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Developing a contextually relevant ECD milestone guide for South African practitioners

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Background: Two hundred and fifty million children under five in low- and middle-income countries are at risk of not achieving their developmental potential. High-quality milestone guides can help mitigate these risks but are often not contextually appropriate for countries like South Africa, because of unavailable resources and its inappropriateness in multilingual group contexts.

Aim: This study aimed to develop and pilot a contextually relevant ECD milestone guide for practitioners working with preschool children (3–5 years 11 months) in low-resourced South African communities.

Setting: This study focused on ECD practitioners within low-resourced South African communities.

Methods: Data collection involved four phases: (1) An initial questionnaire and an abridged milestone guide were reviewed by an expert panel, who suggested contextual adaptations and activities, (2) The Delphi method was used to rank suggestions, (3) Virtual focus group addressed six milestones that required further consensus, (4) a pilot of the language and communication domain was conducted where six practitioners provided feedback on its usability.

Results: Practitioners found the milestone guide valuable and usable, supporting their work with young children in low-resourced communities. Feedback informed further refinements to improve usability and contextual relevance.

Conclusion: The adapted milestone guide equipped practitioners in low-resourced ECD classrooms with tools to promote age-appropriate development and identify developmental delays early. By addressing these delays, the guide helps break cycles of disadvantage, enabling children to thrive and reach their full potential.

Contribution: This study offers a framework for developing contextually relevant milestone guides to support ECD practitioners in low-resourced settings.

Keywords: early childhood development; low-resourced context; ECD practitioners; low- and middle-income countries; milestone guide.

Introduction

Two hundred and fifty million children under five who live in low- and middle-income countries (LMICs) are at risk of not achieving their full developmental potential (Fernald et al. 2017). Biological and environmental risks can accumulate, resulting in developmental delays that negatively impact later academic achievement and scholastic abilities (Black et al. 2017; Ragnarsdottir et al. 2017; South African Department of Health 2017). Although South Africa is considered an upper-middle-income country (UMIC), it has many low-income communities (Statistics South Africa 2020), resulting in being the country with the greatest socio-economic disparity globally (Alaba et al. 2021). Approximately 57% of young children in South Africa reside in low-income communities and are therefore at increased risk for developmental delay because of economic-related factors such as undernutrition and extreme poverty (Thrive by Five 2022).

High-quality interactions between children and their caregivers can ameliorate developmental risks. It is, therefore, essential to foster age-appropriate early childhood development (ECD), particularly language abilities, in children from LMICs for future academic success (World Health Organization [WHO] 2007). The long-term benefits of receiving ECD stimulation have prompted the South African government to emphasise establishing high-quality ECD services through policies

Note: Additional supporting information may be found in the online version of this article as Online Appendix 1.

such as the Side-by-Side campaign (South African Department of Health 2017; Suhrcke & Kenkel 2015). The campaign aims to support children by fostering nurturing and developmentally supportive care to attain children's full educational, social and health potential through early stimulation (Slemming & Bamford 2018). The Side-by-Side campaign is based on the Nurturing Care Framework (NCF) (WHO 2019), which proposes a continuum of services that are necessary for the appropriate stimulation and early development of young children (Berry et al. 2013).

The NCF states that children must have opportunities for early learning primarily in their home environments (Black & Trude 2019; Richter 2019). In reality, 92% of South Africa's 5–6-year-olds (Shung-King et al. 2019) and 63% of South Africa's 3–5-year-olds (Ashley-Cooper, Van Niekerk & Atmore 2019) attend ECD centres as primary caregivers need to work (Smit et al. 2021). Age-appropriate ECD can be targeted in preschool settings through stimulation programmes and milestone guides that support ECD practitioners in stimulating childhood development across developmental domains (Hartinger et al. 2016). Providing nurturing care during this period is essential for sustaining and enhancing children's developmental progress, allowing them to reach their full developmental potential (Nores et al. 2024). Furthermore, ensuring the continuity of age-appropriate nurturing care; fostering coordination among health, education and protection sectors; implementing targeted interventions to assist caregivers; and improving the quality of education and care are key priorities during this vital stage (Draper et al. 2024). According to the Side-by-Side campaign, support should come from establishing enabling environments for families through community programmes and services, such as ECD centres and practitioners, and implementing contextually relevant stimulation programmes to attain developmental milestones (Black & Trude 2019).

In South Africa, many ECD centres function more informally as basic childcare with less focus on ECD stimulation (Van Heerden 2016). Furthermore, quality-of-service delivery is often impacted by limited practitioner knowledge and the absence of a standardised curriculum to guide ECD practitioners (Smit et al. 2021). Many ECD practitioners in South Africa have limited training and no formal qualifications (Van Heerden 2016). Limited educator knowledge may lead to less stimulation and delayed identification of developmental delays (Smit et al. 2021). Early childhood development centres are considered places where young children receive quality care and educational services that support development in all domains (Alameen, Male & Palaiologou 2015). Research, however, indicates that ECD practitioners feel like they need support to provide adequate developmental support through the use and provision of appropriate resources (Smit et al. 2021; Vargas-Baron et al. 2019). Thus, it is imperative that ECD practitioners receive support and guidance, for example, through resources such as contextually relevant ECD milestone guides, to enable an environment conducive to ECD.

The most cost-effective and critical opportunity for reducing the effects of inequality, trauma and poverty is through contextually appropriate and accessible stimulation programmes to attain developmental milestones (Woodhead et al. 2014). Through these programmes, accessibility of developmental services can be improved to reduce developmental gaps compared to same-aged, higher socio-economic peers. Classroom-based intervention is a favourable and feasible approach to meeting the developmental needs of young South African children from low-income communities (Moonsamy & Kathard 2015). A challenge is that currently only a few reputable ECD stimulation programmes exist, typically developed in high-income countries (HICs) (Vargas-Baron et al. 2019). As a result, implementing existing stimulation programmes in low-resourced communities would be inappropriate because of contextual differences (Vargas-Baron et al. 2019). There has consequently been a call to adapt or develop ECD milestone guides that can be used as contextually relevant stimulation programmes in low-resourced communities (De Bruin 2021).

Most adaptations to ECD milestone guides are made to make resources appropriate for the local population, as seen by linguistic and cultural adaptations; however, contextual relevance and adaptations are lacking (De Bruin 2021). A contextually relevant milestone guide should consider the developmental needs of the target population, the multilingual nature of the population, the availability of resources and the training of ECD practitioners within that context. In South Africa, communication impairment is the most prevalent delay in early childhood (Van der Linde et al. 2016). Therefore, South African milestone guides should focus on fostering the language domain, especially considering the foundational role of language in participation and education.

Contextually adapted guides should be relevant for primary caregivers and ECD practitioners to use in their specific communities. The Centers for Disease Control and Prevention (CDC) Developmental Milestone Guide is a free, easily accessible developmental stimulation programme (CDC 2017). The resource contains specific age-related milestones per developmental domain and examples of activities to stimulate milestones (CDC 2019). The monitoring of developmental milestones using a simple checklist informs caregivers which skills are expected at what age, how to stimulate milestones through different activities and when to seek additional help if concerned about children's development (CDC 2021). The CDC Developmental Milestone Guide (CDC 2017) is a widely used programme but is, however, based on typically developing American children from high socio-economic backgrounds (CDC 2019).

A simple, contextually relevant checklist for implementation within a low-resourced setting does not exist, which leaves ECD practitioners from different contexts with the difficult task of implementing existing milestone guides that are not contextually responsive (Smit et al. 2021; Vargas-Baron et al. 2019). This gap highlights the urgent need for tools that are tailored to the realities of low-resourced South African ECD centres. Therefore, this study aimed to develop and pilot a contextually relevant ECD milestone guide for ECD practitioners of preschool children aged 3–5 years 11 months from low-resourced South African communities.

Research methods and design

Research design

Phases 1–3 applied an exploratory mixed-method research design to collect quantitative and qualitative data from an expert panel to adapt an existing milestone guide and develop a contextually relevant resource. Cultural considerations for the guide included socio-economic realities, linguistic and cultural diversity, training of ECD practitioners and the availability of resources within low-resourced South African communities. To ensure contextual relevance, the suggested activities were made developmentally appropriate, required minimal to no materials and could be easily integrated into classroom routines. Data were collected using questionnaires and a focus group discussion. An initial questionnaire was completed by the expert panel in Phase 1 to review the contextual applicability of the original guide and to suggest activities to facilitate the attainment of the indicated milestones for groups of young children at ECD centres in low-resourced communities. Phase 2 consisted of a follow-up questionnaire in which the Delphi method was applied to rank suggestions collected in Phase 1. The Delphi method is a process based on the results of multiple questionnaires, in which the follow-up questionnaire contains a summarised version of the previous round (Twin 2021). A focus group discussion was used in Phase 3 to gain consensus from the expert panel for the suggested activities where consensus could not be reached during Phases 1 and 2. Phase 4 entailed piloting a portion of the adapted milestone guide, specifically the language and communication domain because of the foundational role of language in participation and education and gathering ECD practitioners' perspectives on the usability of the milestone guide.

Setting and participants

In Phases 1–3, purposive sampling was used to identify six experts who interact with and support ECD as part of their scope of practice. Experts had to meet the following selection criteria (Table 1): have a formal qualification; should have active registration with the Health Professions Council of South Africa and/or Department of Basic Education; have a minimum of 4 years' experience in ECD; and understand a low-resourced context in South Africa, either by living and/or working experience within a low-resourced context for a minimum of 4 years. Research has shown that community members must form part of the adaptation and/or development process of a milestone guide at an early stage to create understanding, build ownership and make optimal use of local resources (Richter et al. 2017). The following experts were selected to serve on the expert panel: one educational psychologist, two occupational therapists, one physiotherapist, one principal of an ECD centre and one speech-language pathologist.

TABLE 1: Expert panel characteristics ($N = 6$).

Characteristic	Category	*n*
Years of experience working in ECD	4 years	3
	5–10 years	1
	More than 10 years	2
Setting in which the participant has experience in managing children aged 3–5 years 11 months	Public sector	4
	Private sector	1
	Both sectors	1
Experience in a low-resourced setting	Lived only	0
	Worked only	4
	Lived and worked	2

ECD, early childhood development.

Non-probability purposive sampling was employed to identify ECD practitioners included in Phase 4. Early childhood development practitioners were from an ECD centre in a low-resourced community in a high-population township that forms part of the City of Tshwane Metropolitan Municipality, northeast of Tshwane, with most citizens living in informal settlements. Many languages are spoken in the community, including isiZulu, Sepedi, Sesotho and English, a widespread spectrum of exposure for children learning languages (Khanyile & Ballard 2022).

Six ECD practitioners participated in Phase 4. The small purposive sample allowed for rich qualitative insights that brought direct experience within classrooms to provide nuanced feedback on feasibility. They provided ECD education to children in the 2- to 3-year-olds, 3- to 4-year-olds, 4- to 5-year-olds and 5- to 6-year-olds classes at the ECD centre. Only two of the six ECD practitioners had a formal qualification in ECD-related fields.

Data collection materials and procedures

Prior to data collection, Institutional Review Board (IRB) clearance was obtained. In Phase 1 (Figure 1), an abridged version of the CDC Developmental Milestone Guide (CDC 2017) and the self-developed initial questionnaire were sent to the expert panel via email. The panel had 1 month to return

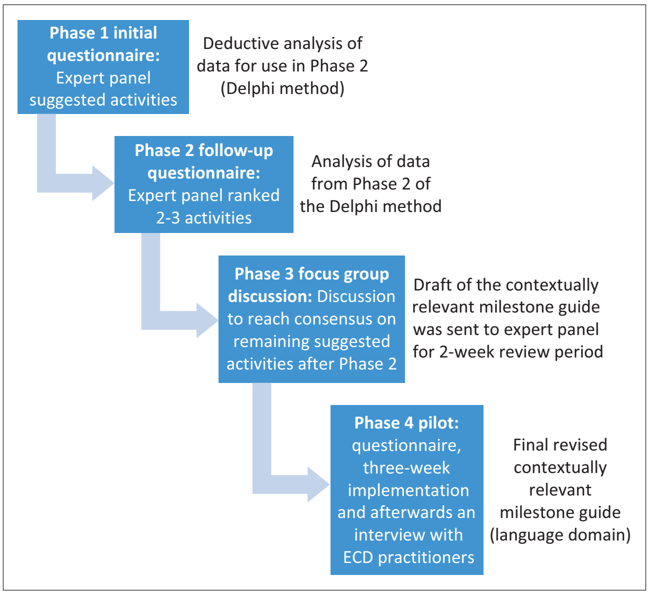

FIGURE 1: Phases of data collection.

the completed questionnaire. During this month, the panel received weekly phone calls to ensure they had no questions or concerns.

Abridged Centre for Disease Control and Prevention Developmental Milestone Guide (CDC 2017)

The CDC Developmental Milestone Guide (CDC 2017) is a reliable and valid booklet that provides information regarding children's expected developmental outcomes at certain ages as well as activities to stimulate the achievement of these outcomes (CDC 2019). The age ranges included in the CDC Developmental Milestone Guide (CDC 2017) are from 2 months to 5 years and 11 months of age. An abridged version of the CDC Developmental Milestone Guide (CDC 2017) was provided as a reference guide for the expert panel when completing the initial questionnaire. The abridged version included the age range of 3–5 years and 11 months, tailored to the planned rollout in Phase 4. The CDC Developmental Milestone Guide (CDC 2017) targets the following domains: social-emotional; language and communication; cognitive (learning, thinking and problem-solving) and movement or physical development.

Initial questionnaire

A self-developed initial questionnaire was used to obtain the expert panel's suggested contextual adaptations and proposed activities for practitioners to use when facilitating the attainment of developmental milestones with groups of young children in low-resourced communities. To achieve a focused approach that was more manageable for the expert panel, only three milestones per developmental domain per age range from the CDC Developmental Milestone Guide (CDC 2017) were reviewed.

Qualtrics follow-up questionnaire

During Phase 2, the panel was required to complete a Qualtrics follow-up questionnaire in which the Delphi method (Twin 2021) was used to rank two to three of the most appropriate suggestions made in Phase 1 towards achieving consensus. Additionally, space was provided at the end of each domain per age range for the panel to provide further comments. The only comment made was that 'Children learn more on a practical display, doing things at hand and by themselves'. This comment was considered by ensuring that most activities involved all the children in the group and not leaving some as observers.

Focus group semi-structured interviews

In Phase 3, the activities for six milestones that still required consensus were discussed by the expert panel during a virtual focus group. The focus group discussion took place online using Microsoft Teams to allow for audio and video recording. Field notes were recorded during the discussions to supplement transcriptions of the recordings. One of the members of the expert panel, the occupational therapist, was unable to attend the focus group discussion; however, all panel members received the minutes of the focus group discussion afterwards to review the agreed-upon changes to be made to the original milestone guide. No additional comments were received on this point. Additionally, once adaptations and activities were incorporated into the milestone guide, they were sent to the expert panel via email for final review. One of the experts suggested a blindfolded component for one of the activities, and this suggestion was duly incorporated.

Pre-survey

In Phase 4, a self-developed pre-survey was conducted to collect ECD practitioners' demographic information, classroom practices and perspectives on children's language skills.

Pilot implementation

A 3-week pilot of the language and communication domains of the adapted milestone guide was then conducted in the 2- to 3-year-olds, 3- to 4-year-olds, 4- to 5-year-olds and 5- to 6-year-olds ECD classrooms. The 3-week period was implemented to ensure sufficient time for the ECD practitioners to engage with and familiarise themselves with the guide, while also allowing for the collection of meaningful and structured feedback in a feasible manner. After the first and second weeks, the ECD practitioners were contacted telephonically to enquire about implementation and to address any questions or concerns. Early childhood development practitioners were encouraged to make field notes on the provided adapted guide to gather opinions about the activities.

Semi-structured interviews

After the pilot, individual paper-based semi-structured interviews were conducted with the ECD practitioners. These interviews served as the primary data source for evaluating the success of the pilot implementation. The variables measured to analyse the usability of the milestone guide were the understandability of the instructions as well as of the purpose of each activity, the ease of integration of the activities into daily schedules, the effort needed to perform the activities, time needed to implement the activities, the level of adaptability of the resources and the level of enjoyability for the children.

Data analysis

Mostly qualitative data, with a few quantitative data points, were collected across the four phases. The quantitative data relating to the expert panel's characteristics were analysed using descriptive statistics and presented numerically (Table 1). Quantitative data in Phases 1, 2 and 4 were collected using numerical ranking of information or activities according to the preferred order of importance. The qualitative data collected from the open-ended questions in the questionnaire and surveys in Phases 1, 3 and 4 were related to the expert panel's responses to suggestions for activities for specific milestones. These qualitative data were analysed using inductive thematic analysis, including the video and audio recordings (Braun & Clarke 2006; Terry et al. 2017). Each interview was transcribed using TurboScribe

Artificial Intelligence, and the resulting transcripts were manually reviewed and verified by the research team to ensure accuracy.

Thematic analysis involved reading the responses collected during the focus group with the expert panel and semi-structured interviews with ECD practitioners multiple times to identify common perspectives and suggestions for adapting the milestone guide for usability with groups of young children from low-resourced communities. Quotes from the various participant groups, the expert panel in Phase 3 and ECD practitioners in Phase 4, were coded; thereafter, codes were categorised according to their overarching themes to answer the research question. To ensure inter-rater reliability, multiple coders were involved when analysing the data. Discrepancies in coding were addressed through peer debriefing and group discussions until consensus was reached.

Results

Development of contextually relevant milestone guide (Phases 1 to 3)

The panel members were required to suggest activities appropriate for use within a low-resourced group ECD setting. Based on the coded qualitative data from the first three phases of data collection, two themes were identified, namely (1) equipment available in the children's and ECD practitioners' immediate environments and (2) no equipment required. Examples of equipment that was considered to be immediately available in the children's and the ECD practitioners' immediate environments included items such as a ball, a doll, feeding utensils and plastic tables and chairs. Similarly, equipment that could also be used to stimulate multiple milestones across developmental domains and age ranges was suggested. For example, a ball could be used to stimulate social-emotional abilities, peer engagement with other children and gross motor skills.

The following quotes from the expert panel supported the identified themes:

1. Equipment available in the children's and ECD practitioners' immediate environments

   'There are some parts in South Africa which are rural, [where] the children in the ECD centres may not have some materials that are stipulated on the checklist.' (P6, Occupational therapist, female)

   'Activities will differ as per the context of each individual client. A child in a rural setting will have different play activities to a child living in an urban setting. A child playing in rural areas usually do not have access to toys. Their toys would usually be made out of metal, wire, tires and waste material.' (P1, female, speech therapist)

2. No equipment required

   'Those domains which require a child to execute an activity or movement without using outside resources, e.g., running, standing on 1 leg for 5 seconds, are appropriate. However, activities that require a child to climb stairs, ride a tricycle, swing, these activities cannot be assessed in low socio-economic settings like rural areas. Thus, adaptation is required by using the resources or facilities available in the community.' (P4, female, physiotherapist)

During Phase 1 (initial questionnaire), 232 activities were suggested; 89 out of 232 activities included equipment available in the children's and ECD practitioners' immediate environments. Sixty-five out of 232 activities required no equipment (Table 2).

In Phase 2, the Delphi method was employed, and 86 activities were included in the Qualtrics follow-up questionnaire. Fifty-five out of 86 activities included equipment in the children's and ECD practitioners' immediate environments. Twenty-four out of 86 activities required no equipment (Online Appendix 1: Table 1-A1).

The CDC Developmental Milestone Guide (CDC 2017) was provided to the expert panel as a reference guide when suggesting contextually appropriate activities for implementation in a low-resourced group ECD setting. Table 2 provides a brief comparison of a select number of activities suggested in the CDC Developmental Milestone Guide (CDC 2017) and more contextually appropriate activities suggested by the expert panel.

During Phase 3, six milestones still required deliberation by the expert panel on which activity should be included in the contextually relevant ECD milestone guide. A total of

TABLE 2: A short comparison of activities provided by the Centers for Disease Control and Prevention Developmental Milestone Guide (CDC 2017) and the expert panel for four milestones.

Activity provided in CDC Developmental Milestone Guide (CDC 2017)	Activity suggested by a member of the expert panel
Targeted milestone: Children's ability to walk up and down steps, with one foot on each step (Movement/Physical Development Domain in the age range of 3 years to 3 years 11 months)	
Hold your child's hand going up and down stairs. When he/she can go up and down easily, allow him/her to use the railing.	An activity that requires the children to climb from a low surface to a higher surface should be utilised to assess their ability to climb. Any available item in the context can be used; for example, a chair, an empty crate or a basin can be used to assess the ability to walk up and down stairs. Ensure that the height is suited for the children.
Targeted milestone: Children's ability to climb well, such as on a jungle gym (Movement/Physical Development Domain in the age range of 3 years to 3 years 11 months)	
Help your child climb on the monkey bars.	A chair can be used, as it is readily available in a low-resourced setting, to assess the children's ability to climb.
Targeted milestone: Children's ability to tell someone their name and their address (Language and Communication Domain in the age range of 5 years to 5 years 11 months)	
Teach your child her address.	Explanation of an address, for example: When we want a specific toy and want to know where it belongs, we will say something like, 'the red ball that is in the box with the balls'. When we want to find someone, we will say his/her name, surname and address. Do you all know where you live? A discussion about addresses will follow. Then, each child can say, 'I am NAME, SURNAME, living at ADDRESS'. Then, participating in pretend play, 'I don't know you; what is your name and where do you live?'
Targeted milestone: Children's ability to count 10 or more items when they are placed in front of him/her (Cognitive Domain in the age range of 5 years to 5 years 11 months)	
Count common items, like the number of snack crackers, stairs or toy trains.	Firstly, do rote counting. Secondly, show the children how to move a finger from object to object (such as leaves or paper cuttings) when counting. Start with one, add one and keep doing this until the children can count 10 objects.

CDC, Centers for Disease Control and Prevention.

12 activities were deliberated on – two activities per milestone. Using the Delphi method, the activities of the six remaining milestones were refined through three phases (Table 3). Of the 12 activities, 6 activities needed equipment available in the immediate environments of the children and ECD practitioners and 3 activities needed no equipment. The remaining three activities did not fit into either of the two themes, for example, making use of a daily schedule to understand the concept of time. At the end of the three phases of data collection, the newly developed contextually relevant ECD milestone guide contains 36 activities to stimulate the ECD milestones of children aged 3–5 years 11 months in low-resourced group ECD settings. Of the 36 activities, 25 activities use equipment typically available in the immediate environments of the children and ECD practitioners and 11 activities require no equipment to be performed. After deliberation and refinement of the activities, the milestone guide was updated for pilot implementation in Phase 4 (Online Appendix 1: Table 2-A1).

Pilot study (Phase 4)

Six ECD practitioners implemented the adapted milestone guide for 3 weeks in Phase 4. The individual feedback reflected an overall positive experience implementing the guide. Practitioners reported that they could implement all the required activities and felt the activities benefited the children's development, as reflected in the feedback:

> 'I am not at all disappointed. I was happy with it because everything that is written there is clear, straightforward and understandable. It was fun.' (P4, 45 years, Female)

However, variability was noted in the consistency of the use of the milestone guide, which was because of time demands, heavy workloads and competing priorities. Every practitioner used all activities under the relevant age ranges at least once during the 3-week implementation period. Some practitioners (n = 4) used all activities in the age range daily, while others (n = 2) rotated the activities by week. Only one practitioner (Participant 3) was able to do a few activities only once a week, whereas three practitioners (Participants 1, 5 and 6) did the activities every second day, while two practitioners (Participants 2 and 4) implemented all the activities in the guide every day of the week within the relevant age range.

From the interviews that explored the practitioners' perspectives on the usability of the newly adapted milestone guide for low-resourced communities in South Africa, four main themes were identified: Resources and activities, the applicability of the adapted milestone guide, children's experience of the activities and recommendations for implementation in various communities, each with sub-themes (Table 4). Feedback from the practitioners was utilised to refine the milestone guide further for future use (Table 5), including revision of the instructions to users and adding additional suggested resources.

In conjunction with the positive responses, the usability of the milestone guide was generally supported (n = 6), although

TABLE 3: Process of refinement of the activities of the six remaining milestones through the use of the Delphi method (Phases 1–3).

Activities suggested in Phase 1 (initial questionnaire)	Suggested activities ranked in Phase 2 (Qualtrics questionnaire)	Activities selected in Phase 3 (focus group discussion)
Social-emotional domain (Children aged 5 years to 5 years 11 months)		
Milestone 1: What activity can be used to help children understand the concept of rules and the ability to abide by the rules? (Theme 2)		
• Hide and seek with a no-go area • Tag • Stuck in the mud • Touchers • Snakes and ladders	• Hide and seek with a no-go area • Stuck in the mud	• Stuck in the mud
Cognitive domain (Children aged 3 years to 3 years 11 months)		
Milestone 2: What activity could be used to stimulate the children's ability to turn pages of a book 1 at a time during story time? (Theme 1)		
• Using magazines and newspapers • Practising turning pages • Picking up leaves and papers • Taking 1 piece of paper at a time	• Picking up leaves and papers • Taking 1 piece of paper at a time	• Taking 1 piece of paper at a time
Cognitive domain (Children 4 years to 4 years 11 months)		
Milestone 3: Can you suggest an activity that could help children to start to understand the concept of time? (Theme 1)		
• Making a clock out of cardboard • Singing about yesterday, today and tomorrow • Daily schedules • Timecard sorting • Duration contests • Timelines • Using an hourglass/timer	• Daily schedules • Using a timer	A combination of the 2 activities was decided upon namely: • Daily schedules • Using a timer
Cognitive domain (Children aged 5 years to 5 years 11 months)		
Milestone 4: What activity could be adapted to stimulate a child's ability to draw a person with at least six body parts? (Theme 1)		
• Practicing drawing of shapes • Drawing a face on a paper plate • Tracing of the whole child lying down on a large piece of paper • Tracing their hand/foot • Giving cutouts of body parts of a person and then building a person	• Drawing a face on a paper plate • Giving cutouts of body parts of a person and then building a person	• Giving cutouts of body parts of a person and then building a person
Movement and physical domain (Children aged 3 years to 3 years 11 months)		
Milestone 5: Can you suggest an activity that could be used to stimulate children's ability to walk up and down steps, with 1 foot on each step? (Theme 1)		
• Practising climbing stairs using the last three steps • Kicking a ball • Climbing from a lower to a higher surface (such as a chair) • Hopscotch	• Practising climbing stairs using the last three steps • Climbing from a lower to a higher surface (such as a chair)	• Climbing from a lower to a higher surface (such as a chair)
Movement and physical domain (Children aged 4 years to 4 years 11 months)		
Milestone 6: Can you suggest an activity that could be used to stimulate children's ability to maintain balance while hopping and standing on one foot for at least 2 s? (Theme 2)		
• Jumping on a trampoline • Hopscotch • Dancing and hopping activity • Standing on an unstable surface • Standing on one leg and increasing the height of the surface	• Standing on one leg and increasing the height of the surface • Dancing and hopping activity	Both activities can be utilised: • Standing on one leg and increasing the height of the surface • Dancing and hopping activity

TABLE 4: Themes and sub-themes identified from ECD practitioner responses.

Theme	Sub-themes	Verbatim response
Resources and activities	Understandability of activities	'For me to apply to them it was easy…' (Participant 5, 37 years, Female) 'Oh yeah, some of the questions I didn't understand so I did ask my colleagues.' (Participant 6, 31 years, Female)
	Implementation into the daily routine	'Every time we wake up, it's normally a play, it's free play. That's when we made that activity [*the milestone guide*]. It was our free play.' (Participant 3, 45 years, Female) 'They're used to our routine that we do every day. So, when I slot this one in, yeah, they were a bit surprised at the first time around. But the second time around and the third and the fourth and you name it until, until they get used to.' (Participant 4, 45 years, Female) 'I did have to make time to do it.' (Participant 5, 37 years, Female)
	Feedback on recommended resources	'[*An old telephone*] Maybe it would have helped more than the cell phone. Because of cell phone, they just want to touch and slide and go to the pictures. […] Maybe we are sliding a lot also.' (Participant 2, 38 years, Female) 'We had everything [*resources*].' (Participant 3, 45 years, Female)
The applicability of the adapted milestone guide	Age appropriateness of activities	'These activities have been divided according to the age of the children.' (Participant 4, 45 years, Female)
	Applicability of skills learned through the milestone guide to everyday life	'Yes. It helped with their communication.' (Participant 1, 26 years, Female) 'I think it also helps with the address, knowing that when maybe you are lost in the mall, then you can know the address and the telephone number.' (Participant 2, 38 years, Female)
	Language barriers	'We teach them English, so now that is why […] when we try to speak with them Sotho, they just say: no teacher, speak English.' (Participant 1, 26 years, Female) 'Others, speak English even at home. And then others speak Sotho. So, we have to use two languages.' (Participant 3, 45 years, Female) 'It also helped with the English because some of them you can see they're trying, even though they did mix up the words or they're mixing the languages.' (Participant 6, 31 years, Female)
The children's experience of the activities		'It was interesting for them and I saw it. Yeah, they liked it. And I'm going to continue doing this more often.' (Participant 4, 45 years, Female) 'New things, they like to explore new things. They want to do it more, like they were so happy, like, can we do it again?' (Participant 5, 37 years, Female)
Recommendations for the milestone guide implementation in various communities		The practitioners suggested providing the guide to: 'Another preschool. Maybe one that works with the kids like that at home, preschool, daycare.' (Participant 1, 26 years, Female) 'The parents. To teach them and do the parental support.' (Participant 3, 45 years, Female)

some changes were recommended to ensure a better understanding of the activities. Activities were easily slotted into the daily routine or were already part of the daily tasks, although it took some time for the children to get used to the change in routine. Even with the change, the children indicated enjoyment.

The resources recommended by the milestone guide were generally accessible or adaptable, according to most practitioners (n = 5). One concern was, however, raised by the practitioners (n = 2) regarding the use of a telephone to elicit dialogue. Participant 1 had an 'old' telephone to use. In contrast, the others used their cell phones or Lego blocks, by which the children were reportedly too easily distracted to follow through with the activity, taking apart the Lego blocks or trying to swipe on the cell phone. Practitioners suggested that they would recommend the milestone guide to other ECD centres (n = 3) and parents to use them in the home environment (n = 4).

There were comments regarding language barriers experienced because of the activities not being available in children's home languages. In the pre-survey, 4 out of 6 practitioners believed that almost 25% of children struggle because their home languages differ from the language of learning and teaching, that is, English, at the ECD centre. Practitioners highlighted that some children do not understand English, leading to disengagement and silence, even when attempts are made to communicate with them in their home languages. Yet, the interview results reflected that most children could follow the activities, sometimes with the help of translation from the practitioners. Table 5 summarises recommendations and suggestions made by the practitioners for further adaptation to the individual activities to improve their usability.

Discussion

Despite a strong focus placed on ECD facilitation within the global and South African context, according to the authors' knowledge, this milestone guide appears to be the first adapted guide aimed at supporting ECD within a low-resourced group setting, with activities to target specific skills rather than provide specific developmental milestones to be met (Slemming & Bamford 2018). Developing a contextually relevant ECD milestone guide for preschool-aged children (3–5 years 11 months) prioritised activities that require minimal to no equipment or are readily available within the children's and ECD practitioners' immediate environment. This ensured that implementation was feasible for ECD practitioners within low-resourced communities. Stakeholders familiar with various low-resourced contexts were involved in the development and pilot of the milestone guide from the beginning. This ensured that the activities suggested considered accessibility, feasibility and optimal use of the available resources (Richter et al. 2017) and could, therefore, be integrated into established classroom routines. It is imperative that community members, such as ECD practitioners, form part of the development process of milestone guides. Involvement from an early stage creates understanding, builds ownership and fosters buy-in for the use of the contextually adapted milestone guide (Richter et al. 2017). The effectiveness of the milestone guide was evaluated through qualitative feedback from ECD practitioners, who reflected on its relevance as well as its developmental, cultural and linguistic appropriateness and perceived impact on the children's receptive and expressive language skills.

Although the expert panel was very cognisant about the number of resources ECD practitioners would require to implement the suggested activities, ECD practitioners had minimal concerns about the resources needed to support

TABLE 5: Additional adaptations suggested for activities in the adapted milestone guide.

Adding instructions: Implement for 30 min every day of the week. ***What is expressive language?*** *The ability to produce language that is understood by others.* ***What is receptive language?*** *The ability to understand and interpret the message that you hear.*			
Age group	**CDC Language and Communication milestone**	**Initial adaptation: Milestone guide activity**	**Final adaptation (Phase 4): Adapted activity**
3 years to 3 years 11 months	Children's abilities to understand and follow two-to-three-step instructions.	Children's cups are placed with the opening face down on the table. Tell the children to pick up their cups and hold them out for you to fill with fruit juice. Pick up/ Turn around/Hold out.	To add more suggested instructions for daily routines, e.g. 'Put your pens down and stand in the queue.'
	Help children to understand prepositions such as 'in', 'under' and 'on'.	Gross motor obstacle course activities – Place various obstacle course items out which require the children to climb over, on top of or walk behind an item or crawl under an item.	Gross motor obstacle course activities – Place various obstacle course items such as tyres, rocks, boxes, string, rope, newspaper pieces and chairs out which require the children to climb over, on top of or walk behind an item or crawl under an item.
	Children's ability to maintain a conversation using two to three sentences, while using plurals and pronouns.	Playing telephone where the children tell their parents about their day so far at the ECD centre.	Go out and let each child pick up something outside (stone, stick, leaf, flower), make a show-and-tell circle for them to explain what they found, where and how they found it and what they can do/build with it.
4 years to 4 years 11 months	Children's ability to correctly use 'he' and 'she' in a sentence.	Give examples. When we talk about Given, we say he is a boy. When we talk about Precious, we say she is a girl. Now, what will we say about John? He is a boy or she is a boy? Keep using examples until the children can use them correctly.	No suggestions made
	Children's memory to remember a nursery rhyme.	Use facial expressions and activities. The spider (fingers in a spider form) hops (hop) and scares (big eyes) the people (gesture to others).	No suggestions made
	Children's ability to understand the concept of his/her first and last name.	Taking register, playing a game in which they need to say their name and surname when the ECD practitioners point to them.	Taking register, playing a game in which they need to say their name and surname when the ECD practitioners point to them and let them say with what letter their name starts with.
5 years to 5 years 11 months	Children's ability to tell someone their name and their address.	Explanation of an address, for example: participating in pretend play. 'I don't know you. What is your name and where do you live?' Then each child can say, 'I am NAME, SURNAME, living at ADDRESS'.	Explanation of an address, for example: participating in pretend play. 'I don't know you. What is your name and where do you live?' Then each child can say, 'I am NAME, SURNAME, living at ADDRESS'. Firstly, write down the address for each child to learn and then ask them.
	Children's ability to make use of the past tense when speaking.	Throughout the day make the children aware that something is happening now and that something has happened already. We were playing outside but now we are working. Yesterday it rained, but now the sun is shining.	No suggestions made
	Children's ability to speak clearly and be understood by all communication partners.	If it is a matter of a lazy talker, a game using syllables of words can be used. I am STAN-DING. This can be performed by clapping out the words and saying them slowly and then starting to say them normally and at a normal rate.	No suggestions made

CDC, Centers for Disease Control and Prevention; ECD, early childhood development.

language and communication development in the classroom, the availability of materials in their classroom and how they used them for the activities in the milestone guide. This can potentially make the milestone guide more accessible for practitioners in various settings, including ECD centres and home environments, regardless of resource accessibility. One ECD practitioner's experience of successfully sharing the activities further with other ECD centres supports this notion and emphasises the potential snowball benefits of adapting the developmental milestone guide (Akinrotimi & Olowe 2016).

The pilot also brought to light practical challenges and areas for improvement. Early childhood development practitioners emphasised the need for clear instructions for certain activities, such as the obstacle course, and suggested modernising tasks like telephone play to reflect the modern world. Old-fashioned telephones were deemed impractical, as children are more familiar with smartphones. However, the practitioners indicated that during independent implementation, smartphones could sometimes distract rather than support developmental activities (Slutsky & DeShetler 2016). Furthermore, show-and-tell circles using natural materials – stones, sticks, leaves or flowers – were proposed to foster creativity, communication and turn-taking. These adjustments demonstrate the importance of ensuring activities are not only developmentally appropriate but also culturally and contextually relevant. These suggestions from the practitioners highlight the importance of revising the milestone guide's activities to include more relevant prompts that promote flexibility and reduce over-reliance on specific suggested materials.

Early childhood development practitioners reported that the children desired repetition and exploration of activities, reflecting their enthusiasm and curiosity linked to internal motivation and knowledge acquisition (Spielberger & Starr 2012). Engagement, as demonstrated by the children during the piloted activities, refers to the level of active participation and is crucial for learning (Hiver et al. 2024; Mercer 2016). Language development relies heavily on participation or interaction between primary caregivers and young children (Romeo et al. 2018). Both language use and interaction were factors facilitated by the activities in the piloted milestone guide. Implementation consistency of the guide across the ECD practitioners, however, varied because of external factors such as time demands, heavy workloads and competing priorities, which are common challenges faced by

ECD practitioners in South Africa (Bernstein & Batchelor 2022). Suggestions and added instruction such as dedicating 30 min daily to the milestone guide activities, developing clear and time-efficient lesson plans, offering additional training sessions that focus on integrating the guide into daily classroom routines and creating visual checklists to support planning could help standardise implementation and ensure better outcomes.

The results revealed language barriers in ECD centres as a challenge for the practitioners. Implementing language-based activities solely in English led to isolation and reduced participation for some children. This, in turn, can result in unequal learning opportunities, especially when there is insufficient support for both primary languages and languages of instruction (Garcia & Kleifgen 2018). This underscores the significant impact that language differences have on children's language development and participation, highlighting the need for guidelines to implement activities for ECD, regardless of the language used, especially in multilingual countries like South Africa. The milestone guide could be further adapted by providing translations of the activities into locally spoken languages or by including culturally and linguistically relevant examples. Training ECD practitioners on how to incorporate the children's home languages during guided activities may help prevent language barriers and foster participation and learning in the classroom.

Early childhood development practitioners emphasised the value of parental involvement in supporting and reinforcing the activities from the milestone guide at home. This highlights the need for parents to work closely with stakeholders within the enabling environments, such as ECD practitioners, to actively engage in children's learning process by implementing developmental activities at home, bridging the gap between classroom and home learning. Parental involvement in learning activities with children from a young age is linked with positive academic achievements, as supported by the NCF (WHO 2019) and the Side-by-Side Campaign (South African Department of Health 2017).

Collaboration among practitioners was also noted as beneficial. Practitioners reported consulting one another to clarify activities, which enhanced their understanding and confidence in implementation. This intra-professional support not only improved their execution of the guide but also strengthened professional relationships and knowledge-sharing (Eadie et al. 2022). Such collaboration underscores the importance of tools like the milestone guide being supportive rather than intrusive, seamlessly fitting into practitioners' workflows (Hartinger et al. 2016).

Conclusion

When adapted or developed appropriately, a milestone guide becomes a locally relevant tool that assesses and monitors the same underlying skills as the original guide but in a contextually appropriate manner (Fernald et al. 2017). The core content of the CDC Developmental Milestone Guide (CDC 2017) remained unchanged, but the activities were modified to ensure contextual relevance. The pilot phase demonstrated the potential of the adapted guide to meet the language and communication development needs of children in low-resourced communities while addressing challenges faced by ECD practitioners.

Feedback led to key revisions, including incorporating multilingual adaptation and alignment with available resources in ECD classrooms. This work lays the foundation for a larger-scale pilot that expands the age range and includes additional developmental domains, particularly those relevant to the home environment. Continuous feedback and improvements are essential for widespread implementation.

The milestone guide may equip practitioners in low-resourced ECD classrooms with tools to promote age-appropriate development and identify developmental delays early. By addressing these delays, the guide helps break cycles of disadvantage, enabling children to thrive and reach their full potential.

Despite the pilot phase showing great promise, several considerations must be met to maximise full-scale adoption in future. These improvements include clear guidelines on the implementation of activities within the classroom language of learning. Furthermore, clearer instructions on how the guide can be utilised within daily classroom routines, rather than considering it as an added workload, may also potentially improve large-scale uptake and more consistent implementation.

Practitioners found the guide easy to incorporate into their daily routines, and the accessibility of the recommended materials ensured wide usability. Feedback also indicated that children enjoyed the activities, confirming the guide's effectiveness. Based on this input, the milestone guide has been enhanced for further contextual relevance. By prioritising accessible resources and fostering practitioner understanding, the guide helps create enriched learning environments that support language development, increasing engagement and enhancing enjoyment.

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Competing interests

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Authors' contributions

R.E., J.v.d.L. and M.d.T. developed the research design. K.C., L.d.T., D.d.P., T.K. and J.W. carried out the four phases. K.C., L.d.T., D.d.P., T.K., J.W., R.E., J.v.d.L. and M.d.T. co-authored the manuscript. All authors contributed to the article, discussed the results, and approved the final version for submission and publication.

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Data availability

The data that support the findings of this study are openly available in the secure Research Data Repository of the University of Pretoria (Figshare) in electronic format, and hard copy data will be kept in a locked facility with limited accessibility. The authors confirm that the data supporting the findings of this study are available within the article and/or its online appendix.

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