ORIGINAL RESEARCH

Exploring Learning Environments in Urban Anganwadis: Pathways to Early Childhood Development

Sylvia Fernandes Rao[1] · Bharati Kulkarni[2] · Shridevi Kareddy[1,5] ·
Bernardita Munoz Chereau[3,6] · Lynn Ang[3] · Dawn Davis[4] · Julie E. Dockrell[3]

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Abstract

Profiling the quality of early learning environments in low- and middle-income countries is challenging, but essential to ensure that all children have access to quality early childhood education and care. We report a study which assessed the early learning environments of a sample of 36 Anganwadi centres (AWCs) in two urban disadvantaged areas in Hyderabad, India, using the MELE (Measuring Early Learning Environments, 2014). To profile the children's early learning environments. The MELE was translated into Telugu and observations completed by a local researcher supported by the main team. We outline the context and characteristics of preschool education in the urban Hyderabad Anganwadis and the ways in which the Anganwadis function as centres of learning. The findings offer an in-depth assessment of the learning environment, learning opportunities and learning interactions provided in the centres to the children who attend. While we found that children in Anganwadis were receiving adequate nutrition, questions are raised about how the settings were supporting children's cognitive development. Specifically, there was little evidence of individualised or small group learning opportunities, play opportunities were rare, materials present such as books were often not used and there was a high level of punitive interaction. Opportunities for enhancing Anganwadi provision are discussed.

✉ Julie E. Dockrell
  j.dockrell@ucl.ac.uk

[1] Indian Council of Medical Research (ICMR), National Institute of Nutrition, Hyderabad, India

[2] Indian Council of Medical Research (ICMR), Reproductive and Child Health and Nutrition, Hyderabad, India

[3] UCL Institute of Education, London, UK

[4] University of Nebraska–Lincoln, Lincoln, USA

[5] Hyderabad, India

[6] London, United Kingdom

Springer

Résumé

Il est difficile de déterminer la qualité des environnements d'apprentissage dans les pays à revenu faible ou intermédiaire, mais c'est essentiel pour garantir que tous les enfants aient accès à une éducation et à des soins de qualité. Nous rapportons une étude qui a évalué les environnements d'apprentissage précoce d'un échantillon de 36 centres Anganwadi (AWC) dans deux zones urbaines défavorisées à Hyderabad, en Inde, en utilisant le MELE (Measuring Early Learning Environments, 2014). Pour profiler les environnements d'apprentissage précoce des enfants. Le MELE a été traduit en Telugu et les observations complétées par un chercheur local soutenu par l'équipe principale. Nous décrivons le contexte et les caractéristiques de l'éducation préscolaire dans la ville d'Hyderabad Anganwadis et les façons dont les Anganwadis fonctionnent comme des centres d'apprentissage. Les résultats offrent une évaluation approfondie de l'environnement d'apprentissage, des opportunités d'apprentissage et des interactions d'apprentissage offertes dans les centres aux enfants qui y assistent. Bien que nous ayons constaté que les enfants d'Anganwadis recevaient une nutrition adéquate, des questions sont soulevées quant à la façon dont les environnements soutenaient le développement cognitif des enfants. Plus précisément, il y avait peu de preuves d'opportunités d'apprentissage individualisées ou en petits groupes, les opportunités de jeu étaient rares, les matériaux présents tels que les livres n'étaient souvent pas utilisés et il y avait une forte interaction punitive. Les opportunités d'améliorer l'offre Anganwadi sont discutées.

Introduction

Children growing up in low- and middle-income countries (LMICs) are at risk of suboptimal development due to adverse conditions such as poverty and poor nutrition (Black et al., 2016; Richter et al., 2017). Approximately 80.8 million children aged between 3 and 4 living in LMICs have low cognitive and/or socio-emotional development (McCoy et al., 2016). Crucially, learning opportunities play a key role in mitigating these negative consequences (Prado et al., 2019) and were encapsulated in the Global Sustainable Development Goals (SDGs) target 4.2, to ensure that children have access to quality early childhood education and care (ECEC). A key component in quality early years provision is a curriculum that provides guidance in terms of best practices, content, ideas and approaches, to ensure all children receive consistent and equitable education (OECD, 2025; UNESCO, 2022). The status of preschool curricula varies by country and is influenced by laws, governance structures and funding models (OECD, 2025).

Access to ECEC in LMICs is increasing and seen as a key opportunity for enhancing the lives of children in challenging situations, yet the quality of these services is variable (Yoshikawa et al., 2018). The development of effective early years learning provision is underpinned by evidence-based pedagogical practices (Sun Joo

et al., 2020) which reflect an understanding of the local social, cultural and educational context. Capturing the quality of early years provision using a reliable and culturally appropriate approach provides the basis for understanding the educational and local context and is essential for developing effective and relevant continuous professional development (CPD), to inform policy and to promote a culture of continuous improvement. We report the first study, to our knowledge, to document the learning environment (space, materials and hygiene facilities), the learning opportunities (the activities that occur in these settings) and the learning interactions (the ways in which staff interact with the children) in a sample of Anganwadi early years settings in Hyderabad, India, using a tool specifically designed to identify universally relevant aspects of early childhood settings, Measuring Early Learning Environments (MELE) Classroom Observation tool (MELQO, 2014).

Early Learning in India: Anganwadi Services

Significant numbers of children growing up in India are disadvantaged, experience malnutrition, childhood stunting and impaired development; yet ways to enhance life opportunities are challenging to operationalise (Deb et al., 2020; Perkins et al., 2017). The Anganwadi Services, also known as the Integrated Child Development Services, were launched 50 years ago in 1975, with the aim of addressing some of these challenges by providing a solid foundation for the psychological, physical and social development of children, reduce mortality, morbidity, malnutrition and support their overall development and enhance mothers' capacity to care for their children's needs through health and nutrition education. Anganwadi Centres (AWCs) are non-formal early learning centres which act as a delivery mechanism for providing 'Early Childhood Care, Education and Development including Preschool Education and Supplementary Nutrition' (Ministry of Women and Child Development, MWCD, 2023), underpinned by a National Curriculum Framework (NECF) for foundational stage, Early Childhood Care and Education (ECCE) (Ganimian et al., 2024; Pratik et al., 2021; Rao et al., 2021). The programme is nationwide, encompassing all the country's states and union territories, and is the largest early education programme in the world (MWCD, 2023).

These government programmes are free of cost for all children. The AWCs are under the Department of Women and Child Development (DWCD) and are managed thorough the Child Development Program Officers (CDPO) and supervisors. Each Anganwadi has a teacher and an aide. A minimum of a tenth-grade qualification is required to be an Anganwadi teacher and a bachelor's degree to be supervisor or CDPO. The government settings are the largest in the country, and the Government of India (GOI) has strengthened and proposed a minimum of six hours of working of AWCs. Accordingly, the State Government has extended the timings of preschool from 9 am to 4 pm and enhanced the honorarium of Anganwadi workers (AWWs) and Anganwadi Helpers (AWHs).

The annual preschool education programme is conducted from June to April. Both the structure of the day and the curriculum guidance are explicitly formalised in Anganwadi settings following guidelines and structure for age-appropriate

activities specified in the National ECCE curriculum framework[1] (NECF, 2014) and detailed in the ECCE curriculum framework (https://ncf.ncert.gov.in/#/web/home). Guidance includes yearly targets, and there are the objectives for the monthly ECEC days such as 'To enlighten the parents and community about age and developmentally appropriate practices'. Monthly targets include, for example; three action songs/rhymes (two in the local language Telugu and one in English), two stories and two games (indoor/outdoor). For a detailed description of the guidelines for daily activities, see Lall et al. (2024), WCDW Department, state of Telangana (n.d.).

Studies in and of Anganwadi centres have focused primarily on health prevention and promotion (see Debata et al., 2023; Malik et al., 2015) or on Anganwadi workers (AWW) (Somani et al., 2023). AWWs are reported to spend a substantial amount of time on administrative tasks (Jain et al., 2020), but little is known about the children's experiences and the potential for Anganwadis to be centres of learning. A notable exception is a recent study in 42 centres in the state of Telangana (Anjaneyulu, 2023) where data using a structured questionnaire and personal interview were collected. Anjaneyulu found that, on average, settings had 46 children registered, did not provide hygienic conditions and learning resources were present but information about their use, the nature of learning opportunities and the interactions in the settings was not documented (Anjaneyulu, 2023). Documenting learning opportunities and interactions is key to ensuring quality and for developing effective CPD. The gap in our understanding of Anganwadis as centres of learning is a significant limitation in our understanding of the potential impact of Anganwadis on children's cognitive and academic development.

The Quality of ECEC Settings

Current conceptualisations of the quality of ECEC are guided by socioecological, constructivist and learning theories which all focus on children's experiences in their classroom environments and point to the critical role of learning interactions and opportunities to enhance development (Chen & Wolf, 2021). Quality early learning environments and pre-primary education are important experiences that can form the foundations for lifelong learning and success, meeting Global Sustainable Development Goals (SDGs 4.2), and the benefits to disadvantaged children of ECEC provision were most consistent between the ages of three and five years (Melhuish et al., 2015). Attending ECEC settings promotes early achievement, although the gain is greatest if quality is high (Causa & Johansson, 2010). Nevertheless, debates continue about the nature and extent of the effectiveness of early intervention (Conti et al., 2016), and much of the work is underpinned by research from English speaking upper middle-income countries. In addition, little is known about the experiences of children in Anganwadi centres and the extent to which staff use the curriculum framework.

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[1] The curriculum was revised in 2024, after our data were collected, to improve the quality of ECE. See Ministry of Women and Child Development 11.4.2024 press release.

ECEC may also serve as a protective factor against risks associated with poverty such as malnutrition, lack of stimulation and higher levels of stress (Berry et al., 2016). Quality education at ECEC can enhance pupils' readiness for primary school entry, providing a foundation for effective approaches to learning, supporting emergent literacy and math skills and helping to develop socio-emotional skills (Joo et al., 2019; Rouse et al., 2005). Early quality learning experiences, such as having teachers or adult carers who engage responsively in reading or telling stories and fostering opportunities for play and learning, shape children's development and engagement with later learning opportunities (Britto et al., 2017). In sum, early learning environments can offer a potential driver for future development, and classroom observation tools are part of monitoring the quality of ECEC settings. Reliable and valid measures are needed to profile ECEC quality to inform the development of both the learning environment and teacher pedagogy (Britto et al., 2011, 2017).

Measuring Quality in ECEC

A holistic evaluation of ECEC settings involves capturing features of the learning environment, the learning opportunities and the learning interactions. The learning environment includes both the physical environment (e.g. space and facilities) and the resources available to children in the settings (such as books, art materials and toys). By contrast, learning opportunities are specific evidence-informed activities designed to foster children's oral language, literacy, numeracy and motor skills. Interactive book reading, for example, is an evidence-based learning opportunity that supports a range of early skills including literacy, oral language and socio-emotional development (Grøver et al., 2023). Evidence-based activities are scaffolded by learning interactions, that is the ways in which teachers support learning through feedback, reinforcement and group activities (Burchinal et al., 2008). While several tools exist to capture early learning environments (e.g. ECERS-3 and the ECERs-R) (Cassidy et al., 2005; Gordon et al., 2013), few have been used across early ECEC in LMICs.

Learning environments are further shaped by the cultural values, the demographics and the economy of a society (Chen & Wolf, 2021), and these differences should be captured in the tools that are used. The MELE is a tool designed to capture 'universally' relevant aspects of the learning environment which predict child outcomes (Raikes et al., 2020). A systematic literature review examining the MELE's content, construct and criterion validity, as well as its internal consistency and inter-rater reliability, recommended its use in early learning settings in LMICs (Munoz-Chereau et al., 2021). Versions of the MELE have been used in Colombia, Kenya, Nicaragua and Tanzania (UNESCO, 2017). Despite the items being developed from quality in high-income countries, when adapted to capture quality in LMICs through discussion with local stakeholders and in consideration of the relevant national curriculum framework, it provides a systematic profile of the learning setting.

The MELE includes seven core domains of quality (play, pedagogy, interactions, environment, parent/community engagement, personnel and inclusion). It aims to allow comparisons within and across country settings to profile their quality. To our

knowledge, there have been no previous studies using the MELE to capture the early learning environments for children in Anganwadi services in India. Additionally, research shows a lack of skill-based training and professional development opportunities for AWWs are a major challenge for effective preschool education (Manhas & Qadiri, 2010). Findings from the MELE will, therefore, provide evidence of the feasibility of using the tool in this context and the scope for informing local CPD.

The current study aims to further understandings of Anganwadi centres by capturing the learning environment (space, materials and hygiene facilities), learning opportunities (the activities that occur in these settings) and learning interactions (the ways in which staff interact with the children) using the MELE. Given the lack of information about the learning interactions in Anganwadis and the diversity across India in terms of languages, poverty levels and resources the study settings were selected to reflect a homogeneous low-income urban setting. Our focus was in two urban settings within Hyderabad city limits (Addaguta and Warasiguda under the Secunderabad). These areas are homes to large sections of population from the lower middle-class population (Census of India, 2001).

To capture the learning environments in the Anganwadis, we examined the data generated from our observations in two phases. While the MELE has been used in several low- and middle-income countries, it has not been used previously in India. Our first step was, therefore, to make appropriate cultural adaptations and establish the reliability of the scale. The second step was to profile the learning environments to capture variability across the different Anganwadi settings and differences across the learning opportunities that were provided, and the interactions that occurred. We predicted that children would be exposed to a range of conversation and school readiness activities given the clearly delineated criteria in the curricular guidance and the emphasis on Anganwadis as centres of learning. Given the previous research across LMICs, we also anticipated that learning interactions would include an aspect of harsh discipline (Cuartas et al., 2019). Finally, within each of the domains of interest and by assessing the learning environments across the sample settings, we anticipated that the MELE results would provide potential foci in which specific culturally appropriate actions could be implemented to ensure high-quality ECEC provision for all children and develop evidence-informed professional development.

Method

Epistemological Approach

The study adopted a pragmatic paradigm that is compatible with the use of quantitative and qualitative methods, by recognising the value of using different research methods suitable to answer the research questions (Foster, 2023). Epistemologically, a pragmatic methodological approach is premised on the idea that research should be focused on understanding of practical, real-world issues within complex social settings. This epistemological stance formed the underlying principles of our methodological approach. In the case of our study, we aimed to understand the social realities of the learning environments of Anganwadi centres to address the complex

issue of quality ECEC provision for children. Feilzer (2010) contends that taking a pragmatic approach to problem solving in the social world offers a more reflexive and flexible guide to the research process and design, we argue that pragmatism is of instrumental value to our study as it enabled us to closely engage with Anganwadi centres and AWWs to orient our inquiry and the use of the MELE tool to understanding the local context. The real-world emphasis of pragmatism as a research paradigm aligned well with our study by focusing on the situational realities and unique nature of the study sites and target preschool settings in Hyderabad, India.

Sample and Settings

Two urban slums in Hyderabad, India, participated in the study. These slums together have a population of $\approx$175,000, with a high prevalence of childhood stunting (around 27% at 24 months age) (Government of Telegana, 2024). The study area has predominantly government-managed preschools (*Anganwadis*) and a few private preschools. Thirty-six Anganwadi government settings in the urban areas of Addagutta ($n = 19$) and Warasiguda ($n = 17$) participated in the study.

Total preschool enrolment varied across the centres ($M = 13.92$, SD $= 4.31$, range 8–25), with two children with special educational needs identified in the total sample. However, these children were not enrolled in the class records. Class sizes also varied ($M = 10.56$, SD $= 3.19$, range 3–18). Children in the settings during the observation period varied. On average, there was a $M = 10.47$ (SD $= 3.92$) children in the classes during the observation period (Boys $M = 4.94$, SD $= 2.83$; Girls $M = 5.53$, SD $= 2.21$). All observed classes had one teacher, and 86% of classes had an aide present ($n = 31$).

ECCE Curriculum Framework

Thirty-one (86.1%) of the settings reported following the national curriculum framework (NCF). Observations captured different aspects of the NCF. Within the settings learning areas that were covered daily in lesson plans varied: socio-emotional development ($n = 36$), language and literacy ($n = 35$), mathematics and health ($n = 31$) with art rarely present ($n = 8$). No other curricular aspects were recorded.

Measures

Classroom characteristics and classroom quality were measured using a translated and adapted version of the MELE. The MELE 'core' version contains 42 items grouped into six sections (detailed in Appendix 2) with scoring criteria. The MELE Classroom Observation English core version was translated into the local language (Telugu) and adapted by the Indian country team through support provided by international experts via training sessions. These consisted of an introductory overview of MELE, pilot classroom observations, item-by-item discussions, practice of the scoring and a review of reliability procedures. Translation into Telugu was completed by trained local staff ensuring the language was as spoken in the community.

The translation was validated by back translation. More precisely, the Indian MELE tool was adapted through three processes. Six items were removed: 1. special needs support, as the Anganwadis did not accommodate children with special needs; 2. toilets divided by gender; 3. toilets were child sized; 3. toilets were utilised for all toileting requirements; 4. water was accessible in the toilet; 5. toilets were utilised for toileting requirements as these are not features of any of the toilets and their use in Anganwadi centres and 6. fence surrounding the school, as the Anganwadis were located in urban settings without outdoor areas. Three items were added: 1. use of digital technology because of COVID-19 changes in practice, 2. food hygiene and 3. interactions during mealtime, since snack and a noon meal were provided and offered the opportunity for communicative exchanges and language scaffolding. Finally, one item was modified to provide examples given lack of responses in the piloting: The frequency of negative physical interactions item included examples included pinching, poking, pushing or striking. The translated version is available from the first author.

Piloting and Reliability Assessments and Revisions

The tool was piloted in four centres, and inter-rater reliability was established between the two observers through independent scoring during the same observations for each item coded. The inter-rater reliability ranged between 96 and 98%. Reliability was established by having the two enumerators assessing four of the centres observed. The average reliability of the final tool was 97.25% between the two enumerators and ranged between 96 and 98% in the four centres that were rated by two observers in the main trial.

Data were collected between December 2021 and April 2023, and all observations took place in the mornings to systematically capture attendance and activities. The average length of observations was over two hours ($M = 147.46$ min; SD $= 33.26$) following MELE guidance.

Ethics Approval, Data Checking and Validation

The study protocol was approved by the Institutional Ethic Committee of the ICMR-National Institute of Nutrition Hyderabad and UCL, IOE ethics panel. Anganwadi centres were identified from the local catchment centres for the GCRF Action Against Stunting Hub (Heffernan, 2019), with settings opting voluntarily into the project. All data collected were transcribed and entered into Excel. A random 10% were double-coded and checked for accuracy. The final file was checked for outliers and data missing.

Analytic Strategy

Reliability of the MELE scale was assessed using Cronbach's alpha. Overall, the Indian version of the MELE demonstrated high reliability across respondents (42 items, $\alpha = .79$) but principal component analysis (PCA) did not entify a unified
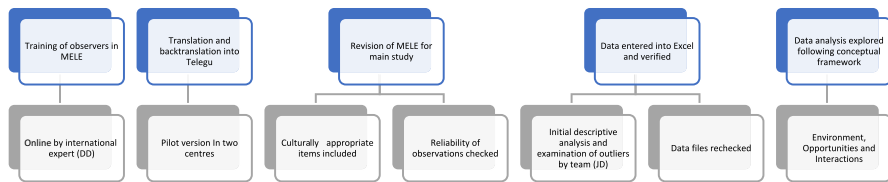
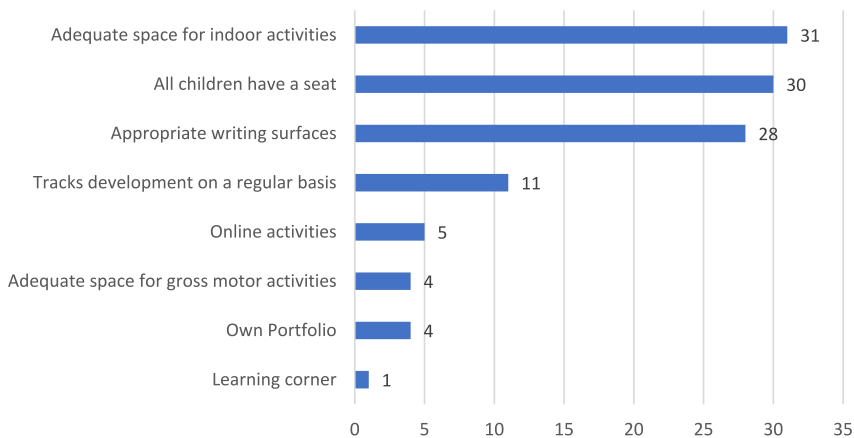**Fig. 1** Flowchart MELE adaptation and application

Fig. 2 Reported presence of aspects of the learning environment in Anganwadis ($N = 36$)

structure or any statistically significant factors. As a result we use the domains as a conceptual framework for descriptive purposes to examine the learning contexts of the Anganwadis. We explored associations between variables which have been reported in the research literature to be significant. Specifically, we anticipated that oral language use would be associated with both specific activities, e.g. literacy and interactions (Cash & Pianta, 2023). Secondly, we predicted that less punitive behaviour by the staff would be associated with greater levels of active engagement (Kay & Buxton, 2024). We return to these issues in the discussion and present the means (SDs) for all MELE items in Appendix 3.

Results

We report the results of the MELE in three sections capturing the learning environment, learning opportunities and the learning interactions (Fig. 1).

Figure 2 reports the learning environment, measured on a nominal scale (present/absent), included in the MELE. As these centres were in urban regions, outdoor space for gross motor activities was not available in any setting. However, inside the classroom children had space to sit on the floor in a semi-circle or circular fashion with the teacher. Some settings were constrained for space for activities that required physical movement. Limited space could also explain why
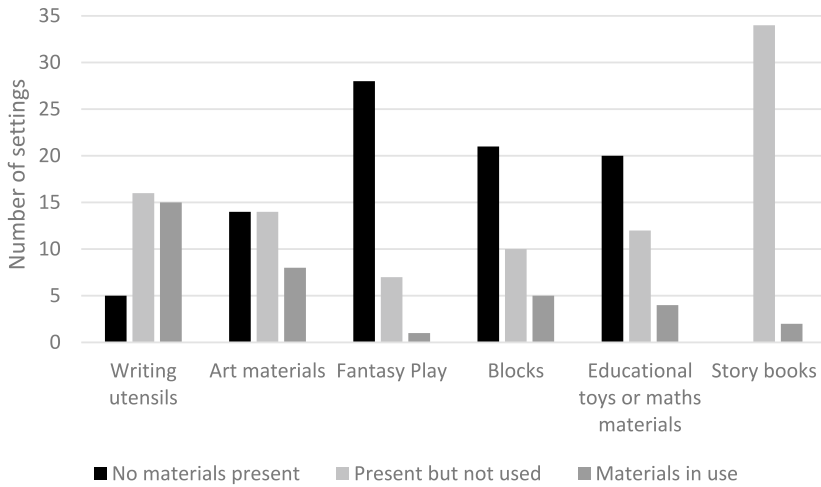
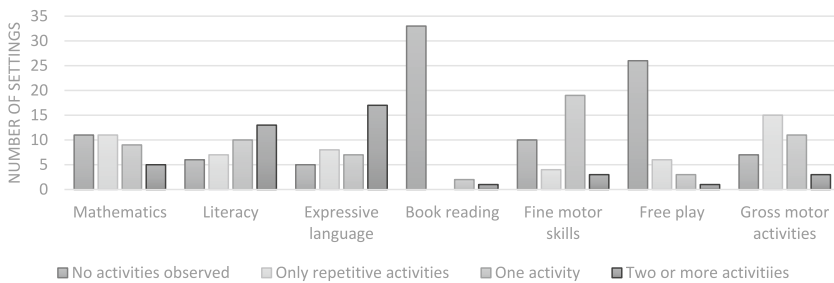**Fig. 3** Materials present and used in the 36 Anganwadi settings

Fig. 4 Observations of different learning opportunities in Anganwadis ($N = 36$)

learning corners were only observed in one setting. Children rarely had their own portfolios ($n = 4$), although tracking development was reported in just under a third of the settings ($n = 11$).

Figure 3 reports availability of learning resources across the 36 settings. As Fig. 4 shows materials that were available, however, even when present, they were typically not used. The most common was writing materials, but despite being present in most Anganwadis ($n = 31$), they were only used in half of them ($n = 15$). All 36 Anganwadis had books (with five having over 14 books) but the materials were rarely in use during the observation periods. The most common writing surface was a slate. Most of the children in the class had access to a slate whenever a writing exercise was observed. However, a few teachers mentioned that slate pencils were not provided, and this becomes an out-of-pocket expenditure for the teachers. Teachers reported concerns that children may damage items or quarrel over items with limited availability and as a result use was restricted.

In all the centres, cooked food was provided, and children were able to get more (94%, $n=34$) and meals were typically (86%) accompanied by pleasant conversation ($n=31$). Table 10 provides details of water and sanitation. Overall, these were safe settings with good sanitation although handwashing by the children was inconsistent and only four settings had running water for handwashing.

Figure 4 provides details of the distribution of scores for all learning opportunities recorded on an ordinal scale from no activities (1) to two or more (4). Means (SD) are reported in Appendix 3, Table 7. Music activities were scored on a nominal scale (present/absent) and were recorded in 84% of the settings ($n=30$).

Figure 4 shows that there was considerable variability across the settings in terms of the opportunities that children had access to: book reading activities to support children's listening and speaking rarely occurred and free play was not a common practice, occurring in less than a third of the centres. A Kendall's τ was calculated to examine whether there were significant differences across learning opportunities. Learning opportunities for each area varied significantly ($r_\tau=.374$, $p<.005$), activities for spoken language occurred significantly more than others, but as Fig. 4 shows book reading used to support listening, and speaking was rare. Opportunities to develop children's listening skills involved acting out to set songs and rhymes. Children were engaged in these actions, and it was often more visual/physical than a listening activity. Books available were also designed to be read by an adult with large amounts of text and not designed for preschoolers (i.e. lack of illustrations, complex text used and small print).

Learning Opportunities

We examined whether learning opportunities to support spoken language were associated with other opportunities or interactions as learning opportunities enhancing language skills can provide effective learning environments for children (Cash &
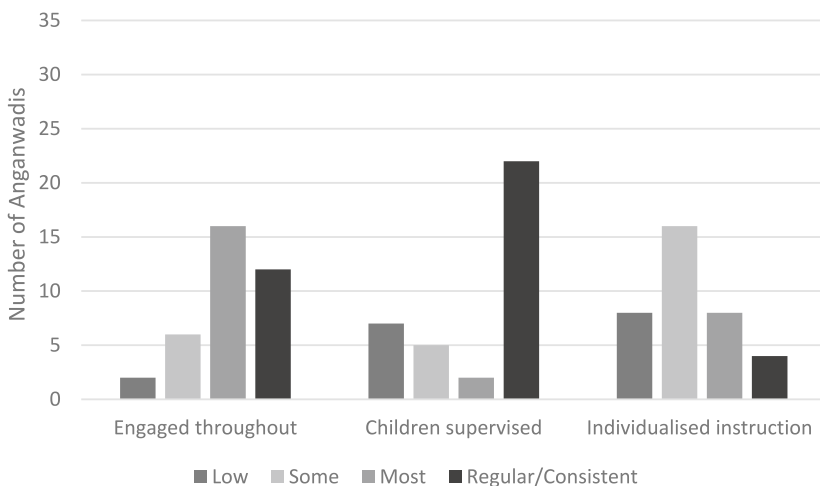
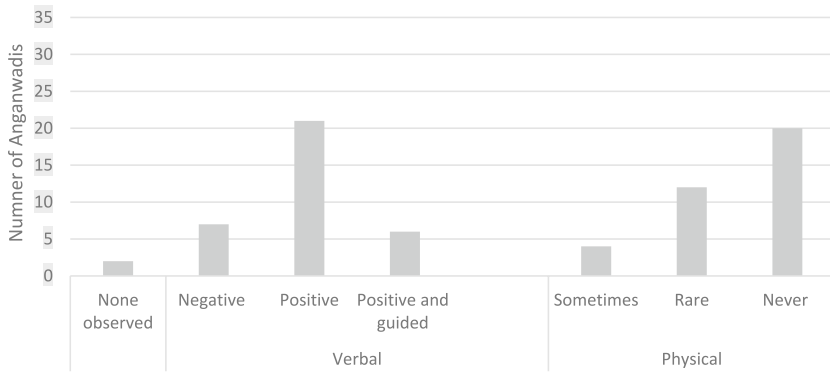**Fig. 5** Interactions with pupils recorded in the settings ($N=36$)

Fig. 6 Verbal and physical discipline observed in response to misconduct in the Anganwadis ($N=36$)

Table 1 Correlations between learning interaction scales

Learning interaction scale	Verbal discipli-nary strategies	Frequency of negative physical activity	Engaged throughout	Children are super-vised
Frequency of negative physi-cal activity	.459**			
Engaged throughout	.562**	.161		
Children are supervised	.056	− .155	.227	
Individualised instruction	.600**	.354*	.674**	.135

Pianta, 2023). There were no significant correlations with any of the learning opportunities or aspects of the learning environment.

Learning Interactions

In relation to learning interactions, children frequently waited for more than 10 min without an activity ($n=24$, 67%). Figure 5 displays interactions by children and supervision by staff. As the data indicate individualised instruction was rare although typically, but not always, children were supervised by the teacher or aide.

Approaches to child discipline are presented in Fig. 6. Negative verbal discipline and physical discipline were common, with physical or negative discipline being recorded 23 times over the 36 observations.

We examined the relationships between verbal and physical discipline and engagement using Spearman's rho as supportive and non-punitive discipline is more likely to promote active engagement and effective learning (Kay & Buxton, 2024). Correlations are presented in Table 1. Frequency of verbal disciplinary strategies was significantly positively associated with the frequency of negative physical inter-actions, child engagement and individualised instruction but not supervision. Larger associations were evident (>.6) between individualised attention from the teacher

and engagement and verbal disciplinary strategies, potentially indicating that teachers used disciplinary strategies to keep the children engaged. .

Discussion

To date, research is lacking about the ways in which Anganwadis function as centres of learning, and without data on the learning environment, staff development and child outcomes cannot be addressed in an evidenced informed manner. To address this,gap data were collected in Anganwadi centres using the MELE to better understand the current learning environments, opportunities and interactions in a sample of 36 government-managed preschool settings in India. We anticipated that observations using the MELE scale would reflect dimensions of the learning environment, learning opportunities and learning interactions and predicted that children would be exposed to a range of conversation and school readiness activities given the clearly delineated criteria in the government's curricular framework. We start by considering the use of the MELE in our settings.

Several changes were made to ensure the MELE reflected the local cultural context, and interpretation of the data was made based on an understanding of those settings. For example, none of the urban Anganwadis had space for outside play, and many of the settings were too small to allow group work. Despite these important caveats, the evaluation of the Indian version of the MELE tool demonstrated strong internal consistency for the entire scale, (suggesting a strong correlation between items). However, the PCA of the observational data did not find a unified structure, suggesting that the items of the MELE may not be measuring a single underlying factor reflecting early years provision in these Anganwadis. Moreover, no statistically or conceptually consistent components were found, indicating that there was no evidence of fixed latent variables. The failure to identify any statistically reliable or conceptual variables may reflect the small sample size but also potentially indicates that the conceptualisation of the learning context or specific items in the MELE were not appropriate for capturing learning in the Anganwadi settings. To further explore these issues, we used the conceptually driven dimensions of environment, opportunities and interactions to examine the results (DeVellis, 2016) but the individual items within dimension were described, analysed and discussed individually for both descriptive purposes and to capture the learning contexts.

All the Anganwadis observed had a teacher, and the majority an assistant as per government policy. The settings observed were smaller than those in other studies ($M = 10$ children), providing opportunities for interaction and small group activities, but as we discuss below, these were not observed. The classes had similar numbers of girls and boys. Despite clear government guidance about the curriculum and activities, differences were evident both between settings and with the national guidance. Indeed, often the children were sitting for long periods of time with no set activities and teachers were rarely engaged for the full session.

All settings reported prioritising socio-emotional development, reflecting educators' recognition of its importance in fostering children's social skills, emotional regulation and interpersonal relationships (Cristóvão et al., 2020), and the curriculum

goals included in the NCF. Additionally, language and literacy were consistently emphasised. However, as we discuss below, these aspects were not evident in the observations. The inclusion of oracy in the settings reflects the increasing awareness of language as a foundational skill for learning and interaction (Girolametto & Weitzman, 2007), but language activities were not language exchanges, rather rote songs or games which are less likely to support language development (Hulme et al., 2020). Nonetheless, when these activities were observed children appeared to enjoy them and most teachers were also enthusiastic about the sessions. Art was not frequently present which may reflect the limited resources available for these specific activities. Art offers children opportunities for self-expression, creativity, fine motor skill development and exploration of different materials and mediums (Sharma & Kaur, 2022) as is encapsulated in NCF within aesthetic and cultural development. The absence of these areas within the activities observed in the centres indicates gaps in the breadth and depth of learning experiences provided to children in the Anganwadi settings.

As Fig. 3 shows, while the majority of Anganwadis observed had a range of resources, their use was restricted. Writing-related materials were found in the majority of Anganwadis (31 of 36), but they were actively utilised in less than half (15 of 36). Similarly, every Anganwadi possessed books, and several Anganwadi centres even had a significant number of books (> 14), but these were rarely used during the observation periods. Given the potential for these resources to support children's cognitive development, it is important to establish why they were not used. Lack of use could reflect that the materials were not appropriate for the group, that teachers have not been trained or supported in using the resources, the settings did not afford opportunities for their use or time constraints due to the multiple roles of Anganwadis workers. Future research will need to move beyond recoding presence and use to further explore the pedagogical decisions made by staff. Active learning was rarely observed in the settings, despite pedagogical approaches emphasising active learning, as integral elements of early childhood education (Kim et al., 2021). Again, further research needs to explore whether this reflects teachers' choices or the physical limitations of the settings.

The addition of three new items to the health and safety scale to capture nutrition in the centres is a recognition of the importance of nutrition in early childhood development and the nutrition polices in India (Government of India Ministry of Women & Child Development, Annual report 2022–23). The findings show positive practices related to nutrition, with cooked food being provided in all centres and children being able to ask for more (94%) if needed. Meals were often accompanied by conversation between the children and aide (who served their food), and between the teacher and children, fostering a positive mealtime environment (86%). However, hand washing by the children was inconsistent across the centres, and only a minority of settings had running water available specifically for handwashing ($n = 4$). There is scope for developing and enhancing hygiene practices which impact health and illness. While the overall conditions were clean, the availability of running water for handwashing, particularly in a setting where young children are present, is crucial for preventing the spread of infections and promoting good hygiene habits (Dreibelbis et al., 2014).

Educational initiatives aimed at promoting proper handwashing techniques among children and caregivers could help improve hygiene behaviours and reduce the risk of illness transmission (Bowen et al., 2007).

Other aspects of the learning environment were inconsistently present, such as children's own portfolios for documenting a child's learning progress, achievements and experiences. In the broader context in which the preschool operates, institutional policies, administrative support and community expectations may also play a role in determining the presence of aspects of the learning environment (Epstein & Gipson, 2018). Understanding the factors influencing the presence or absence of these aspects can provide valuable insights in creating and maintaining high-quality early learning environments. Considerable variation was also seen in the availability and quality of learning opportunities in the Anganwadis, specifically the infrequent use of book reading activities to enhance children's listening and speaking skills. Interactive book reading offers potential word learning and extended conversations (Girolametto & Weitzman, 2002; Zucker et al., 2013) and has been shown to improve receptive and expressive vocabulary and narrative skills (Cabell et al., 2019; Grolig et al., 2020; Mol et al., 2009; Pesco & Gagné, 2017). Interactive book reading was never observed. Further small group activities increase opportunities for joint attention (Hassinger-Das et al., 2017), encourage children to interact and make verbal contributions (Pellegrino et al., 1990) and encourage educators to offer higher-quality language-supporting practice matched to children's developmental levels (Turnbull et al., 2009), but again, despite the small numbers in the classes, these exchanges were not observed.

In addition, we observed few occurrences of unstructured play, observed in less than one-third of the settings (Fig. 4), and the incorporation of two 10-minute periods designated for free play in the curricular guidance was never observed. Notable disparities were also evident among learning opportunities, with teacher directed oral language activities being the most common, such as talking about 'good habits'. Teachers frequently relied on narration rather than reading and the books that were accessible were highly textual, effectively designed for teachers to read. There was considerable scope to develop language-supportive activities by providing age-appropriate and appealing materials, such as picture books specifically developed for preschoolers (Dickinson & Tabors, 2001). Our data suggest that additional training will be necessary to improve the quality and diversity of learning opportunities offered in Anganwadis, especially for supporting activities that encourage language development (Justice & Pullen, 2003; Neuman & Celano, 2001).

We captured learning interactions in different ways. Firstly, by observing the ongoing nature of interactions throughout the session and secondly through the ways in which teachers managed activities and behaviour. A significant portion of children (67%) experienced waiting or transition times between activities of more than 10 minutes without engaging in any activities. Transition between activities was abrupt where the teacher promptly released the children, resulting in sudden shifts. Consequently, the children often found themselves idle, either sitting quietly or engaging in chatter with one another, without engaging in meaningful activities. The data also showed that individualised instruction was rare. Children were typically, though not always, supervised by staff.

There were a high number of occurrences of negative verbal and physical disciplinary approaches. Moreover, the data indicated a significant association between the frequency of verbal disciplinary strategies and negative physical activity, child engagement and individualised instruction. Verbal reprimands were often associated with negative physical activity. Most instances of individualised attention from the teacher, occurred in response to unacceptable behaviour, rather than for non-disciplinary reasons. The reliance on negative disciplinary approaches in early childhood settings has been shown to have detrimental effects on children's socio-emotional development, self-esteem and overall well-being (Gershoff et al., 2018). Training Anganwadi staff about positive discipline strategies, such as positive reinforcement, modelling appropriate behaviour and problem-solving techniques, would effectively promote desirable behaviours and foster positive learning environments (Gershoff et al., 2018).

Limitations

Despite the study's unique strengths in providing observational data in urban Anganwadis, it is subject to several limitations. Firstly, data were collected at the end of the COVID-19 pandemic, and we cannot ascertain what, if any, changes were made in the centre because of this. Thus, the data need to be interpreted in this context. Secondly, while the study comprehensively captures a set of Anganwadis, these are in a prespecified urban location. Practices in rural settings may differ significantly. Thirdly in hindsight, we should have reflected with the teachers about the observations to include their views. For example, to provide an explanation of why, in some cases, they reported not following the NCF (or any locally specified curriculum) or what constraints there were on the availability of specific resources.

While a sample size of 36 settings provides rich data about the children's early learning contexts, further data are needed to capture a more representative sample and to capture potential moderating variables such as population mobility, the impact of teacher education and setting size. Finally, our data raise important questions about the ability of the MELE to capture the Anganwadi learning context. Domains from the MELE are expected to vary across cultures but the lack of any clear statistically generated factors from the tool requires further research. For example, the absence of recorded small group activity requires items in the tool which could tap other ways of embedding teaching activities in these settings. Similarly, the MELE did not provide options to record teaching in different languages, yet these centres include teaching in Telugu and activities in English. Moreover, focusing on single items seriously limits the tool as a measure of capturing potential impacts on learning (see Perlman et al., 2016 for a discussion in relation to CLASS). Research which includes the ways in which children respond to settings and how this impacts their development is required.

Conclusions and Implications

Anganwadis provide a unique opportunity to nurture children's body and mind. Several factors are associated with optimal ECEC, including positive, responsive and enriching experiences that protect children from environmental risks. While our data indicated that children in Anganwadis were receiving nutrition, the current study raises questions about how the settings were supporting the children's social and cognitive development and implementing the intended curricular guidance in their activities. The current data from Anganwadi suggest that quality is variable and that effective learning opportunities, as captured by the MELE are often absent. The term 'quality' is often used in ECEC to describe the structural and process features of the environment that promote learning and development. Many of these indicators of quality were missing in the observed settings and offer scope for further research and development.

While strong learning environments are an important precursor to support children's learning, they are not sufficient. Both evidence-informed learning opportunities and interactions need to be present and were, typically, absent in our observations. Structuring learning opportunities and offering high-quality interactions are underpinned by the skills of the teachers and the opportunities they have to engage in CPD. One way in which high-quality ECEC can be ensured in the Anganwadis is by engaging staff in effective professional development opportunities to advance the knowledge and skills to support children's development (Egert et al., 2018). High-quality CPD in ECE has demonstrated quantifiable impact on children's outcomes, transferable knowledge for supporting practice in various cultural, social and environmental contexts, and empowers educators to articulate their practices, explaining what they did, how and why (Dubiel, 2016).

The current study also highlights the complexity of assessment tools and the importance of reliability and dimensionality in such evaluations across contexts. The lack of factor structure found is not new, as it has been reported when using MELE (Anderson & Sayre, 2016), and other measures, such as CLASS (Perlman et al., 2016) and ECERS-R (Betancur et al., 2021). Future studies need to proactively engage with stakeholders to ensure they capture local contexts to contribute to the overall quality of early childhood education in India.

Appendix 1

See Table 2

Appendix 2: Scoring Criteria

See Tables 3, 4, 5 and 6

Table 2 Alterations to the Tool

Item added	Item altered	Rationale	Example
Use of digital technology		Introduced as a result of COVID-19	
Special Needs	Removed question on special needs	Settings did not accommodate children with special needs	
Frequency of negative PHYSICAL interactions	Added specific examples to prompt responses		e.g. pinching, poking, pushing or striking
Toilets divided by gender	Removed	Not a feature of Anganwadi settings	
Toilets are child sized	Removed	As standard-sized toilets are utilised in the community	
Toilets are utilised for all toileting requirements	Removed	Children are occasionally sent home if they need to use the toilet	
Water is accessible in the toilet	Removed		
No fence surrounding the school in the section on safety conditions	Removed	No urban settings at outdoor areas	
Since these preschools provided snack and a noon meal to the children questions relating to food hygiene and mealtime interactions	Added		Was food covered, Did children receive more food if asked, was there pleasant conversations during mealtime

Table 3 Items and Scoring Criteria for Learning Opportunities

Items	Scoring			
	1	2	3	4
Learning opportunities to support math skills	No activities observed	Instructor teaches math concepts ONLY by repetitive activities	Instructor teaches math concepts by using ONE strategy	TWO OR MORE strategies used
Learning opportunities to support literacy skills (letter identification, phonics)	No activities observed	Instructor teaches literacy by repetition, e.g. asks children to repeat after him/her letter sounds, letter names or words. Examples include singing the alphabet, the teacher asking for a group response while pointing to letters or words, or teacher asking children to trace over letters with a writing utensil or their fingers	Only ONE strategy used	TWO or more strategies used
Learning opportunities to develop expressive language skills	No activities observed	Instructor ONLY engages children in repetitive activities. Examples include asking children to repeat a story or phrases word by word or answer close-ended questions (one-word responses or right/wrong answer questions). No children have choice in what they say, and none is generating or expressing his/her own thoughts. There is no back-and-forth discussion between teachers and children, or children and other children	ONE verbal exchange activity	TWO or more verbal exchange activities

Table 3 (continued)

Items	Scoring			
	1	2	3	4
Book reading	No book reading or not age-appropriate	No discussion	ONE strategy applied	TWO or more strategies applied
Learning opportunities to promote fine motors skills	No activities observed	Instructor teaches ONLY by using NOT developmentally appropriate activities	Developmentally appropriate but focused on product, not process	Developmentally appropriate and focused on process
Learning activities that promote free play or open choice	No activities observed	Teacher chooses or limited choices	Children have one opportunity to choose but teacher does not add/interact	Children have one opportunity to choose, and teacher adds/interacts
Music/movement	1 No music/movement activity is observed		2 At least one music or movement activity occurred during observation	
Gross motor activities	No activities observed	Less than 10 min of activity or only a few participate	Less than 20 min of activity or less than half participate	At least 20 min and most children engaged

Table 4 Items and scoring criteria for classroom interactions and approaches to learning

Items	Scoring			
	1	2	3	4
Verbal disciplinary strategies	Instructor does not discipline disruptive behaviour	Instructor uses one or more negative verbal interaction or does nothing to control behaviour problems	Instructor uses NO negative verbal interactions but is inconsistent/ineffective with redirection	Instructor uses NO negative verbal interaction; uses positive techniques for guiding children's behaviour consistently; no behaviour problems observed
Negative physical interactions	Frequently	Sometimes	Rarely	Never
Child engagement	Few (<25%)	Some (<50%)	Most (<75%)	All
Children wait with no activity for more than 10 min	Yes		No	
Grouping types include whole group (entire class), small groups (three or more), pairs students working alone	One grouping type	Two grouping types	Three grouping types	All four grouping types
Adult supervision	Left without adult > 10 min	Left without adult 5–10 min	Left without adult <5 min	Never left without adult
Individualised instructions	No	Occasional	Present but inconsistent	Present and consistent

Table 5 Items and scoring criteria for the classroom material

Materials	No materials present	Materials present but children do not use	Children use
Writing utensils (pencils, pens, crayons and chalk)			
Art (paper, crayons, markers, chalk, pencils, paints, clay, sand, scissors, tape, glue, stamps, sticks, grasses and natural materials)			
Fantasy play (dolls, stuffed animals, dress up clothes, masks, pretend food, pots and spoons)			
Blocks (wooden or plastic blocks, interlocking pieces)			
Educational toys or Math materials (bottle caps, dice, water, beads, rocks, abacus, materials used for counting or sorting, puzzles and games)			
Storybooks (books with pictures and text, including those made by the teacher)			
Number of books by language	Local language		English

Table 6 Items and scoring criteria for facilities and safety

Items	Scoring			
	1	2	3	4
Drinking Water	No water available	Unprotected dug well/spring, rainwater	Cart with small tank/drum, tanker truck, protected spring	Sanitary water source (piped water, public tap, protected dug well or bottled water)
Handwashing facilities	No handwashing stations	Shared basin or bucket	Hand poured water system with used water separate from water to clean hands but no soap	Running water or hand poured system and liquid/bar soap are available
Handwashing practices	Children do not wash hands	Handwashing is sporadic	More than half of children wash hands	All children wash hands after toilet
Toilet facilities	Bush or field	Pit latrines, uncovered bricks or buckets	Composting toilets	Flush or pour-flush toilets
Toilet conditions	No conditions met	One condition is met	Two conditions are met	3–4 conditions are met
Toilet practices	Most children go outside/in the field	Use toilets sometimes	Urinate mostly outside and use toilets to defecate	Always use toilets
Safety conditions	5+ dangerous conditions exist on school grounds or in classroom	3–4 dangerous conditions	1–2 dangerous conditions	No dangerous conditions

Appendix 3: Descriptive Statistics

See Tables 7, 8, 9 and 10

Table 7 Mean, mode, SD and range for learning activities scored on a 4-point scale ($N=36$ Anganwadis)

Dimension	*M*	SD	Min	Max
Math activities	2.22	1.0	1	4
Literacy activities	2.83	1.18	1	4
Expressive language	2.97	1.13	1	4
Book reading	1.19	.67	1	4
Fine motor activities	2.42	1.0	1	4
Free play	1.42	.77	1	4
Gross motor activities	2.28	.88	1	4

Table 8 Mean, SD and range for teacher/child classroom interactions in Anganwadis ($N=36$)

Dimension	*M*	SD	Min	Max
Verbal strategies	2.86	.76	1	4
Negative physical interactions	3.44	.70	2	4
Child engagement	3.06	.86	1	4
Groups	1.28	.57	1	3
Child supervision	3.08	1.25	1	4
Individualised instructions	2.22	.93	1	4

Table 9 Presence and use classroom materials in Anganwadis ($N=36$)

Materials	Absent	Materials present but children do not use	Children use
Writing utensils	5	15	16
Art	14	14	8
Fantasy play	28	7	1
Blocks	21	10	5
Educational toys or Math materials	20	14	4
Storybooks	0	34	2
Number of books by language	Telugu: 1–14 $n=32$; 15–24 $n=4$		English: none $n=5$; 1–14, $n=28$; 15–24 $n=3$

Table 10 Health and safety items ($N = 36$)

Item	None	Scoring criteria		
		Sanitary source		
Drinking water availability	2	34		
		Hand poured system	Running water + liquid soap	
Handwashing facilities		32	4	
		Sporadic + inconsistent	More than 50% of children	
Handwashing practices	5	25	6	
			All	
Toilet facilities			36	
		1 condition	2 conditions	3 + conditions
Toilet conditions	1	19	11	5
		1 or 2 dangers	No dangers	
Safety conditions		6	30	

Declarations

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