

REVIEW ARTICLE OPEN ACCESS

Exploring Early Childhood Development Interventions for Building Human Capital in Sub-Saharan Africa: A Scoping Review

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ABSTRACT

Background: Inequalities in the provision and implementation of early childhood development (ECD) interventions in Sub-Saharan Africa remain a challenge. This scoping review aimed to investigate the types and extent of ECD interventions in this region, using the Nurturing Care framework (NCF).

Methods: This review included randomised controlled trial (RCT) studies related to ECD interventions in Sub-Saharan Africa. Sources from 2019 to 2024 were included. PubMed, MEDLINE (Ebsco), Web of Science, ProQuest and PsychInfo were searched in September 2024. Abstracts and full texts were reviewed using Rayyan.

Results: Of 85 studies retrieved, 21 conducted across 13 countries were included in our review. Most were conducted in Eastern and Southern Africa, with Western and Central Africa notably underrepresented. Sample sizes varied from 134 to over 9000 participants. ECD interventions targeting children from 0 to 8 years old were included. Nutrition-focused interventions were the most common ($n=9$) and showed the biggest positive impact on child weight and growth. Responsive caring interventions were the second most common ($n=2$), resulting in fewer reports of maltreatment, reduced endorsement of corporal punishment and fewer behavioural problems in children. The remaining three NCF dimensions (i.e., early learning opportunities, safety and security, and good health) each had only one intervention focusing solely on that dimension and showed mixed results on child development. Multidimensional interventions were common, with seven studies combining multiple ECD support elements to create a holistic approach. Although these interventions showed mixed results, they were more likely to report positive outcomes across multiple NCF domains compared to single-focus interventions.

Conclusions: Most interventions focus only on a couple of NCF elements. There is a need for increased focus on underrepresented regions to address local ECD needs effectively and to develop and evaluate interventions that incorporate all elements of NCF in African contexts.

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Summary

- Nutrition-focused ECD interventions are most prevalent in the Sub-Saharan African context, whereas most fail to integrate all five Nurturing Care Framework (NCF) components, limiting their potential developmental impact.
- Despite evidence supporting responsive caregiving and early learning for long-term child development, these domains remain severely underrepresented in ECD interventions in Sub-Saharan Africa.
- Interventions incorporating more than one NCF domain reported mixed results, with limited reported effectiveness attributed to short durations, implementation challenges and contextual barriers.
- Sub-Saharan African ECD research is heavily concentrated in Eastern and Southern Africa, whereas Western and Central Africa remain underrepresented, highlighting a need for geographically inclusive research.
- Future ECD research must prioritise longitudinal studies, multisectoral approaches and locally tailored interventions that address structural barriers and contextual realities, especially in low-resource settings.

1 | Introduction

A recent Lancet Series on early childhood development (ECD) and the next 1000 days, as well as a mapping review on interventions promoting development in the next 1000 days after infancy, highlighted the critical role that ECD interventions can play in human capital development (Draper, Klingberg, et al. 2023; Draper et al. 2024). However, inequalities in the provision of these interventions in low- and middle-income countries (LMICs) remain a challenge to human capital development (Black et al. 2022; Draper et al. 2024; Nores et al. 2024; Vaivada et al. 2022; Victora et al. 2022). Human capital relates to knowledge, health, interpersonal and socioemotional skills, abilities and education possessed by individuals essential for workplace productivity and wellbeing. It thus embodies various factors, including educational, physical and mental well-being, and social outcomes, and is important for economic growth and societal advancement (Black et al. 2022; Clark et al. 2020).

Research has found significant differences in human capital trajectories across communities, and this variation is largely attributed to early life exposures and experiences (Lim et al. 2018; Naicker et al. 2022). Studies often highlight the moderating role of early childhood development (ECD) interventions on early life experiences in adult human capital development (Black et al. 2022). ECD comprises a series of crucial developmental phases that influence one's lifelong trajectory of health, education and overall wellbeing. This development is time-dependent and occurs through interactive biological-environmental-behavioural processes (Black et al. 2022; Naicker et al. 2022). Researchers highlight that the first 1000 days (i.e., from conception to 2 years) and the next 1000 days (i.e., from 2–5 years) are vital and sensitive windows of opportunity

where interventions help to ensure optimal health, growth and development (Black et al. 2022; Draper et al. 2024).

The Nurturing Care Framework (NCF), supported by the World Health Organization (WHO) and UNICEF, is a conceptual framework used to investigate, understand and implement ECD programmes (Britto et al. 2017; World Health Organization 2018). The NCF highlights the importance of multicomponent, multilayered and dynamic ECD interventions to promote human capital development. Nurturing care relates to the provision of stable environments that promote the needs of individuals in five interrelated components, namely, health, nutrition, safety and security, learning and relationships throughout a series of developmental stages (Britto et al. 2017; World Health Organization 2018). Collectively, these components ensure healthy and enabling environments that support optimal human capital development. As evidence, Draper et al. (2024) found that by 5 years of age, children who received adequate early learning opportunities and responsive care were almost one standard deviation ahead of their peers who had not received this support. These advances were found for multiple child outcomes (including literacy, numeracy, motor skills and social-emotional development) as measured by the International Development and Early Learning Assessment (IDELA). This translates to a difference of approximately 2 years of development. Importantly, these five interrelated components of the NCF are embedded within broader structural and policy environments that enable or constrain their effectiveness within that context, and these were highlighted in the recent Lancet series on early childhood development. Furthermore, this series emphasised the importance of a social ecological perspective and the multiple environments that impact early childhood development (Draper et al. 2024; Nores et al. 2024).

Despite the growing policy attention towards early childhood development (ECD) globally, substantial disparities in coverage and implementation persist in Sub-Saharan Africa. Unfortunately, many children in LMICs are still exposed to environmental risks affecting both health and development, including adverse life events related to factors such as poverty, malnutrition, inadequate healthcare, physical punishment, poor caregiver mental health and limited access to early learning opportunities (Draper et al. 2024). According to Lu et al. (2016), more than 250 million children under age five in LMICs were at risk of not reaching their developmental potential due to poverty and stunting, with half of them in Sub-Saharan Africa and South Asia. An updated analysis by Lu et al. (2020) found that although global progress has been made, regional inequities remain stark, with Sub-Saharan Africa experiencing the slowest progress in implementing integrated ECD policies and programmes (Lu et al. 2020).

Corroborating these findings, data from the Country Profiles for Early Childhood Development (UNICEF 2023) show that most Sub-Saharan African countries fall significantly short of key indicators related to the Nurturing Care Framework (NCF). As shown in Figure 1, these data highlight the urgent need for coordinated, multidimensional ECD interventions in African contexts, underscoring the relevance of this review.

A prevalent issue in ECD research, mentioned in our discussion as well, is that ECD interventions are predominantly delivered in high-income countries and not necessarily in these areas

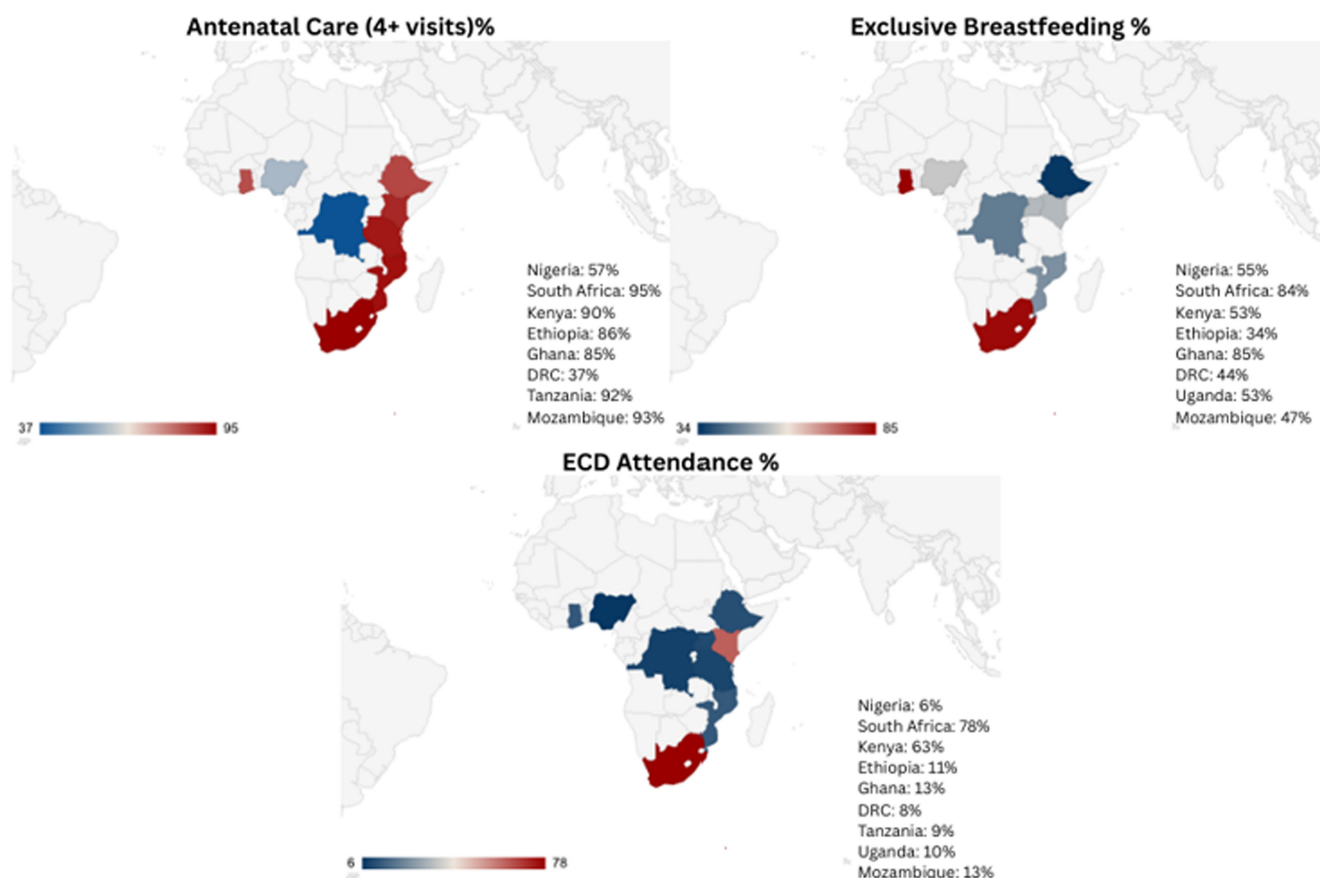


FIGURE 1 | Key NCF indicators per Sub-Saharan African country. Adapted from the Country Profiles for Early Childhood Development (UNICEF 2023).

where children are more at risk (McCoy et al. 2022). As an example, nutritional deficiencies are often linked to challenges in learning, memory and problem-solving (Kansiime et al. 2017; Khanam and Khan 2024), as well as in self-esteem and forming relationships (Khanam and Khan 2024; Rahmadahani et al. 2023) and, as such, the high undernutrition burden in Sub-Saharan Africa means that children in these areas might be at higher risk of impaired physical and cognitive development, as well as behavioural challenges (Agho et al. 2019; Draper, Klingberg, et al. 2023; Simwanza et al. 2023). Considering this, the significance of effective ECD interventions, specifically in the Sub-Saharan African context, cannot be overstated, as these interventions are vital for fostering human capital development.

Despite policies and studies' recognition of the importance of understanding and investment in ECD for the advancement of human capital, implementation challenges persist (Coore-Hall et al. 2023; Draper et al. 2024). One contributing factor is a lack of knowledge on which ECD interventions or programmes are efficacious, such that they may be scaled up in Sub-Saharan Africa, and to what extent the full NCF has been incorporated. Therefore, this scoping review aimed to investigate the types and extent of ECD interventions in Sub-Saharan Africa, using the five inter-related components of the Nurturing Care as classification. By synthesising literature from the last 5 years, this review identified current knowledge gaps, emphasised successful tactics and offered recommendations for future research and implementation.

2 | Methods

A scoping review was chosen as a means to explore what is known about our specific topic (Peters et al. 2020; Tricco et al. 2018). Unlike systematic reviews, which aim to answer specific questions and include quality assessments to inform practice or policy decisions, scoping reviews aim to broadly map key concepts and identify gaps in research without necessarily evaluating the methodological quality of included studies or drawing conclusions about effectiveness. Given the diversity of ECD interventions and the nascent state of region-specific evaluations in Sub-Saharan Africa, a scoping review was deemed most appropriate for exploring recent ECD intervention programmes implemented in this context, how these align with the NCF and what dimensions have been underrepresented in the literature. This review is intended to inform researchers, programme implementers and policymakers seeking to improve early childhood outcomes through comprehensive and contextually appropriate strategies.

This review followed the methodological guidance of the Joanna Briggs Institute Manual for Evidence Synthesis (Peters et al. 2022), based on the foundational framework by Arksey and O'Malley (2005), and was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al. 2018).

A review protocol was developed a priori by the study team to guide the eligibility criteria, screening and data charting process. Although not registered or prepublished, the protocol was followed consistently. A preliminary search of MEDLINE, the Cochrane Database of Systematic Reviews and *JB* Evidence Synthesis was conducted, and no current or underway systematic reviews or scoping reviews on the topic were identified. Institutional ethics approval was not required, as this study used publicly available secondary data.

2.1 | Eligibility Criteria

We included peer-reviewed journal articles and theses of randomised controlled trials of ECD interventions conducted in Sub-Saharan Africa, as well as follow-up or longitudinal studies assessing the long-term effects of these interventions, published between January 2019 and December 2024. The motivation for only including this design lies in its methodological rigour and reliability in evaluating efficacy and causality while reducing the influence of confounding variables (Bhide et al. 2018; Zabor et al. 2020). No risk of bias appraisal was performed, consistent with scoping review standards. The search was restricted to Sub-Saharan Africa and did not include searches of individual countries, as shown in Table 1. We excluded studies implemented outside of Sub-Saharan Africa.

The inclusion criteria focused on randomised controlled trials that explicitly aimed to improve ECD outcomes or components of human capital, as defined by indicators or outcomes related to cognitive, social–emotional, physical and educational development. Studies were excluded if their objectives or outcomes were not aligned with this conceptual framework. Given the

randomised controlled trial inclusion criteria, eligible studies included those that compared ECD interventions to a control condition, for example, standard care, groups that did not receive an intervention or alternative interventions that target similar outcomes.

Other inclusion criteria were English, French and Portuguese studies, published in the last 5 years (i.e., from 2019 to 2024), given the prevalence of these languages in Sub-Saharan Africa. The review period begins in 2019 to capture the evolution of ECD intervention design and evaluation following the influential Lancet Series on Early Childhood Development published in 2016/2017 (Black et al. 2017; Britto et al. 2017; Richter et al. 2017). These publications emphasise the holistic and multi-sectoral nature of nurturing care. Therefore, starting from 2019 allowed us to explore whether subsequent interventions have integrated these expanded concepts and principles into practice, especially within Sub-Saharan African contexts. Further to this, we explore how these interventions relate to the findings of the recent two-part Lancet series on early childhood development (Draper et al. 2024; Nores et al. 2024).

By using the search terms ‘early development’, ‘early childhood development’ and ‘ECD’, we included studies targeted at children aged between conception and 8 years, as these years are defined as ECD (World Health Organization 2018). We note, however, that the NCF has historically had a strong focus on pregnancy to 3 years of age (World Health Organization 2018).

2.2 | Information Sources

The following databases were searched for relevant literature: PubMed, MEDLINE (Ebsco), Web of Science, ProQuest and PsychInfo. Grey literature, preprints and nonpeer-reviewed sources were excluded.

2.3 | Search Strategy

The search strategy was developed in accordance with the Population, Concept and Context strategy (PCC framework; Peters et al. 2020). The population included children aged 0–8 years; the concept was ECD intervention programmes aiming to improve human capital outcomes; and the context was Sub-Saharan Africa. Boolean operators were applied to search terms related to early childhood development, human capital, interventions, Sub-Saharan Africa and randomised controlled trials (see Table 1).

2.4 | Selection of Evidence Sources

All identified citations were exported to Zotero (2023), where duplicates were removed. The remaining records were uploaded to Rayyan (Ouzzani et al. 2016) for blinded screening of the titles and abstracts against the inclusion and exclusion criteria by three team members (S.A., M.L. and U.T.). Titles and abstracts were screened independently against eligibility criteria. A calibration exercise was conducted on a random 10% sample to ensure consistency. Full texts of potentially relevant articles were retrieved and assessed independently by the same team members. The results of

TABLE 1 | Search terms and corresponding Boolean operators.

Primary terms	
Childhood development	‘early development’ OR ‘early childhood development’ OR ‘ECD’
Human capital	‘human capital’ OR ‘health’ OR ‘well-being’ OR ‘interpersonal skill’ OR ‘socioemotional skill’ OR ‘education’ OR ‘level of education’ OR ‘education attainment’ OR ‘knowledge’ OR ‘skill’
Intervention	‘intervention’ OR ‘programme’ OR ‘project’
Sub-Saharan Africa	‘Sub-Sahara Africa’ OR ‘sub-Saharan Africa’
Randomised controlled trials	‘randomised controlled trial’ OR ‘RCT’

the search and the study inclusion process are reported in full in the PRISMA flow diagram (see Figure 1; Page et al. 2021).

2.5 | Data Charting and Items

Data were extracted by four team members (J.B., S.A., M.L. and U.T.) using a self-developed data extraction tool based on the JBI extraction template (JBI n.d.) and iteratively refined. The reviewers piloted the data extraction process by extracting the data from the same record and comparing the results. Charted variables included author, year, title, country, population characteristics, intervention design and content, and reported outcomes. No appraisal of methodological quality was conducted. A full list of charted items is provided in Table 2.

2.6 | Synthesis of Results

The final sample of 21 sources was synthesised thematically. First, interventions were grouped by NCF domain, namely, good health, nutrition, responsive caregiving, early learning, and safety and security. Patterns in study characteristics, intervention type and reported efficacy were summarised narratively. The synthesis focused on descriptive mapping rather than effect estimation, in line with the scoping review methodology. These reported patterns were informed by the research objectives and the NCF. J.B. independently coded the data and discussed discrepancies with the team to ensure consistency. Identified themes were refined through consensus discussions among the research team. Table 2 provides a summary of the data extraction framework followed.

3 | Results

Our search initially identified 85 articles, which were screened according to their full text. Records were excluded based on

wrong study design ($n=43$), wrong population ($n=10$), duplicate studies ($n=7$) and being a proposal and not a full study ($n=4$). Thus, 21 studies met the eligibility criteria and were included in the review. The PRISMA flow chart is illustrated in Figure 2, which indicates the progression of information across the different stages of the review.

Table 3 provides an overview of the included studies' characteristics. For more details, please refer to Table S1.

3.1 | Characteristics of the Included Studies

The studies included in the review span 13 countries across Sub-Saharan Africa, demonstrating regional variation in research focus and reach. Kenya, Tanzania and Zimbabwe are the prominent locations ($n=3$, each), followed by Ethiopia, Sierra Leone and Malawi ($n=2$, each) and Madagascar, Burkina Faso, Uganda, Guinea-Bissau, the Democratic Republic of Congo (DRC) and South Africa and Ghana ($n=1$, each). This indicates an underrepresentation of Western and Central African countries. Most studies were conducted in 2020 ($n=8$) and 2021 ($n=7$); fewer studies were conducted in 2022 and 2023 ($n=3$, each), and only one study was conducted in 2019.

The sample sizes varied considerably across studies, ranging from 134 participants (Daniel 2021) to over 9000 participants (Halliday et al. 2020). Three studies had under 500 participants (Siraneh et al. 2021; Lachman et al. 2020; Daniel 2021). Larger studies with over 1000 participants were those of Garcia et al. (2021), Friis et al. (2022) and Wolf (2019). The largest sample sizes were in Halliday et al. (2020), with 9571 participants, and Broadbent et al. (2022), which included 4996 mothers and 3082 fathers.

The key ECD stages addressed in the included studies were from preconception and prenatal stages through birth (0–2 months), infancy or toddlerhood (3 months to 2 years), preprimary years (2–5 years) and primary school years (6–8 years). Some studies extended over multiple stages, as shown in Figure 3 below.

In addition to the studies encompassing the various developmental periods, they comprised different participant groupings, including pregnant women ($n=3$; Rodriguez 2020; Siraneh et al. 2021; Sudfeld et al. 2021), mother/caregiver-child pairs or households with young children ($n=6$; Broadbent et al. 2022; Datta et al. 2024; Garcia et al. 2021; Lachman et al. 2020; Ojwang et al. 2021; Rockers et al. 2023), children with specific health conditions ($n=5$; Daniel 2021; Friis et al. 2022; Gough et al. 2020; Mbabazi et al. 2023; Rogawski McQuade et al. 2020), primary school-age children ($n=2$; Halliday et al. 2020; Wolf 2019) and a broader community-based approach ($n=1$; Quattrochi et al. 2021).

3.2 | Types of Early Childhood Developmental Interventions

The studies reviewed cover a range of ECD interventions, each aligning with one or more of the dimensions of the Nurturing Care Framework (NCF), as displayed in Figure 4 below.

TABLE 2 | Summary of the data extraction framework.

Field	Description
Author(s), year	Study citation
Title	Study citation
Country/location	Study location(s), sample size, recruitment
Study design	Confirmed randomised controlled trial, phase and arms
Study population	Age and sex of sample
Primary outcomes	Reported outcome measures including cognitive, socioemotional, physical and educational outcomes
Intervention	Intervention description and focus, and delivery method, including home-based, centre-based, group and digital
Results	Reported results of interventions on outcomes measured

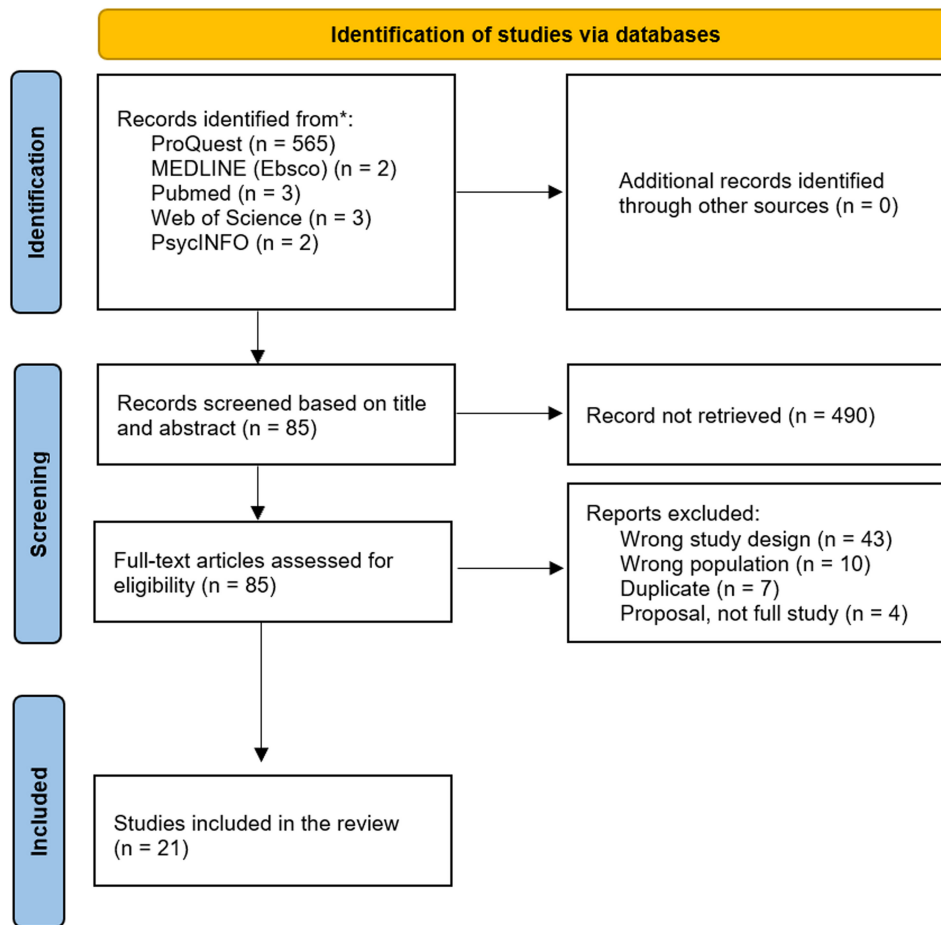


FIGURE 2 | PRISMA diagram.

Nutrition-focused interventions were the most frequent ($n=9$). These consisted of either nutritional supplementation ($n=4$; Friis et al. 2022; Mbabazi et al. 2023; Roberts et al. 2020; Rodriguez 2020) or nutrition education ($n=3$; Abiyu and Belachew 2020; Koyratty 2021; Ojwang et al. 2021). Two provided support and education specifically related to breastfeeding (Onyango et al. 2022; Siraneh et al. 2021). Two interventions focussed solely on responsive caring (Broadbent et al. 2022; Lachman et al. 2020). We found only one study focussing on early learning opportunities (Wolf 2019), one focussing on safety and security (Quattrochi et al. 2021) and one focussing on good health (Halliday et al. 2020). As shown in Figure 3, multidimensional interventions (i.e., interventions incorporating more than one NCF dimension) were common ($n=7$; Datta et al. 2024; Friis et al. 2022; Garcia et al. 2021; Gough et al. 2020; Lachman et al. 2020; Rogawski McQuade et al. 2020; Sudfeld et al. 2021).

3.3 | Reported Efficacy of Interventions

Given that scoping reviews generally do not assess the methodological quality of included studies, we refrain from concluding intervention efficacy or effectiveness. Instead, we describe the reported outcomes as presented in each study, emphasising that observed associations may not equate to causal impact. To maintain analytical caution, we have replaced statements reported in

the included studies suggesting impact or efficacy with terms such as ‘reported improvements’, ‘positive associations’ or ‘observed benefits’.

The reported efficacy of interventions varied by type and was often influenced by the inclusion of multiple NCF domains. Nutrition-focused interventions consistently reported improved growth outcomes, with observed benefits on anthropometric measures of participants. Interventions incorporating nutritional supplementation (Friis et al. 2022; Mbabazi et al. 2023; Roberts et al. 2020; Rodriguez 2020) and targeted breastfeeding support (Onyango et al. 2022; Siraneh et al. 2021) were reported to show the greatest improvements in child weight and growth outcomes.

Interventions aimed at responsive caregiving were reported to show positive associations with caregiver engagement and observed benefits in child socioemotional outcomes. Broadbent et al. (2022) reported that interpersonal communication showed positive associations with talking to children and engaging in children’s practices related to drawing, counting, naming objects and playing. Broadbent et al. (2022) refer to these parental behaviours or activities as ‘ECD behaviours’ in their study; however, they are typically referred to as responsive caregiving practices (Lobo et al. 2024; World Health Organization 2018). Lachman et al. (2020) reported that their intervention was associated with fewer reports of maltreatment, reduced endorsement

TABLE 3 | Overview of study characteristics.

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Wolf (2019). Year 3 follow-up of the 'Quality Preschool for Ghana' Interventions on Child Development.	Rural, Greater Accra Region, Ghana, $n = 3435$, recruitment through schools.	Randomised Controlled Trial, Phase III, with 2 treatment arms and 1 control arm.	Children in Grades 1 and 2 who received the intervention during kindergarten.	Children's academic, social-emotional, and executive functioning skills.	The Quality Preschool for Ghana (QPG): 1-year teacher training and coaching programme. - Treatment arm: training alongside parental awareness meetings (TTPA) - Control arm: the training alone (TT)	- TT positively impacted literacy, cognitive flexibility, and behavioural regulation. - TTPA negatively impacted numeracy but positively impacted behavioural regulation. - TT was more effective than TTPA in improving literacy and numeracy.
Abiyu and Belachew (2020). Effect of complementary feeding behavior change communication delivered through community-level actors on the time of initiation of complementary foods in rural communities of West Gojjam zone, Northwest Ethiopia: a cluster-randomized controlled trial.	Rural West Gojjam zone, Northwest Ethiopia, $n = 612$.	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 1 treatment arm and 1 control arm.	Mothers with infants under 6 months old.	Complementary feeding behaviour based on child, mother, and household characteristics, and timing of food introduction.	Intervention delivered by trained women development army leaders - Treatment arm: mothers receiving training sessions (i.e., cooking demonstrations) - Control arm: no intervention.	- Increased likelihood of timely complementary food initiation by 22%. - Reduced risk of late initiation by 19%. - Higher survival curve after 6 months. - Initiated complementary food earlier ($p < 0.001$).

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Gough et al. (2020). Effects of improved water, sanitation, and hygiene and improved complementary feeding on environmental enteric dysfunction in children in rural Zimbabwe: A cluster randomized controlled trial.	Rural Zimbabwe, $n = 1169$, recruitment by village health workers.	Randomised Controlled Trial, Phase III (i.e., effectiveness study) with 4 treatment arms.	Human immunodeficiency virus (HIV)-unexposed newborn infants.	Environmental enteric dysfunction (EED) biomarkers in plasma and stool samples at 1, 3, 6, 12 and 18 months of age.	Intervention delivered by trained village health workers during home visits Treatment arms: • Standard of Care (SOC): Promote breastfeeding and maternal-child health services uptake. • SOC and the water, sanitation, and hygiene (WASH): Provide ventilated pit latrine, handwashing stations, monthly soap and chlorine delivery, clean play space and behaviour change modules. • SOC plus the infant and young child feeding (IYCF): Daily lipid-based nutrient supplement and complementary feeding counselling. • Combination of all three.	- No interaction between IYCF and WASH on any biomarkers. - Minor changes in biomarkers for IYCF compared to non-IYCF group. - WASH group had higher levels of stool A1AT and myeloperoxidase, higher EE score, lower plasma KTR and CRP, and decreased and increased plasma IGF-1 at 3 and 18 months. - Significant results for WASH group included decreased plasma IGF-1 at 3 months, decreased kynurenine at 12 months, and increased plasma IGF-1 at 18 months.
Halliday et al. (2020). Impact of school-based malaria case management on school attendance, health and education outcomes: a cluster randomised trial in southern Malawi.	Urban Zomba district, Malawi, $n = 9571$, recruited from 58 primary schools.	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 1 treatment arm and 1 control arm.	Schoolchildren from standards 1 to 7.	School attendance, rates of Plasmodium spp infection and anaemia, academic performance and well-being, and health-seeking behaviour.	Treatment arm: Learner Treatment Kit administered to schools. Teachers trained to diagnose uncomplicated malaria, use artemisinin-based combination therapies, provided treatment for minor illnesses and injuries, referred cases to nearest health centre. Control arm: No intervention.	- Females were more likely to seek consultations. - No intervention effect on teacher or child absenteeism. - No impact on child-reported well-being, Plasmodium spp prevalence, anaemia, or education scores.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Lachman et al. (2020). Combining parenting and economic strengthening programmes to reduce violence against children: a cluster randomised controlled trial with predominantly male caregivers in rural Tanzania.	Rural Shinyanga District, Tanzania, $n = 248$, recruitment via public community meetings.	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 3 treatment arms and one control arm.	Parents and caregivers from farmer groups, children aged 10–17 and children aged 1–36 months.	Child maltreatment and parenting behaviour.	Village-based, government-organised farmer groups as intervention delivery platforms, trained by Kiswahili-speaking professional trainers. Treatment arms: • Skilful Parenting Intervention: 12-session, group-based parenting programme focused on parenting skills. • Agribusiness Programme: provided drought-resistant seeds, credit for farm inputs, advice on improving farming techniques and market connections. Control Arm: • No intervention	- Combination of treatment arms reduced child maltreatment, reduced endorsement of corporal punishment and resulted in fewer reports of child behaviour problems. - Skilful Parenting groups report less abuse and fewer child behaviour problems. - Agribusiness Programme result in fewer child behaviour problems, increased household wealth, increased physical abuse, and less positive parenting.
Roberts et al. (2020). Effects of food supplementation on cognitive function, cerebral blood flow, and nutritional status in young children at risk of undernutrition: randomized controlled trial.	Rural villages in the Oio and Cacheu regions of Guinea-Bissau. $n = 1059$	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 2 treatment arms and one control arm.	Children aged 15 months to 7 years, focus on those under 4 years old.	Working memory, haemoglobin concentration, body composition and index of cerebral blood flow (CBFi).	Researchers delivered. Treatments arms: - New food supplement (NEWSUP) provided for breakfast for 23 weeks. - Fortified blended food (FBF) provided for breakfast for 23 weeks. Control arm: - No intervention.	Among children younger than 4: - NEWSUP increased working memory, increased haemoglobin concentration among children with anaemia, decreased body mass index z score gain, increased lean tissue accretion and decreased fat, and increased CBFi compared to the control meal and FBF. Among children aged 4 and older: - NEWSUP had no significant effect on working memory or anaemia but increased lean tissue compared to FBF.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Rogawski McQuade et al. (2020). Impact of Water Quality, Sanitation, Handwashing, and Nutritional Interventions on Enteric Infections in Rural Zimbabwe: The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial.	Rural Zimbabwe, $n = 1169$, village health worker recruitment.	Randomised Controlled Trial, Phase III (i.e., effectiveness study) with 3 treatment arms.	Human immunodeficiency virus (HIV)-unexposed newborn infants.	Enteropathogen infections in children, based on stool samples collected at 1, 3, 6, 12, and 18 months, and during diarrhoea.	Village health worker intervention. • WASH: Provide ventilated pit latrine, handwashing stations, monthly soap and chlorine delivery, clean play space and behaviour change modules. • IYCF: Daily 20 g lipid-based nutrient supplement and complementary feeding counselling. • Combination of WASH and IYCF.	WASH Interventions: • Decreased the number of parasites detected. • No effects on bacteria, viruses, or prevalence/quantity of individual enteropathogens. IYCF Interventions: • No effects on individual or total enteropathogens. Neither had significant effects on pathogen-attributable diarrhoea.
Rodriguez (2020). Maternal Risk Factors for Poor Birth Outcomes in Moderately Malnourished Pregnant Women in Sierra Leone.	Sierra Leone, $n = 1475$	Randomised Controlled Trial, Phase III (i.e., effectiveness study) with 1 treatment arm and 1 control arm.	Pregnant women aged 16 or older (or under 16 with parental consent) with a mid-upper arm circumference (MUAC) of 23 cm or less, and a fundal height of 35 cm or less.	Adequate maternal nutritional supplementation on infant stunting, preterm delivery, and low birth weight.	Delivered by researchers. Treatment arm: • Ready-to-use supplementary food (RUSF) called Mama Dutasi, combined with 5 anti-infective treatments. Control arm: • Standard of care corn-soy blended flour with iron and folic acid supplement (CSB + IFA).	Infants born to mothers receiving RUSF are 0.29 cm longer. • Older mothers have fewer miscarriages and stillbirths. • First-time mothers produce smaller infants and are more likely to have stunted, low-birthweight, or preterm babies. • Maternal BMI < 18.5 kg/cm ² results in smaller infants. Maternal MUAC < 21 cm leads to infants weighing 15 g less and smaller MUAC. • A 1-unit decrease in maternal MUAC increases preterm delivery odds. • Adequate weekly weight gain results in greater length, weight, and MUAC.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Daniel (2021). The Kusamala Program for Primary Caregivers of Children with Severe Acute Malnutrition in Malawi.	Rural Malawi, $n = 134$, recruited from the Mojo nutritional rehabilitation unit (NRU).	Randomised Controlled Trial, Phase II, with 1 treatment arm and 1 control arm.	Primary caregivers and their children aged 6 to 59 months with severe acute malnutrition (SAM).	Child development outcomes (i.e., gross motor, fine motor, language, and social scores) assessed using the Malawi Developmental Assessment Tool (MDAT).	Delivered by researchers Treatment arm: • Kusamala Programme: Four-day hospital-based counselling programme for primary caregivers on nutrition, water, sanitation, hygiene and psychosocial stimulation for children. Control arm: • No intervention.	• No differences in child development measured with MDAT. • No improvement in developmental or nutritional outcomes.
Garcia et al. (2021). Cost-effectiveness and economic returns of group-based parenting interventions to promote early childhood development: Results from a randomized controlled trial in rural Kenya.	Rural Homa Bay County, Kenya, $n = 1152$, recruited from 60 villages.	Randomised Controlled Trial, Phase III (i.e., effectiveness study) with 2 treatment arms and one control arm.	Mothers or female caregivers aged 15 and older, with children between 6 and 24 months.	Cognitive and language development, measured using the Bayley Scales of Infant Development (Third Edition), and socioemotional development, measured using the Wolke Scale.	The Msingi Bora (“Good Foundation”) intervention, delivered by Kenya’s local community health volunteers. Treatment arms: • A group-only delivery model with 16 fortnightly group sessions. • A mixed-delivery model combining 12 group sessions with 4 home visits. Control arm: • No intervention.	• Both treatment arms resulted in improved cognition, receptive language and socio-emotional development.
Koyratty (2021). Food Insecurity, Water Insecurity, Infant Growth and Minimum Infant Dietary Diversity in Rural Zimbabwe. *1 study out of 3 studies in a single dissertation, with data from the SHINE trial	Rural areas of Shurugwi and Chirumanzu districts of Zimbabwe, $n = 1148$, recruited in the SHINE trial.	Randomised Controlled Trial, Phase II, with 1 treatment arm.	Mother-infant dyads enrolled in the SHINE trial.	The ability of mothers to provide their infants with the minimum dietary diversity (MIDD) needed to meet nutritional requirements.	Delivered by research nurses during home visits. Treatment arm: • Six nutrition education modules. • From the 6-month to the 18-month home visit, a daily supply of lipid-based nutrient supplement (Nutrigo) for the infants.	• MIDD implementation prevalence was 65.3%. • Food availability and quality were associated with a lower likelihood of mothers implementing MIDD at month 12. • Poor water quality was associated with a higher likelihood of MIDD implementation.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Ojwang et al. (2021). Do Nutrition Education Approaches With Preschoolers and Their Caregivers Influence Retention of Biofortified Orange- Fleshed Sweet Potato on Farms? Evidence From Homa Bay County, Kenya.	Rural Homa Bay County, Kenya, $n = 431$, 15 villages where orange-fleshed sweet potato (OFSP) has not been introduced, recruited from government-run ECD preschool centres.	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 3 treatment arms and one control arm.	Caregivers of preschoolers aged 3 to 7.	Caregivers' likelihood to retain OFSP on their farms, measured as a binary variable (i.e., whether the caregiver replants OFSP or not).	Delivered by researchers. Treatment arm: • OFSP-branded exercise books, posters, and a poem given to preschoolers. • OFSP-oriented mobile phone- mediated text messages sent to caregivers. • Both exercise books, posters, and a poem, and mobile phone-mediated text messages provided to households concurrently. Control arm: • Only received cooking demonstrations and free vines.	• Positive and significant effects on caregivers' likelihood to retain OFSP on their farms were found only for the third treatment arm with both interventions.
Siraneh et al. (2021). Effectiveness of Positive Deviance Approach to Promote Exclusive Breastfeeding Practice: A Cluster Randomized Controlled Trial.	Urban Jimma Town, Ethiopia: $n = 260$, recruited from family folder logbooks at health posts	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 1 treatment arm and 1 control arm.	Women in their third trimester of pregnancy, or who gave birth in the last 5 years.	Exclusive breastfeeding (EBF) practice and rates of breastfeeding.	Delivered by women in the community trained as positive deviants. Treatment arm: • Counselling and social support in addition to the usual service to promote EBF. Control arm: • Usual community-based services.	• A higher proportion of mothers in the intervention group reported EBF at mid and end-line. • EBF rate increased by 18.5% in the intervention group, and 0.2% in the control group, with a net effect of +18.2%. • At follow-up, the intervention group were twice as likely to practice EBF.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Sudfeld et al. (2021). Effect of a home-based health, nutrition and responsive stimulation intervention and conditional cash transfers on child development and growth: a cluster randomised controlled trial in Tanzania.	Rural Ifakara, Tanzania. <i>n</i> = 593, recruited through a house-to-house survey.	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 2 treatment arms and one control arm.	Pregnant women or female caregivers with children less than 1 year old.	Children's cognitive, language and motor development (measured using the Bayley Scales of Infant and Toddler Development), and child length/height-for-age z-scores (HAZ) at 18 months follow-up.	Delivered by community healthcare workers. Treatment arm: • Integrated home-visiting health, nutrition, and responsive stimulation (CHW). • Integrated home-visiting health, nutrition, and responsive stimulation intervention with conditional cash transfers (CHW + CCT). Control arm: • No intervention.	- Both CHW and CHW + CCT had positive effects on child cognitive development compared. - CHW + CCT also had positive effects on language and motor development. - Neither intervention affected HAZ in the primary analysis, but positive effects were found in multivariable analyses. - Both CHW and CHW + CCT attended more child health and growth monitoring clinic visits.
Quattrochi et al. (2021). Effects of a community-driven water, sanitation and hygiene intervention on water and sanitation infrastructure, access, behaviour, and governance: a cluster-randomised controlled trial in rural Democratic Republic of Congo.	Rural villages in Congo Central, Kasai, Kasai Central, South Kivu and North Kivu, Democratic Republic of Congo (DRC), <i>n</i> = 403 villages, identified by UNICEF.	Randomised Controlled Trial, Phase II, with 1 treatment arm and 1 control arm.	Villages (including both adults and children).	Time spent collecting water, quantity of water collected, drinking water quality, defecation sites, and child health.	Delivered by the DRC government's Ministries of Public Health and Primary, Secondary and Professional Education. Treatment arm: • Healthy Villages & Schools programme (in French 'Villages et Ecoles Assainis' (VEA), a WASH programme). Control arm: • No intervention.	- The VEA programme increased access to improved water sources, improved sanitation facilities, and improved water governance, water satisfaction, handwashing practices and sanitation practices. - No difference was found in the financial cost of water, school attendance, child health or water storage practices.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Broadbent et al. (2022). Promoting Caregiver Early Childhood Development Behaviors through Social and Behavioral Change Communication Program in Tanzania.	Rural Lake Zone Region of Tanzania, <i>n</i> = 8078	Randomised Controlled Trial, Phase III, with 3 treatment arms and one control arm.	Mothers or primary caregivers (<i>n</i> = 4996) and corresponding fathers or male heads of the households (<i>n</i> = 3082). Households with a child under 2 years.	ECD behaviours (i.e., talking to children, and engaging in children's practices related to drawing, counting, naming objects and playing).	The Addressing Stunting in Tanzania Early (ASTUTE) programme disseminated ECD-related messages via a mass media campaign and using interpersonal communication.	• Most female primary caregivers reported engaging in three of the five ECD behaviours measured, namely talking, playing, and naming objects. • The prevalence of ECD behaviours of drawing and counting with the child was lower. • Interpersonal communication exposure was significantly related to increased engagement in all ECD behaviours. • Male heads of households who heard radio spots with intervention messages were more likely to name objects for their child and to play with their child.
Friis et al. (2022). Serum cobalamin in children with moderate acute malnutrition in Burkina Faso: Secondary analysis of a randomized trial.	Urban Province du Passoré, Northern Region, Burkina Faso, <i>n</i> = 1608, recruited via community health worker screening or referral from caregiver or health centre.	Randomised Controlled Trial, Phase III (i.e., effectiveness study).	Children aged 6–23 months with moderate acute malnutrition (MAM).	Serum cobalamin (SC), fat-free mass index, iron status, and overall development of children.	Delivered by researchers. 2 × 2 × 3 factorial trial: Daily supplements for 3 months with the following variations: • Lipid-based nutrient supplement (LNS) or corn-soy blend (CSB). • Dehulled soy (DS) or soy isolate (SI). • 0%, 20%, or 50% of protein from dried skimmed milk.	• Median (IQR) SC increased, and after 3 months without supplementation, the median SC dropped again. • A 3-way interaction between experimental factors was explained by an interaction between matrix and soy quality. • Larger SC increase in those given LNS (versus CSB) when SI was used.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Onyango et al. (2022). Associations between exclusive breastfeeding duration and children's developmental outcomes: Evidence from Siaya county, Kenya.	Urban Siaya county, Kenya, N= 570	Randomised Controlled Trial, Phase II (i.e., efficacy study) with 1 treatment arm and 1 control arm.	Children below 6 months.	Child development measured using the Ages and Stages Questionnaire-Third Edition (ASQ-3).	Delivered by researchers. Children were classified as either: • Exclusively breastfed (EB); or • Not exclusively breastfed (no-EBF).	- Large differences were found between the mean developmental outcome scores for the 3-6-month period, where the EBF group had significantly higher mean scores. - EBF children between 3 and 6 months were associated with higher ASQ mean scores.
Datta et al. (2024). Do Behavioral Interventions Enhance the Effects of Cash on Early Childhood Development and Its Determinants? Evidence from a Cluster-Randomized Trial in Madagascar.	Rural Madagascar, n = 2757	Randomised Controlled Trial, Phase III (i.e., effectiveness study) with 3 treatment arms and one control arm.	Households with children under 6 years old.	Positive parenting behaviours, interaction and preparing diverse meals. Children's language learning, fine motor skills, social skills and composite development were measured using the Malagasy-adapted (MDAT).	Delivered by 'Mother Leader' (ML) groups. Treatment arms: - Behaviourally Enhanced Arm 1: Consisted of the ML intervention groups layered onto a cash-transfer intervention. - Second and third enhanced arms: Additionally trained facilitators to deliver a 'nudge' to ML groups on cash transfer days, including Plan-making nudge and Self-affirmation nudge Control arm: - Received only the cash transfer, with no behavioural intervention.	- Parents in two of the ML and ML + planning nudge arms practised more positive parenting behaviours, interaction, and diverse meals. - Parents in all three behaviourally enhanced arms engaged in more parent-child interactions. - Only the arm with cash + ML groups showed significant positive differences in overall child development. - The arms with cash + ML groups, and the group ML + planning nudge, showed better language learning.

(Continues)

TABLE 3 | (Continued)

Study (year)	Study location	Study design	Study population	Primary outcomes	Intervention	Results
Mbabazi et al. (2023). Effect of Milk Protein and Whey Permeate in Large-Quantity Lipid-Based Nutrient Supplement on Early Child Development among Children with Stunting: A Randomized 2×2 Factorial Trial in Uganda.	Urban Walukuba division and peri-urban Buwenge town in Jinja, Uganda, n = 750, recruited via the study clinic.	Randomised Controlled Trial, Phase II (i.e., efficacy study), using a 2x2 factorial trial.	Children aged 1 to 5 years, with height-for-age z-score (HAZ) less than -2 and a weight-for-height z-score (WHZ) greater than -3.	Head circumference and child development outcomes, namely motor, fine motor, language and social skills, measured using the Malawi Development Assessment tool (MDAT, version 6).	Delivered by the researchers. 2×2 factorial trial: - Milk protein (MP) versus soy and whey permeate (WP). - Maltodextrin in large-quantity, lipid-based nutrient supplement (LNS). - LNS versus no supplementation.	- No interactions between MP and WP for any of the outcomes. - No effect of either MP or WP on any developmental domain. - Although LNS itself had no impact on development, it resulted in 0.07 cm higher head circumference. - Neither dairy in LNS nor LNS itself had an effect on development among already stunted children.
Rockers et al. (2023). Evaluation of a community health worker home visit intervention to improve child development in South Africa: A cluster randomized controlled trial.	Rural Tzaneen and Giyani subdistricts, Mopani District, Limpopo, South Africa, n = 316, recruited via community health workers.	Randomised Controlled Trial, Phase II, with 1 treatment arm and 1 control arm.	Caregiver-child dyads, where the caregiver was 18 years or older and the child was born after 15 December 2015.	Child height-for-age z-scores (HAZs) and stunting, child development scores measured using the Malawi Development Assessment Tool (MDAT). A subsample was selected to measure changes in EEG gamma power, total power, and saccadic reaction time (SRT).	Delivered by trained community health workers. Treatment arm: - CHWs delivered information on child health, nutrition, and developmental milestones, and encouraged caregivers to engage in developmentally appropriate play-based activities during monthly home visits. Control arm: - HCWs provided the local standard of care.	- Adjusted models showed the intervention had no impact on HAZ, stunting, gross motor skills, fine motor skills, language skills, and social-emotional skills. - In the lab subsample, the intervention had a significant impact on SRT, absolute gamma power, and total power, but had no impact on relative gamma power. - SRT improvement was observed at the first two lab visits but was no longer present at the third visit, which coincided with the final assessment.

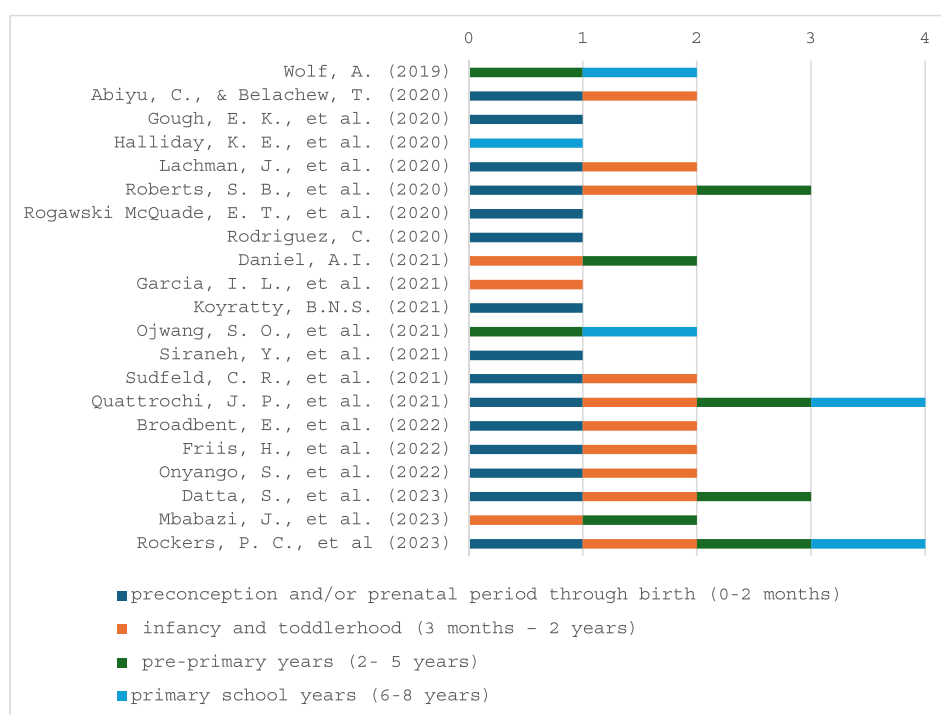


FIGURE 3 | EDC stages included in each study.

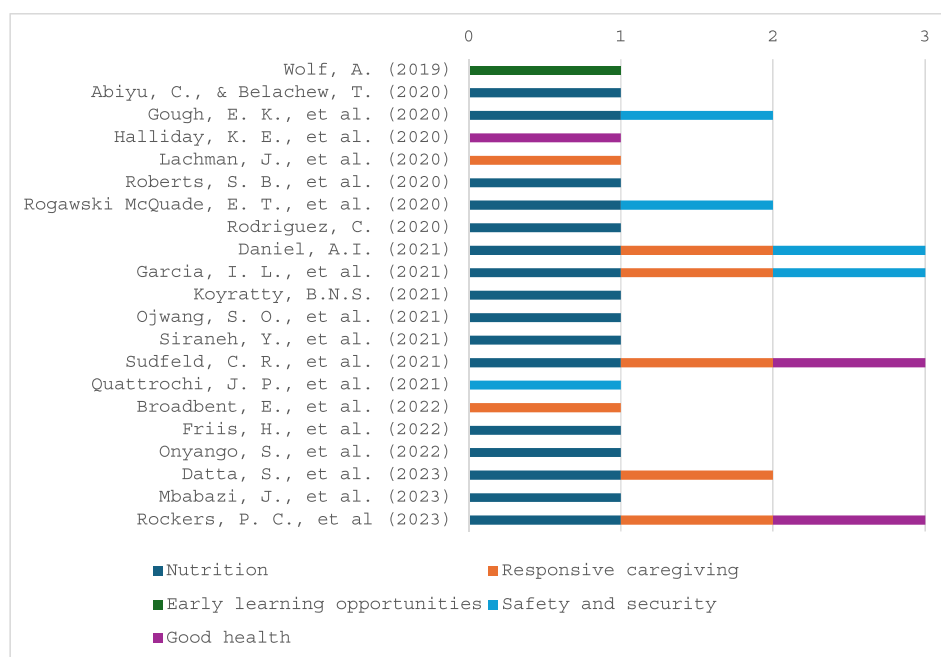


FIGURE 4 | NCF dimensions addressed in each study.

of corporal punishment and fewer behavioural problems in children.

Wolf (2019) reported that the Quality Preschool for Ghana intervention demonstrated observed gains in literacy and social competence, highlighting the value of structured early learning environments within ECD programmes. Quattrochi et al. (2021) reported that the Healthy Villages & Schools intervention showed mixed results; although the programme was associated with increased water access and hygiene behaviours, they found

no direct impact on child health. This study did not specifically measure developmental outcomes but rather focussed on child health. Halliday et al. (2020) reported that the school-based malaria case management intervention found no intervention effect on school absenteeism, well-being, malaria infection, anaemia or education scores.

Reported results of multidomain interventions demonstrated both mixed effects and positive associations with outcomes across the NCF domains. The Msingi Bora intervention was

reported to result in overall positive associations with developmental outcomes for children (Garcia et al. 2021). The integrated community health worker intervention was reported to show observed benefits in child cognitive development and linear growth (Sudfeld et al. 2021). The Mother Leaders intervention was reported to be positively associated with households with more desirable parenting styles and interaction with children and more diverse home-cooked meals with less food insecurity, which were ultimately associated with better performance of children on measures of sociocognitive development (Datta et al. 2024). Contrary to these findings, other multidomain interventions were reported to show no significant results on ECD outcomes (Daniel 2021; Gough et al. 2020; Rockers et al. 2023; Rogawski McQuade et al. 2020).

4 | Discussion

This scoping review aimed to identify and summarise ECD RCTs in Sub-Saharan Africa to identify gaps and inform future research and intervention initiatives that may support ECD in the region. Our findings illustrate reported efficacious interventions but indicate a predominance of nutrition-focussed interventions, and where multidimensional interventions were evaluated, they mostly did not include all elements of the NCF.

The predominance of nutrition-focused interventions was expected, given the rise of food insecurity across Sub-Saharan Africa. An estimated 123 million people (approximately 12% of the population) experience malnutrition and are unable to meet minimum food consumption needs (Food Security Information Network 2023). In the child population in Sub-Saharan Africa, the pooled prevalence of malnutrition is 33.2% for stunting, 7.1% for wasting and 16.3% for being underweight (Akombi et al. 2017). The predominance of nutrition-focused interventions may also be attributed to the globally recognised impact of nutrition on early development (Ewunie et al. 2022). These interventions were consistently reported to have positive associations with child growth outcomes, particularly those incorporating nutritional supplementation and breast-feeding support.

The multidimensional interventions identified ($n=7$) were reported to show mixed effects. Three of these showed reported improvements in child development outcomes (Datta et al. 2024; Garcia et al. 2021; Sudfeld et al. 2021), whereas four did not yield significant results (Daniel 2021; Gough et al. 2020; Rockers et al. 2023; Rogawski McQuade et al. 2020). The limited efficacy of these interventions was discussed to some extent by the authors and was attributed to several interrelated factors, including the complexity of the intervention design, contextual barriers, implementation fidelity and the duration of the intervention. Multidimensional interventions require the integration of diverse strategies across domains. However, in resource-constrained settings, the simultaneous implementation of multiple interventions may dilute the initial focus and thus effectiveness, which can later lead to inconsistencies in participant engagement and uptake (Daniel 2021; Gough et al. 2020; Rockers et al. 2023; Rogawski McQuade et al. 2020). Contextual factors, such as socioeconomic barriers including poverty and limited access to resources, also

influenced intervention outcomes, particularly when caregivers struggled to implement recommended health and feeding practices (Daniel 2021; Gough et al. 2020; Rockers et al. 2023; Rogawski McQuade et al. 2020). Additionally, variations in implementation fidelity—such as inconsistent adherence to intervention protocols by those providing the intervention—may have affected outcomes. Research often highlights the importance of maintaining intervention integrity to achieve desired results (Freeman et al. 2022).

Another key challenge in these studies was the duration of the interventions, with some programmes not allowing sufficient time for behavioural changes to take effect, particularly for entrenched practices related to WASH and nutrition (Gough et al. 2020; Rogawski McQuade et al. 2020). Finally, adaptations made to intervention programmes during implementation to accommodate local contexts may have altered core intervention components, reducing their intended impact (Swindle et al. 2022). These reported mixed efficacy results highlight the complexity of interactive biological-environmental-behavioural processes occurring during ECD in Africa (Black et al. 2022; Naicker et al. 2022). These mixed results corroborate that of the Lancet Series on ECD the next 1000 days in that, although multidimensional interventions are recommended and important as children face multifaceted challenges and environmental risks during these developmental years, further evidence on the efficacy of these interventions is required (Draper et al. 2024; Nores et al. 2024).

Our review highlighted large gaps in terms of the focus of research on ECD interventions, both in terms of single-domain and multidomain focused studies. Most multidomain interventions did not incorporate all the NCF domains. The seven included multidomain interventions reveal a common focus on nutrition and health while often neglecting early learning, responsive caregiving, and safety and security. Although not explicitly discussed, the reason might relate to these studies' focus on urgent health concerns, such as severe acute malnutrition (Daniel 2021), enteric infections (Gough et al. 2020; Rogawski McQuade et al. 2020) or physical growth (Rockers et al. 2023), which may have resulted in the deprioritisation of these broader developmental needs. The lack of early learning interventions is particularly alarming given global evidence highlighting its role in long-term cognitive and social development (Draper et al. 2024; Nores et al. 2024). The same holds for safety and security, which is crucial for ensuring that children grow up in environments free from violence, neglect and instability (Buccini et al. 2022; Maree et al. 2024). This finding of a limited focus on responsive caregiving aligns with findings from Draper et al. (2024), indicating that such interventions are scarce even in LMICs, although responsive caregiving has been linked to improved child outcomes across various settings. This finding underscores the necessity of designing integrated interventions that not only address immediate health risks but also support cognitive and socioemotional development.

As mentioned, the five NCF components are embedded within a broader ecological context of structural and policy environments that affect interventions' delivery and effectiveness (Draper et al. 2024). Our review used the NCF components merely as a

classification system. However, ECD interventions should not be viewed as five isolated components, focusing on individual, parenting or household-level change without adequately addressing upstream social determinants such as poverty, inequality and limited access to services. To honour the ecological grounding of the NCF, these interventions must be situated within a broader developmental framework that includes multisectoral coordination, policy support and community-level engagement.

Further to this, this review highlighted significant variation in research activity across Sub-Saharan Africa, with most studies concentrated in Eastern (e.g., Kenya and Tanzania) and Southern Africa (e.g., Zimbabwe), with Western and Central Africa notably underrepresented. This finding is similar to that of Lu et al. (2020), who propose that the lagging of Western and Central African research may be due to limited funding and inadequate infrastructure for ECD activities. Agyekum et al. (2023) and Draper et al. (2024) also highlight the effect of rural–urban differentials on access to ECD resources. Urban areas may attract more research attention due to better infrastructure and resources for ECD activities.

At the study level, our findings highlight a need for studies that include more diverse geographic contexts and underrepresented regions in Sub-Saharan Africa to ensure that local ECD needs are effectively addressed. Various studies show that ECD interventions are predominantly delivered in high-income countries and that there seems to be a large mismatch between where these interventions are most needed and where they are being implemented and evaluated (Draper, Klingberg, et al. 2023; Draper et al. 2024; McCoy et al. 2022), a finding also evident in our review. Draper, Barnett, et al. (2023) highlight that the larger issue at play here is that child development journals and funding agencies favour research from high-income countries, resulting in the epistemic exclusion of research from the Majority World, the Global South, non-WEIRD (Western, Educated, Industrial, Rich, and Democratic) or LMICs. There is thus a need to expand the research focus to underrepresented regions in Sub-Saharan Africa (and other LMICs) and consider local contextual factors that could influence the administration and success of ECD interventions.

At the research level, this review revealed a critical need for longitudinal studies to assess the long-term impacts of ECD interventions, particularly in LMICs. Apart from ECD interventions' immediate outcomes, Draper, Barnett, et al. (2023) emphasise the need for additional supportive protective interventions to ensure the support of continued childhood development. These are interventions that should be implemented at home, such as parenting education, social protection, violence prevention and mental health support, all of which may have great long-term financial impacts (Richter et al. 2017).

In contrast to high-income countries where ECD programmes are well established and extensively researched, Sub-Saharan Africa still grapples with significant gaps in intervention implementation and evaluation (Draper et al. 2024). As LMIC research populations often face compounded challenges that necessitate tailoring interventions to fit the specific context, interventions in LMICs should leverage community resources and emphasise local adaptability of interventions (Aboud and

Yousafzai 2015). Considering this, our implementation learning findings (see Table S1) revealed challenges in early learning interventions related to variations in school environments, teacher burnout and resource constraints. Limited nutritional resources were also a significant challenge in implementing interventions. In contrast, active engagement, family involvement and targeted training for mothers were effective strategies for implementation. These findings emphasise the importance of culturally sensitive intervention delivery and study methods; engagement with community stakeholders to gain participants access and trust; and the integration of interventions into existing health and education systems to simplify intervention delivery and research. The need for flexible intervention programmes and study designs was also revealed by the consistent challenges related to time constraints and competing priorities.

5 | Limitations

The first limitation of this review relates to not including a quality assessment. Although quality assessments are optional for scoping reviews (Xue et al. 2024), a lack thereof could result in studies with methodological limitations being included in the review and may also limit the interpretability of the findings. We aimed to include all RCTs irrespective of quality to understand the scope of interventions evaluated in the past 5 years. Another limitation is the inclusion of studies that use the same research sample or dataset, which could introduce some redundancy in the review findings, thereby possibly overstating the significance of specific results. For example, Rogawski McQuade et al. (2020) and Gough et al. (2020) both used the same research sample, suggesting that the concentration of studies may not reflect a greater implementation of ECD interventions but rather repeated analysis of the dataset from a single intervention. Randomised controlled trials in the search strategy have limited the number of studies we included in the review and may have resulted in the exclusion of valuable insights from other study designs, such as quasiexperimental studies, cohort studies and qualitative research. This limitation may have narrowed the scope of evidence, potentially excluding studies that address contextual factors, implementation challenges and real-world effectiveness. Future reviews should consider incorporating diverse study designs to provide a more comprehensive overview of the field.

6 | Conclusion

In conclusion, the review demonstrated variations in research activity across the region and highlighted that nutrition-focused interventions are the most prevalent and yield the most positive child development outcomes in this context. Although responsive caregiving interventions were less common, they also demonstrated positive effects on developmental outcomes. This review highlighted the need for interventions that also include good health, safety and security, and early learning opportunities. Continued investment in research is essential to inform practice and policy to support child development in resource-limited settings and ultimately build human capital.

Author Contributions

Johanna Beukes: conceptualization, writing – original draft, investigation, methodology, formal analysis, data curation, project administration. **Stephanie Alcock:** conceptualization, writing – review and editing, formal analysis. **Michelle Leal:** conceptualization, writing – review and editing, formal analysis. **Urridge Thompson:** conceptualization, formal analysis. **Catherine E. Draper:** conceptualization, supervision, writing – review and editing. **Shane A. Norris:** conceptualization, supervision, writing – review and editing, methodology.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing is not applicable to this article, as no datasets were generated or analysed during the current study.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.