ventilation at birth	Bortagarai *et al.*,[36]
	Normal childbirth	Pereira *et al.*,[35] Silva *et al.*,[39]
	Cesarean delivery	Pinheiro *et al.*,[19] Bortagarai *et al.*,[36]
	Teenage mothers	Borba *et al.*,[34] Costa *et al.*,[33]
	Mothers infected with HIV-1	Pamplona *et al.*,[37]
	Maternal age (adolescents and >35 anos)	Pereira *et al.*,[17]
	Maternal insecurity in the first care of the baby	Schiavo and Perosa[38]
Maternal characteristics	Alcohol and tobacco during pregnancy	'Negrão *et al.*,[29]
	Mothers with professional activity[6]	Bortagarai *et al.*,[36]
	Complications during pregnancy	Bortagarai *et al.*,[36]
	Mothers without professional activity[7]	Bortagarai *et al.*,[36]
	Fewer numbers of prenatal consultations	Bortagarai *et al.*,[36]
	Unplanned pregnancy	Bortagarai *et al.*,[36]
	Medication during pregnancy	Bortagarai *et al.*,[36]

Family characteristics	Parental stress	Caetano *et al.*,[40]
	Parental depressive symptoms	Caetano *et al.*,[40] Schiavo and Perosa,[38] Pinheiro *et al.*,[19]
	Low maternal and paternal schooling	Costa *et al.*,[33] Tella *et al.*,[32] Bortagarai *et al.*,[36]
	Leaving the PIM before 55 months of age	Gonçalves *et al.*,[16]
	Father's absence	Araújo *et al.*,[28]
	Food insecurity	Correia *et al.*,[41]
	Parents who participate of the routine	Bortagarai *et al.*,[36]
Environmental factors	Infrastructure	Rocha Neves *et al.*,[22]
	Interaction and trust in the neighborhood environment	Rocha Neves *et al.*,[22]
	Stimulation of quality in the family environment	Pantoja *et al.*,[23]
	Daycare center attended by the child without FHS monitoring	Silva *et al.*,[39]

MW= minimum wage; PREAUT= Programme de Recherche et Evaluation sur l'autisme; HIV-1= human immunodeficiency virus (variant 1); PIM= *Programa Primeira Infância Melhor* (Improved Early Childhood Program); FHS= Family Health Strategy; 1) 13 items that involve in their composition variables recognized in the literature as factors that influence child development, the sum obtained in each of these items establishes the level of urban poverty of the family; 2): Araújo *et al.*,[28] [≤2,500 g]; Boo *et al.*,[4] [-2 standard deviations in weight for age]; 3) Low weight, chronic or acute malnutrition and overweight; 4) Treatment used in cases of jaundice; 5) Difficulty in eating; 6) Work/ Study; 7) Stay at home.

Table 4

Protective factors assessed by studies (n=15). Brazil, 2025.

Category	Protection Factors	Article
Socioeconomic status	Highest monthly income	Boo *et al.*,[4] Correia *et al.*,[41]
Individual characteristics	Children without RIHL	Araújo *et al.*,[26]
	Child's attendance at daycare	Pereira *et al.*,[25]
Maternal characteristics	High maternal schooling	Boo *et al.*,[4] Schiavo and Perosa,[38]
	Breastfeeding	Oliveira *et al.*,[31]
	Prenatal care	Pamplona *et al.*,[37]
	Practices and knowledge about infant development	Pereira *et al.*,[25]
	Positive perception of the baby[1]	Schiavo and Perosa,[38]
	Mother who enjoys performing maternal functions	Schiavo and Perosa,[38]
	Does not smoke during pregnancy	Schiavo and Perosa,[38]
	Paternal presence	Araújo *et al.*,[28]
Family characteristics	Positive parenting practices (reading books and counting numbers)	Boo *et al.*,[4]
	Partner's Support	Borba *et al.*,[34]
	Parents' schooling	Costa *et al.*,[33]
Environmental factors	Quality of the family environment (physical space, variety of stimuli and toys)	Araújo *et al.*,[26] Pantoja *et al.*,[23] Pereira *et al.*,[25]

RIHL = Risk indicators for hearing loss; 1) Perception of the baby's temperament (calm, quiet, happy).

as was high maternal schooling (n=2) and breastfeeding (n=1). Other factors such as a suitable environment, the presence of the father, positive parenting practices (reading books and counting numbers) and high maternal schooling were also cited (n=1).

Discussion

This scoping review was carried out to map the evidence on risk and protective factors associated with ECD in Brazilian children in their first six years of life. Different outcomes were addressed in the included studies, ranging from neuropsychomotor development to mental, behavioral or developmental disorders. Infant development is broad and encompasses several areas and domains, such as motor, cognitive, personal-social and others.[12] Therefore, each study tends to address one or more of these dimensions according to its proposed objectives.

In order to achieve full development, it is essential that children develop skills in academic, behavioral and socio-emotional areas, and various factors, whether positive or negative, influence this process, covering aspects such as health, nutrition, safety and protection.[42] One of the risk factors for ECD that was addressed in the studies in a significant way and which involves the aspects mentioned, was in relation to socioeconomic status. Although the studies included use different methods to assess this, they all present evidence that ECD is influenced by the low socioeconomic status of families.

Poverty is closely linked to limited performance and the risk of not achieving full development in early childhood.[3,43] A study that assessed several specific brain structures linked to learning and educational functioning, including total gray matter, frontal lobe and temporal lobe, showed that the maturational delay of these structures can be influenced by the environmental circumstances of poverty.[3]

The interrelationship between low socioeconomic status and child development is complex because several variables act as mediators of this relationship, including limited access to resources, poor housing, nutritional deficiencies and lack of access to educational environments.[3,43] Cumulative exposure to risks can explain this relationship. Disadvantaged children are more exposed to adverse social, physical and environmental conditions.[3,43] They have less parental support, face higher levels of stress, greater family instability, greater exposure to violence and a lack of a support network when compared to advantaged children.[3,43] Reducing poverty seems to be a fundamental strategy for children to achieve their potential development, but this strategy is usually slow and gradual, so it is unlikely to bring about significant changes in a short period of time.[3,43]

Another risk factor pointed out in the studies was the male gender. According to a report by the *Organização das Nações Unidas para a Educação, a Ciência e a Cultura* (UNESCO),[44] (Nations Educational, Scientific and Cultural Organization), girls in developing countries tend to perform better in terms of completion rates and learning outcomes. Studies have shown that boys have greater difficulty with reading, anti-social behavior, attention disorders, dyslexia and speech delays, while girls show better cognitive performance in measures of executive functioning and intelligence.[41,45] However, during the course of development, these differences between boys and girls can become insignificant.[45] Furthermore, it is important to note that of the articles included in this study, males were mentioned with other risk factors and not in isolation.[4,16,18,36,41] ECD is influenced by several factors, meaning that it is essential to avoid generalizations on this subject, thus recognizing its complexity.

According to the articles included in the study, low birth weight, vaginal and cesarean childbirth and nutritional problems are also risk factors for ECD.[4,36,28,35,39] This result corroborates the findings by Hillemeier *et al*.[46] in which children with low birth weight had up to a three-fold increase in the risk of cognitive delay at 24 months of age. In addition, a meta-analysis also showed that children with very low birth weight have deficits in academic performance, attention problems and internalizing behavioral problems.[47]

In relation to the type of childbirth, children born by normal/vaginal childbirth were 4.4 times more likely to have altered development compared to children born by cesarean section in the study by Silva *et al*.[39] However, in the study by Bortagarai *et al*.[36] babies born by cesarean section were three times more likely to have delayed fine motor development compared to babies born by normal childbirth. The WHO recommends vaginal delivery as the preferred option, due to its benefits for both mother and child. According to Silva *et al*.[39]vaginal delivery can increase the risks for infant development, due to the conditions in which the delivery takes place and clinical misconduct, demonstrating the importance of gestational prenatal care and childbirth and puerperium care. Bortagarai *et al*.[36] reported that the fact that children were born by cesarean section could be associated with other risk factors, such as perinatal anoxia, leading to microfunctional brain alterations. In Brazil, the main indications for scheduled cesarean section according to the Ministry of Health 2016 guidelines[48] include: prevention of vertical transmission of HIV; primary infection of the simple Herpes virus during the third trimester of pregnancy and women with three or more previous cesarean operations; labor and vaginal delivery is also not recommended for women with a longitudinal uterine

scar from a previous cesarean operation, as there is greater impairment of the uterine musculature, increasing the risk of its rupture during labor. According to the data in this report, cesarean operations in Brazil reached 56.7%, 85% of which occurred in private services and 40% in public services. Although it is safe when carried out under medical indications, surgical delivery, when carried out without justification, can lead to unnecessary risks for the mother and baby.[48]

Finally, with regard to nutritional problems, delays in growth are indicative of chronic malnutrition and much of the literature associates malnutrition with developmental deficits.[49] It is known that good nutrition leads to good brain development, strengthens the immune system and improves the child's emotional and social health, adequate nutrition is considered an area of comprehensive necessary care for children to reach their full potential developmental[49] essential for early childhood development. Good prenatal care can minimize part of the effect of these risk factors.

The caregivers and adolescent mothers' mental health are also recognized as risk factors. During pregnancy and the postpartum period, women are more vulnerable, which favors the development or worsening of mental disorders such as depression and anxiety.[50] The effects of depressive symptoms on children's neurodevelopment are independent.[51] The effect of gestational depression on the child's development can be caused by hormonal changes such as an increase in cortisol levels,[52] causing damage to the fetal's brain development.[53] Exposure to prenatal stress not only affects children's physical development, but also causes poor psychomotor performance and more difficult behavior during the first ten years of life.[54] Depressed women are less likely to use recommended childcare practices and there is an impairment in the involvement with the child.[53] These results demonstrate the importance of maternal health in the overall, the child's well-being.

Maternal age was a factor that influenced children's development. Costa *et al*.[33] relate to this delay of factors such as early sexual relations and motherhood, the presence or absence of a partner, and family neglect. In addition, social factors and a lack of maternal stimulation or interaction are also influential. In the study by Borba *et al*.,[34] adolescent mothers had less time breastfeeding, a lower level of schooling, a lower employment rate and a lower income. In this study, the children of teenage mothers performed worse in one motor skill (supine position). However, adolescent motherhood was not a persistent risk factor for early childhood development.[34]

In order to gain a broad understanding of infant development, it is necessary to understand the environment in which the child develops.[55] In this sense, the family environment has been mentioned as both a risk factor and a protective factor. The environment inhabited by the child plays an essential role in their development, and this is the first environment provided by the family.[42,56,57] It is the duty of those responsible to provide basic needs, such as affection, food, care and support.[57] An environment with the availability of learning resources such as toys and books has been positively associated with children's cognitive development.[25] In these environments, children are encouraged to develop motor skills through playing.[33] Language, imagination, creativity and intellectual skills are also favored by stimuli from the family environment.[55]

Regarding protective factors for ECD, having a higher monthly income was also cited by the authors, confirming the importance of this factor in the context of the infant development. An alarming figure from the United Nations Children's Fund (UNICEF) in 2018,[58] showed that six out of ten Brazilian children and adolescents live in poverty and 32 million children (61%) live in vulnerable situations in Brazil. Disadvantaged children in developing countries who fail to achieve full development are less likely to become productive adults.[59] Therefore, these results reinforce the role of public policies and interventions that minimize, in some way, the effects of poverty on the child population. According to the *Atenção e Cuidado Integral* (Comprehensive Care and Attention) model for children,[58] strategies need to focus on five interrelated and indivisible components of care: good health, adequate nutrition, safety and protection, responsive care, and learning opportunities.

This scoping review had the following limitations: only Brazilian studies were included. Therefore, the results should be interpreted with caution, since it is not possible to generalize countries that do not have the same cultural, economic and social characteristics. In addition, seven potentially eligible studies were not included. The documents were not available electronically or in institutional libraries, making it impossible to extract information and critically evaluate it. Finally, since the studies included several domains of development, the interpretation of the results becomes complex and requires careful analysis of the findings. It is essential that new studies be encouraged, with designs that allow us to understand the causality of certain risk and protective factors for ECD.

The evidence provided in this study showed that several factors influence ECD in Brazilian children, acting as both risk and protective factors. Children in greater economic vulnerability face greater threats that may compromise their full development. Thus, the necessity of public interventions aimed at socioeconomic improvements that ensure a developed environment that is more favorable to early childhood is highlighted. The training and qualification of professionals who work

directly with children in early childhood can minimize risk factors and encourage protective factors.

Authors' contribution

Martins IM: conception, study design, analysis, interpretation of data, writing of the manuscript, and critical and intellectual review of the manuscript. Corrêa-Faria P: analysis and critical and intellectual review of the manuscript. Santos IG, Mateus AC, Tavares NO: conception, study design, analysis and critical and intellectual review of the manuscript. Fernandez AMS: conception, study design, and critical and intellectual review of the manuscript. Perazzo MF: analysis and critical and intellectual review of the manuscript. Costa LR: conception and study design, acquisition, analysis and interpretation of data, critical and intellectual review of the study. All authors approved the final version of the article and declare no conflict of interest.

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Received on June 22, 2024
Final version presented on February 7, 2025
Approved on February 10, 2025

Associated Editor: Karla Bomfim