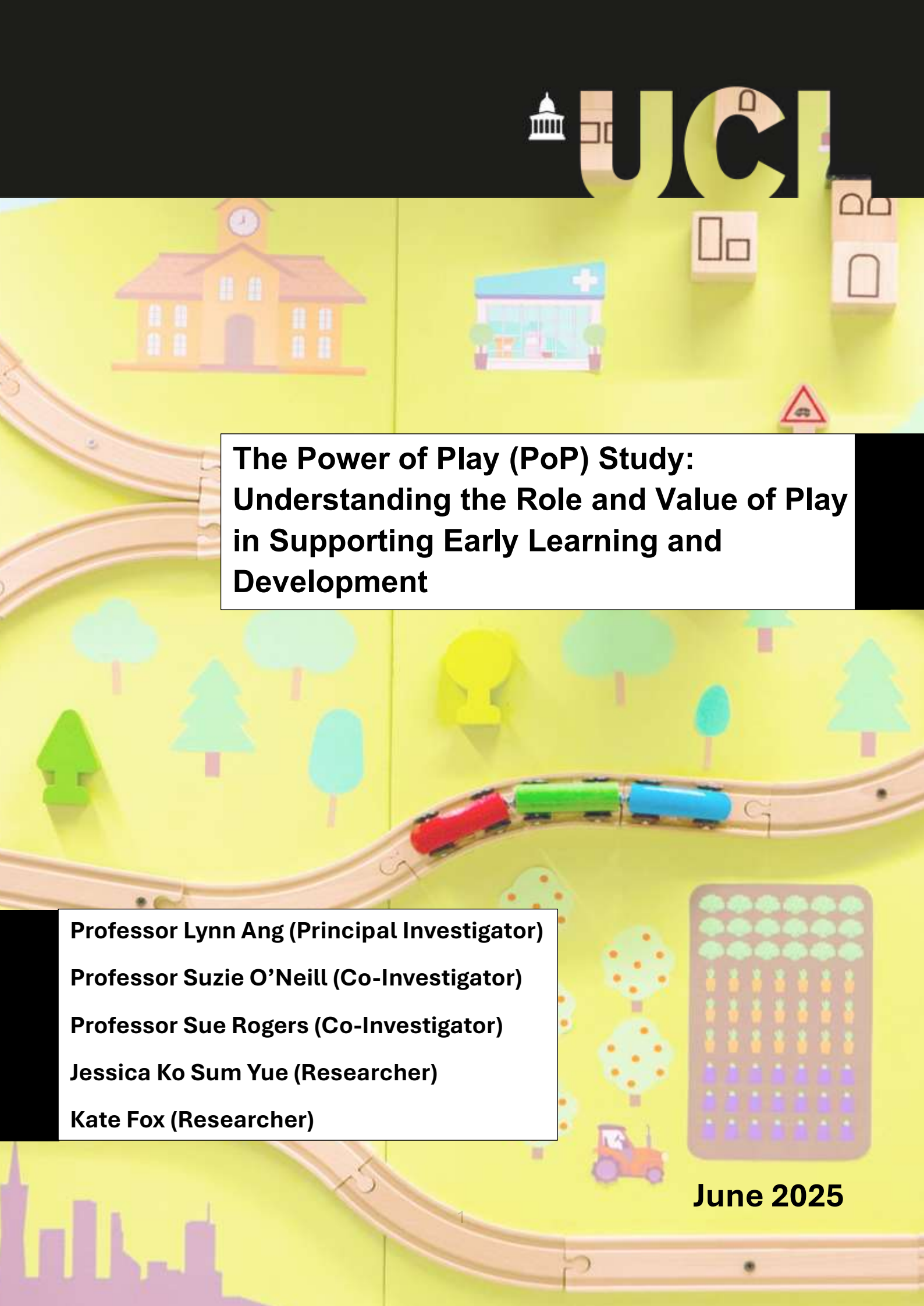

The Power of Play (PoP) Study: Understanding the Role and Value of Play in Supporting Early Learning and Development

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- **Fliss James**, Assistant Head Teacher, Sheringham Nursery School & Children's Centre
- **Dr Jennifer Chung**, Lecturer, UCL Institute of Education
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Conflicts of interest

There were no reported conflicts of interest.

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1. Introduction

Play gives a child new form of desires. It teaches her to desire by relating her desires to a fictitious "I," to her role in the game and its rules. In this way a child's greatest achievements are possible in play, achievements that tomorrow will become her basic level of real action and morality.
(Vygotsky, 1978, p.100)

The importance of play in early childhood has gained global momentum over the last two decades. The early childhood phase, typically from birth to eight years old, is a unique and critical stage in the human life cycle. During these early years, play is crucial for young children's learning and development. In 2024, the UN General Assembly officially designated 11 June as the International Day of Play in recognition of the importance of play. Article 31 of the *Convention on the Rights of the Child* (United Nations, 1989) considers play to be a fundamental right of all children. A *State of Play* interim report contends that play and play-based learning are vital for overcoming social and educational barriers, and should be a policy priority in England (Raising the Nation Play Commission, 2025).

Our vision for this study is to ensure that play lies at the heart of early childhood education and is recognised as a powerful medium for learning and development which can benefit children's lives everywhere. To achieve this, we conducted an in-depth systematic review of the evidence base on play and learning to better understand the drivers that shape environments in which play can flourish to benefit children's learning, development, and wellbeing. This was supported by qualitative focus group discussions with caregivers and play practitioners. Our ambition is to inform a deeper learning of play and strengthen the case that affording children the opportunities and space to play, safely and freely, has become more critical than ever in an increasingly complex and changing world.

1.1 Objectives and aims

Much debate has taken place over the last decade about the precise role of play in children's learning and development. There is robust evidence on the important role of play in early childhood development particularly in formal settings. However, despite this established research, the evidence is variable in terms of the impact of play and play interactions in children's informal or non-formal everyday environments, that is, play that occurs outside formal, organised educational settings such as schools and preschools. More specifically, there is an additional need to better understand the role of play and children's engagement with play materials in diverse, naturally occurring contexts such as the home, and social and community spaces. This is evidenced by emerging research which shows the role of play in supporting children's engagement with a variety of social and familial interactions across age groups and generations (Giraudeau and Bailly, 2019; Holmes, 2009; Peach, 2024).

The overarching objective of this systematic review and primary research is to therefore examine the role and value of play in supporting early learning and development for children aged 3 to 8 years, particularly outside formal educational settings and activities. The specific aims are:

- To understand the role and value of play in supporting early learning and development, especially social and emotional development.
- To understand the nature of play interactions and children's engagement with play materials in the home, community, and other informal social spaces.
- To develop a repository of effective strategies that support children's play and learning that is adaptable for different contexts internationally.

1.2 Research Questions

The study aimed to answer the following research questions (RQ):

- **RQ1:** What is the impact of play on supporting early learning and development, particularly social and emotional development, for 3- to 8-year-olds?
- **RQ2:** What kinds of play interactions in children's everyday naturally occurring environments show positive outcomes on, and support meaningful multi-/inter-generational interactions?
- **RQ3:** What is the role and impact of children's engagement with play materials (i.e., manufactured or found-objects, small assembleable and loose part toys) in supporting early learning and development, particularly social and emotional development?

1.3 Concepts and Definitions

We adopted both a deductive and inductive approach to defining play, whereby our definition of play gradually evolved throughout the process of the research.

For the purposes of this report, **play** is broadly defined as a dynamic *emotional, physical* and *intellectual* process, which comprises interrelated elements of "anticipation, surprise, pleasure, understanding, strength and poise" (Eberle, 2014, p.214). This can take place both outdoors or indoors, and can be of a physical, oral, or creative nature. Our conceptualisation of play is informed by the literature as existing along a continuum, from free play, which gives children the freedom to lead, initiate, play and explore freely with minimal constraints, to more adult-led, guided play at the other end of the continuum (Hassinger-Das et al., 2017; Pyle and Danniels, 2017). Essentially, our working definition is based on the premise that play is not just something that happens in a vacuum but takes place in relation to the child's surrounding environments in the home, early childhood care and education settings, outside the home and other informal contexts. Affordances offered by these contexts – both material and human - influence the nature of children's play and their play interactions.

Loose part toys refer to moveable materials and equipment, either found or manufactured, which children use in multiple ways and combine with other loose parts objects through imagination and creativity to play. Our definition builds on the work of Nicholson (1971) who theorised loose parts as "variables" that are tangible and non-tangible such as materials, shapes, smells, noise, and abstract concepts and ideas that children find enjoyment in experimenting, inventing and playing with.

2. Methodology: Systematic Review

2.1 Search strategy

Five databases relevant to the field of early childhood education and development were used in the search strategy: the *British Education Index*, *Education Resources Information Center (ERIC)*, *Scopus*, *Web of Science*, and *PsycINFO.* The search terms listed in **Table 1** below were applied consistently across all five databases. The Boolean operators "OR" and "AND" were used to link terms within and between concepts respectively. The appropriate truncation mark (*) has been incorporated to cover variations (e.g., plural terms, American/British spelling) in keywords, ensuring a highly sensitive search for comprehensiveness. The search was limited to studies in English and studies published over the last 10 years from 2015 to 2025. The search results were saved into RIS files and imported into the systematic review software EPPI-Reviewer 6. The detailed search strings used are available in **Appendix 1**.

Table 1: List of search terms

Criteria		Search terms
Population	Children aged 3-8	child* OR children OR kid* OR toddler* OR infant* OR preschooler*
AND		
Exposure	Play or play materials	play OR play interaction* OR play materials OR play affordance* OR play engagement OR toy* OR small assembleable toy* OR loose part toy* OR loose parts play OR playful learning OR manufactured object* OR found object* OR play-based approach* OR play based pedagog* OR play pedagog* OR play learning early years play OR early childhood education play OR creative play OR artful play OR imaginative play OR pretend play OR socio-dramatic play OR role play OR identity play OR outdoor play OR

		free play OR unstructured play OR non-structured play
AND		
Setting/ context	Informal play settings	informal setting* OR non-formal setting* OR home OR community OR everyday life OR outside of school OR early childhood OR early years OR learning environment OR preschool OR kindergarten
AND		
Outcomes	Learning outcomes	learning outcome* OR learning experience* OR early learning OR early learning and development OR play-based learning OR play based learning OR social and emotional learning OR SEL OR positive impact on learning OR psychosocial learning
	OR	
	Developmental outcomes	developmental outcome* OR social and emotional development OR well-being OR wellbeing OR well being OR skill development OR skill building OR cognitive development OR psychosocial development
	OR	
	Interactions and engagement	intergenerational interaction* OR multigenerational interaction* OR intergenerational relationship* OR multigenerational relationship* OR interaction* with grandparent* OR interaction* with parent* OR interaction* with family OR interaction* with sibling* OR interaction* with peer* OR interaction* with brother* OR interaction* with sister* OR Interaction* with other children engagement with grandparent* OR engagement with parent* OR engagement with family OR engagement with sibling* OR engagement with peer* OR engagement with brother* OR engagement with sister* OR

		engagement with other children OR familial interaction* OR familial engagement

2.2 Screening, Selection and Coding Procedure

Study eligibility criteria:

Studies were included if they contained empirical data and focused on young children between the ages of 3 and 8 (inclusive) who are exposed to unstructured play within informal contexts such as the home, the community (e.g., playgroups, libraries, museums), as well as recess or break time in school. Additionally, studies were only included if they reported quantitative or qualitative outcomes related to children's learning, development, and interactions or engagement with peers and family members. The inclusion and exclusion criteria are detailed in **Appendix 2**.

Study selection:

The selection and screening of studies derived from the search were conducted in EPPI-Reviewer 6. In piloting the screening tool at both the **title and abstract** and **full text** stages, approximately 5% of the studies were double-screened by at least 2 reviewers. This not only maximised shared understanding and consistency between reviewers throughout the screening process but also ensured quality assurance. Any discrepancies were discussed and reconciled through team meetings, and the screening tool, detailed in **Appendix 3**, was refined throughout this double-screening process.

Coding:

Records included at the full text stage underwent an initial round of high-level coding using the coding tool shown in **Appendix 4**. This coding exercise described and categorised studies based on: the citation date, study design, country, setting of play, the population sampled, age range of children, characteristics of children, the type of play described, whether the study addressed play interactions or loose parts play, and the learning or developmental outcomes assessed within the study.

Based on these high-level codes, records included on full text that addressed **loose parts play** OR **assessed outcomes** related to socialisation, socio-emotional development, or inter-generational relationships were selected for quality appraisal. These codes were deemed to be the most relevant for answering research questions 3, 1, and 2 respectively.

2.3 Quality Appraisal

An adapted version of the Weight of Evidence (WOE) framework by Gough (2007) was used to appraise the quality and relevance of the studies included to answer the review questions (RQ 1-3). The framework comprises four aspects - WOE A, B, C, and D.

- **WOE A**: evaluated the quality of execution of the primary study in question based on transparency, accuracy, accessibility and method-specificity.

- **WOE B**: evaluated the appropriateness of the methodology used in the primary study in relation to the review question(s).
- **WOE C**: considered whether the focus of the primary study is relevant and appropriate for the review question(s), specifically the study's utility and propriety.
- **WOE D**: assessed the overall quality rating of the primary study, which comprises ratings for WOE A, B, and C.

For the purposes of our review, studies assessed as low quality for WOE A or WOE C were automatically assigned a low overall rating (WOE D). The full appraisal tool is detailed in **Appendix 5**.

2.4 Data Analysis

The data analysis process was both deductive and inductive. Thematic patterns across all the included papers were first identified in order to derive broad meta-themes that addressed the research questions (Noblit and Hare, 1988; Wutich et al., 2021). In accordance with the thematic synthesis methodology proposed by Thomas and Harden (2008), line-by-line coding of the findings presented in the included studies was undertaken, which allowed for the production of codes. These codes were mapped onto the aforementioned meta-themes to produce a framework for synthesis. This allowed qualitative and quantitative data from the included studies to be synthesised narratively, using this framework. The findings from each primary study were then extracted and structured around the intervention and outcome codes. We identified thematic patterns in the evidence base to understand the overall impact of play in different contexts.

2.5 Stakeholder Engagement: Advisory Group

An advisory group of four experts in early years education and play-based pedagogy were involved in supporting the study. The advisory group included three specialist academics and one Assistant Headteacher. The key role of the advisory group was to guide the review process and provide feedback to the review team. The advisory group also provided advice on maximising the relevance and usefulness of the review findings for research, policy, and practice. Two advisory group meetings were held during the course of the project in February and May 2025. The agenda for advisory group meetings was co-developed in consultation with participants.

3. Results: Systematic Review

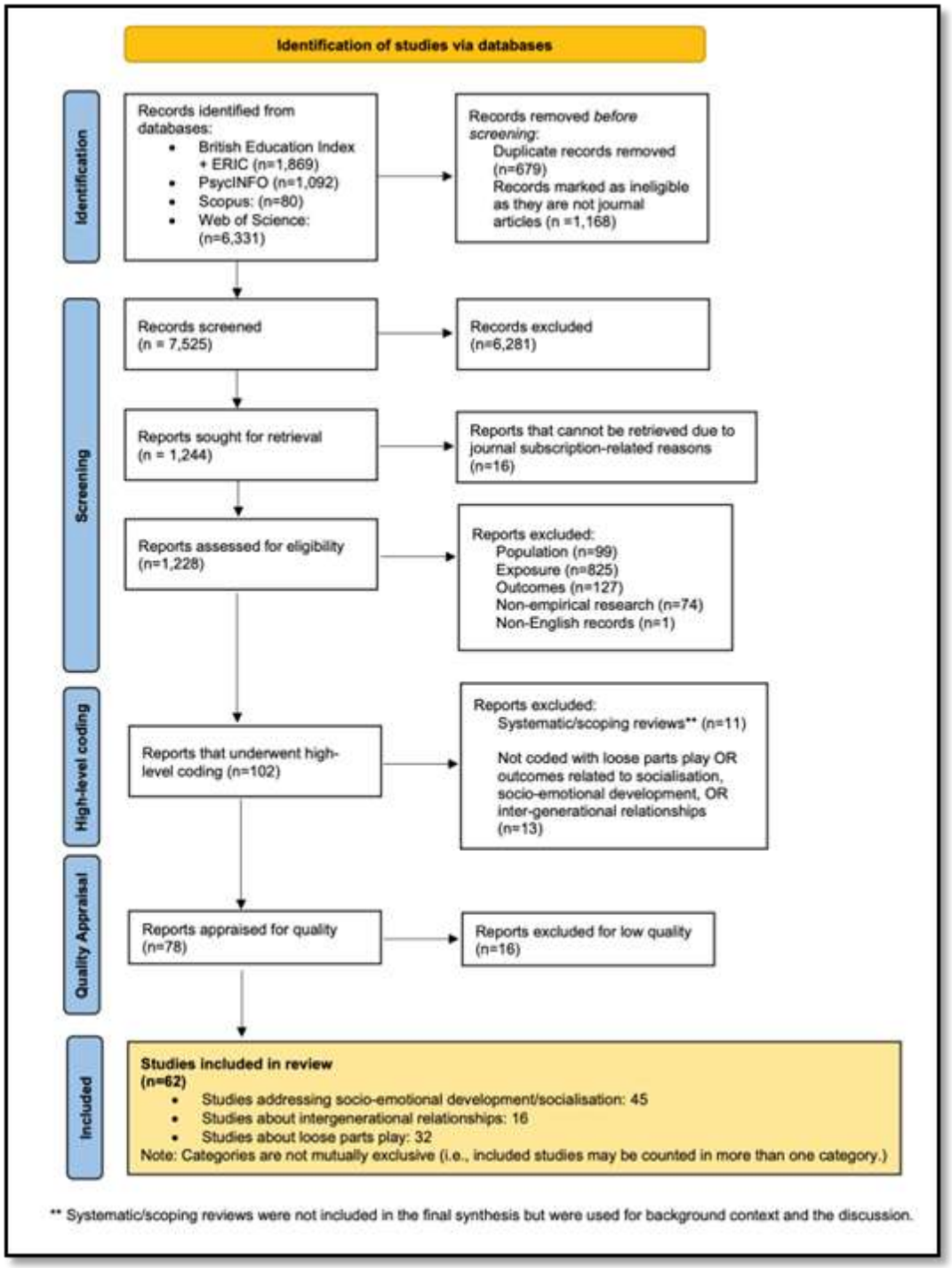
In total, the review found **62 relevant studies** which addressed our research questions. This compelling body of evidence supports the view that play, throughout childhood, is not only an important innate behaviour of young children but also contributes to children's quality of life, their well-being and their cognitive, social and emotional development.

3.1 Search and Screening Results

The search generated 9,372 records, as depicted in the PRISMA flowchart below (Figure 1). Following the removal of 679 duplicated items, 1,168 non-journal articles were excluded in

the first instance. 7,525 items were then screened on title and abstract by the review team using the screening tool in **Appendix 3**.

Figure 1: PRISMA flowchart



Source: Page et al., 2021

At the title and abstract stage, more than a third of the studies were excluded on either population (n= 2844) and exposure (n= 2803). **1,244 studies were included on title and abstract** and screened on full text.

At the screening on full text stage, **102 studies** were included on full text, of which 11 were systematic/scoping reviews which are listed in **Reference List I of the Appendix**. While these reviews were not included in the final set of included studies, some were used as reference for the background and discussion sessions. Of the studies that underwent high-level coding, 78 addressed loose parts play OR assessed outcomes related to socialisation, socio-emotional development, or inter-generational relationships. These **78 studies** were selected for quality appraisal.

3.2 Quality Appraisal Results

78 studies were appraised for quality using the WOE framework. The quality appraisal results are tabulated in **Table 2** below.

Table 2: Quality Appraisal Results

	HIGH	MEDIUM	LOW
WOE A: Quality of execution of study	51	19	8
WOE B: Appropriateness of methodology for the review	30	42	6
WOE C: Utility & propriety of study for the review question	29	38	11
WOE D: Overall rating	**11**	**51**	**16**

While the majority of studies (n=51) were deemed to be of high quality in and of themselves, and the designs and methodology adopted in these studies were generally appropriate for answering our review questions (n=72), their findings may have been less relevant or fit for purpose for our review. The **16 studies** that were deemed to be of low quality overall were excluded from the synthesis. Given that the majority of studies included were of medium quality, we judge the quality of the evidence base to be moderate.

3.3 Characteristics of Included Studies

After full text screening, high-level coding, and quality appraisal, **62[1] studies** assessed as medium and high quality were included, as listed in **Reference List II of the Appendix**.

Countries and Context

The majority of included studies were set in high-income, western countries such as the United States (n=15), Australia (n=12), and Canada (n=7), as well as Europe (the UK (n=9), Ireland (n=2), Italy (n=1), Norway (n=3), Portugal (n=1), Hungary (n=1)).

Nevertheless, the evidence base of our review is of a highly international nature and included Low- and Middle-Income Countries (LMICs) spanning multiple geographical regions: Africa (Ethiopia (n=3), South Africa (n=1)), East Asia (China (n=2), South Korea (n=1)), South Asia (Bangladesh (n=1)), Southeast Asia (the Philippines (n=1), Myanmar (n=1), Malaysia (n=1)), and the Middle East (Iran (n=1), Qatar (n=1), Turkey (n=1)).

[1] These included studies may cover more than one coding category (e.g., contains outcomes pertaining to loose parts play and socio-emotional development).

Due to the focus of the research on informal play in informal settings, more than half of the included primary studies were based in the home (n=38) and community settings such as playgroups, libraries, and museums (n=15). A small number also investigated play in outdoor and natural settings such as forests (n=5). The evidence-base still included some studies that were conducted in formal contexts such as schools (n=9) as they focused on children's unstructured free play during school breaktimes and in playgrounds.

Population sampled
Barring children (n=54), parents were the most common population sampled by included studies (n= 33), followed by other family members such as grandparents (n=6) and siblings (n=10), and finally teachers and other school staff (n=3). This aligns well with the aforementioned finding that much of the informal and unstructured play surveyed in these studies takes place within the home. While a small number of studies considered both typically and non-typically developing children (n=6), the majority of the included studies were sampled on typically developing children (n=54) rather than neurodivergent children (n=2) who have been diagnosed with conditions such as autism.

Types of play observed
The included studies analysed a variety of different modes and forms of play. The majority of studies considered equipment/toy play (n=41) encompassing loose part toys (n=32). In contrast, less than a fifth of the studies focused on digital play (e.g., video games, technology-based play, etc.) (n=10). A substantial number of studies considered nature/outdoor play (n=24) and pretend play/role play/socio dramatic play (n=21), while roughly equal numbers of studies considered oral/language play (n=14), creative play (n=16) and physical play (n=15).

Learning and developmental outcomes
The review included studies that considered outcomes such as cognitive development (n=34), socio-emotional development and socialisation (n=45), general wellbeing and pleasure/enjoyment (n=23), as well as the nurturing of intergenerational relationships (n=16), and motor skills development (n=9). A few studies went beyond focusing on children's outcomes to parental outcomes (n=5) as well as sibling outcomes (n=2).

3.4 Synthesis: Key Themes

The review revealed that play is an inherent and natural part of young children's everyday lives. The findings highlighted several key themes:

Theme 1: Positive associations of play with children's early learning, social and emotional development

The review of evidence demonstrates a strong link between play and all aspects of early learning and development. In many of the studies, play is a vital **physical and cultural space** of care, enjoyment and learning for young children in diverse geographical and cultural contexts such as Qatar (Ihmeideh, 2019), Ethiopia (Jirata, 2019), China (Wang et al., 2024) and nomadic communities (Jirata, 2019; Kale and Araptarli, 2021). Play helps children develop confidence (Lacey, Banerjee and Lester, 2023), resilience, divergent thinking, and

the ability to self-regulate and cope with anxiety and stress (Buldu and Buldu, 2023; Moon-Seo, Munsell and Kim, 2024; Wu et al., 2024). In particular, play and play-based interventions have been shown to improve socioemotional and academic outcomes for children from disadvantaged backgrounds and at risk of poverty (Brown, Shokunbi and Garnett, 2024).

Findings from included studies showed that **informal play activities** such as games, painting and drawing, are predictive of higher socioemotional development scores (Gomes and Fleer, 2019; Hoyne and Egan, 2024; Yoo, 2024). In contrast, the impact of digital play on children's development was mixed (Archbell, Coplan and Rose-Krasnor, 2020). On one hand, digital play has been proven as an effective platform for social engagement and collaborative problem solving, through which children are encouraged to consider other's perspectives and knowledge (Danby et al., 2018). Digital play was also shown to provide "opportunities for language and literacy learning" by catering to each individual child's needs and preferences (Kervin, 2016, p.70). Furthermore, media play was perceived by fathers to not only foster creative expression in their children (Moon-Seo, Munsell and Kim, 2024), but digital toys such as apps and robots could promote imaginative and pretend play (Palaiologou, Kewalramani and Dardanou, 2021). Digital literacy games were also a positive predictor of children's literacy development and skills (Schmitt et al., 2018). On the other hand, excessive screen time was shown to have a negative impact on children's early learning skills and motor development (Ghandour et al., 2024). Media play was also often perceived by parents as being detrimental to the social interactions and socio-emotional development of young children under the age of six (Moon-Seo, Munsell and Kim, 2024), as watching TV or playing computer games were perceived as a solitary rather than a social activity which did not significantly support social development.

The included studies also showed positive associations of play with early learning and development in a variety of out-of-school informal settings such as **play dates**, **playgroups, play clubs in schools,** and **community-based programmes** (Dawes et al., 2023; Edwards et al., 2022; Lacey, Banerjee and Lester, 2023; Parrott and Cohen, 2020). To begin with, playgroups enhance playfulness in children (Fabrizi and Hubbell, 2017). A quasi-experimental study on playgroup programmes targeting children five to six year olds from poor households prior to entering the reception year in primary school in South Africa showed that the effects of weekly playgroup sessions have the potential to improve learning outcomes and school readiness for the children in fostering social competence and emotional maturity (Dawes et al., 2023). Well-resourced and high performing playgroups afford opportunities for play and social interactions between children and their adult caregivers such as parents, guardians and extended family, to participate in shared play and socialisation in a way that strengthens the bonding and bridging relationships (Edwards et al., 2022). Studies in other informal contexts showed similar findings. A larger study examining young children's (n=189) daily experiences outside-of-school in a suburban neighbourhood in Ontario showed that children engage in a wide range of play activities across different social contexts that encourage social participation (Archbell, Coplan and Rose-Krasnor, 2020). These informal play activities also have positive spillover effects for participants; while Williams et al. (2017) found no direct relationship between **playgroup participation** and children's socio-developmental outcomes among ethnic minorities in Australia, they do note that participation is associated with increased parental engagement in home learning activities, which is correlated with positive social outcomes among children. This is supported by findings from Dawes et al. (2023) where **informal playgroups** were

found to be particularly beneficial for children and their parents in low-and-middle-income countries as they could be delivered at a lower cost than centre-based programmes and enhanced children's access to early learning.

Additionally, the review found studies that showed **play and play settings can benefit children with additional needs**. A study of 70 autistic preschoolers in Toronto, Canada examined engagement with caregivers and use of spoken language in symbolic and gross motor play. The findings revealed that children were more likely to engage with caregivers in play environments with gross motor toys with moderate effect, and showed strong overall correlation between autistic children's engagement states or spoken language use and their play contexts (Binns et al., 2022). Significantly, the literature revealed that the *absence* of play is harmful for children's wellbeing, resilience and development (O'Connor, Butler and Lynch, 2021).

Evidence-gaps and future research:

- Children's play activities and interactions in informal contexts such as playgroups and other community-based settings.
- The role and impact of digital play in children's development.
- Play interactions though which children with additional learning needs engage and communicate across different play contexts.
- Types of play activities that foster children's resilience and agency as well as benefit social and emotional development.

Theme 2: Benefits of play in outdoor and nature-based environments

The review found several studies which showed that play in **nature-based** sites such as forest, fields, gardens, and other outdoor spaces offer rich opportunities for fostering learning, socialising and knowledge-building, thereby providing children the chance to develop their understanding of the world around them. Outdoor and nature play has been perceived as contributing to children's resilience and life skills (Creighton et al., 2015; Gull, Goldstein and Rosengarten, 2020). Playful learning in natural outdoor environments (Izzo et al., 2024; Zhu et al., 2024) was also shown to support the development of children, specifically their socio-emotional development through the building of their social skills as well as the regulation and management of their emotions (Duflos, Lane and Brussoni, 2024; Ghandour et al., 2024; Zhu et al., 2024).This positive correlation between natural outdoor play and socio-emotional development and wellbeing in children was prominent in outdoor activities such as tree climbing (Gull, Goldstein and Rosengarten, 2020), woodwork, fishing (Creighton et al., 2015), and sand play activities (Buldu and Buldu, 2023).

Additionally, nature and the outdoors offer children an effective space to play in an uninhibited manner, as well as facilitate meaningful intergenerational play (Keary et al., 2024). In Duflos, Lane and Brussoni (2024), children were reported by grandparents as having a greater sense of freedom when playing outdoors, which was essential for their wellbeing. Outdoor and nature play's positive impact on wellbeing was particularly evident within Early Childhood Education and Care (ECEC) settings in Norway where educators actively encourage children to rely on what is available in nature to play (Sando, 2019). A similar observation was made within the sea gypsies community in the Philippines, whereby the ocean was described as the children's "playground" (Kale and Araptarli, 2021, p.1367)

and the Guji community in Ethiopia, where cattle fields provide children with a platform to experience “amusement” and “joy” through play and social interactions (Jirata and Kjorholt, 2015, p.233). However, the research also showed the importance of supporting educators to develop children’s deeper understandings making children’s learning meaningful in nature-based outdoor education settings (Creighton et al., 2015; Duflos, Lane and Brussoni, 2024; Jirata, 2019). A challenge of nature-based learning is the capacity of educators to adapt their **pedagogical practices** to prepare an effective nature-based context that utilises resources already available in the natural environment rather than reliance on a pre-set curriculum.

Evidence-gaps and future research:

- The ways in which young children consider and engage in play in the natural or outdoor environment.
- How nature play might be incorporated in schools using appropriate pedagogy with resources afforded by natural environments.
- The role of educators in facilitating nature play in schools or preschool settings.
- Supporting the professional learning and development of early childhood educators in adapting and delivering effective pedagogies for nature-based play and learning.

Theme 3: Play as an important part of home and family life is linked to predicted improvements in educational and developmental outcomes

There is a robust research base which documents play as an important part of home life, and that parent-child play is particularly important for socioemotional development (Kervin, 2016; Ghandour et al., 2024; Yoo, 2024). The nature of play interactions and relationships in the home is complex, and the quality and depth of interactions is often influenced by multiple factors such as affordances within the home (Fagan, Cabrera and Iglesias, 2024; Fenton, MacDonald and McFarland, 2016; Howe et al., 2016; Zoghi et al., 2019), as well as parental/sibling relationships and broader family dynamics (Cun, 2022). Longitudinal data from five studies conducted in Bangladesh, Bhutan, Cambodia, Ethiopia, and Rwanda that examined the links between family stimulation and early developmental outcomes in low and middle-income countries indicate that **family play** provides vital opportunities for children to engage in reciprocal, playful, and educational interactions with caregivers that lead to predicted improvements in children’s numeracy, literacy, social-emotional, motor, and executive function skills (Cuartas et al., 2023).

Our review found that the quality of the home environment during early childhood is linked to positive learning and developmental outcomes (Davidson et al., 2024; Zoghi et al., 2019). Fenton, MacDonald and McFarland (2016), as well as Salminen et al. (2021), demonstrated how children’s home numeracy environment positively predicted children’s counting objects skill and number producing skill. Home enrichment activities such as the availability of learning and educational play resources, for example, puzzles, toys, games and family interactions also have an important role in shaping children’s development (Cun, 2022; Davidson et al., 2024) and propensity to learn (Gomes and Fleer, 2019). Bronfenbrenner’s (1979; 2005) bioecological systems theory is referenced in several studies as a theoretical framework for understanding how the microsystem of the home impacts on particular activities such as children’s play and self-regulation that can provide a protective or

conversely, risk factor which negatively impacts on children's stress levels and childhood experiences (Brown, Shokunbi and Garnett, 2024).

The studies included in the review shows play in the home is also facilitated by interactions between siblings. **Sibling relationships** have been shown to provide a unique context for the development of social and emotional understanding with siblings as children's common play partners (Cirelli et al., 2020; Cun, 2022; Danby et al., 2018) as well as teachers or guides supporting children's understanding of social interactions (Kale and Araptarli, 2021; Palacios et al., 2016). A study by Howe et al. (2016) examined sibling-directed play and teaching of mathematics between two- and six-year-olds in the informal home context. The researchers contend that siblings spend a significant amount of time playing together with a wide variety of toys and materials which can facilitate mathematical thinking and knowledge development (Howe et al., 2016). Similarly, a qualitative study that explored the nature of play and interactions between siblings from refugee backgrounds exemplifies the rich literacy practices that occur in the home between siblings as they constructed knowledge together and used educational resources collaboratively to help each other develop their literacy learning (Cun, 2022).

Evidence-gaps and future research:

- Children's play interactions in culturally diverse, naturally-occurring contexts within and outside the home.
- Dynamics which affect learning and development between children and siblings or other family members in the home context.
- The impact of sibling interactions and relationships in promoting the social and emotional wellbeing of children.

Theme 4: Parents as play partners help support children's learning, academic competence and well being

The studies reviewed generally acknowledge the important role of the family, and in particular parents, as a significant influence in supporting children's learning and development through play. Studies show how play interactions between parents and children are a central activity in many cultures, where parents make a significant contribution to children's conceptual learning through play and development and enjoyment (Devi, 2022; Ihmeideh, 2019; Izzo et. al., 2024). A qualitative study using video recordings of children's daily lives in the home and school with expatriate families in Malaysia found that an increase in the children's academic competence was associated with play-based learning in the family home (Adams and Fleer, 2016). The findings reinforce other studies in the review (O'Connor, Butler and Lynch, 2021; Yoo, 2024) which reveal how parents as **play partners** support children's focus on structured or semi-structured playful activities in the home that encourage early learning and which are aligned with pedagogical practices in the early childhood setting and school. A study of four Indian-Australian families in Victoria, Australia reveal the quality of interactions between children and their mothers as play participants in imaginative play at home (Devi, 2022). According to Devi (2022), by positioning themselves actively as play partners mother gained an insight into their child's perspectives and world and were better able to support and extend children's play. Research into families'

engagement in science museums show parent-child interactions through games and family group activities help children to co-construct meaning and shape their learning experiences (Harris and Winterbottom, 2018; Taylor and Kervin, 2022; Weisberg, Dunlap and Sobel, 2023). The literature also shows how technology might be effectively introduced into play contexts to elicit rich parental engagement with children during play (Kervin, 2016). These studies show parents using play as a pedagogical tool (Adams and Fleer, 2016) in a variety of social contexts including the family home to support children's learning and skills development, as well as social and emotional well-being.

As well as academic and cognitive development, the literature shows how playful interactions and negotiations between children and parents can also help to strengthen family traditions and values and children's social and emotional development. **Parental playfulness**, defined as a parent's use of imagination, creativity, humour and curiosity during parent-child interaction (Menashe-Grinberg and Atzaba-Poria, 2017, cited in Wu et al., 2024) is found to be is positively associated with children's levels of playfulness, which is known to promote development (Wu et al., 2024). Shared family play activities undertaken between parents and children have also shown to improve affection and acts as a **bonding and bridging medium** for the parent-child relationship (Izzo et al., 2024). The study by Izzo et al. (2024, p.31) revealed "happy moments of play between parents and children" as a key theme that emerged where playtime was a source of happiness for both children and parents, promoting greater social and emotional well-being for children and their families.

However, the review also showed that parent-child interaction patterns during play varies across diverse **cultural contexts** and is dependent on parental feelings of competence as play partners. A quasi-experimental study in USA that investigated parent competence and social participation in a community-based playgroup intervention programme for families with a child between eighteen months and five years showed that **parent competence** in facilitating intentional, purposeful play can inform a supportive and inclusive environment to foster children's social development and playfulness (Fabrizi and Hubbell, 2017).

Evidence-gaps and future research:

- The characteristics of effective parental involvement and play pedagogy in culturally diverse contexts.
- The impact of play and technology on child-parental interactions and play practices.
- The role and characteristics of parents (mother or father) as play partners in supporting children's social and emotional development.
- Parents' use of 'pedagogical tools' to support play and learning in the home.
- Frequency and types of play exhibited by parents when interacting with their children.

Theme 5: Intergenerational play within and outside the family can provide a rich context for supporting early learning, educational experiences and transmission of cultural practices.

Intergenerational play experiences between children and adults within and outside the family can provide a rich context for learning and development that is embedded within children's social and cultural milieu (Merculief et al., 2023). The reviewed literature showed

that children benefit from participating in shared play and socialisation with adults (Edwards et al., 2022; Peach, 2024), with pretend play, storytelling, object-based play, and physical play emerging as particularly impactful. For example, in Chinese families, “story-time serves as a play-based educational tool, fostering positive parent–child relationships and supporting child development” (Wang et al., 2024, p.1). Storytelling was used to transmit Confucian values, with parents using stories to “teach cultural values and foster emotional and social development” (Wang et al., 2024, p.14). A small-scale qualitative study conducted during the COVID-19 pandemic in Australia shows how play during the lockdown period involving diverse meaning-making between young children and grandparents allowed for valuable space and time for young children to learn about shared language and cultural traditions (Keary et al., 2024). Within the context of museums, play allowed children to “act out real-world scenarios in a way that they can control,” thereby promoting creativity and problem-solving (Taylor and Kervin, 2022, p.281) as well as spend quality time with their families and siblings (Harris and Winterbottom, 2018). Storytelling and dialogic reading were especially effective in supporting language, emotional, and social development. Izzo et al. (2024, p.18) found that children’s happiest moments often involved “affective interactions, play times, and moments of free time spent together” with parents. These emotionally rich interactions not only support early literacy and cognitive growth but also strengthen family bonds and intergenerational continuity. These examples highlight how culturally embedded play practices can serve as vehicles for both learning and intergenerational transmission of values.

Several studies which focused on intergenerational programmes outside the family context also showed mutual benefits for older adults, their families and the children, young people and other generations participating in the programme (Hernandez, Murray and Stanley, 2022; Peach, 2024). A qualitative case study in a residential aged-care setting in Australia using observation sessions and semi-structured interviews showed how older adults and children connect through play to form meaningful social relationships with young children, promoting community engagement and social capital development between children and residents. Older participants in the intergenerational programmes report they enjoyed the company of the children and watching them develop (Hernandez, Murray and Stanley, 2022). Likewise, in intergenerational programmes involving older adults with dementia, Peach (2024, p.10) found that “acknowledging that material aspects of the interaction can ‘make things happen’ powerfully conveyed the possibilities for intergenerational learning”. These findings underscore the role of responsive, inclusive adult facilitation in enriching children’s play.

Play interactions co-constructed with adults were consistently shown to enhance learning experiences, whether with parents, grandparents, or educators. In families with children with severe disabilities, O’Connor, Butler and Lynch (2021, p.701) emphasised the importance of “an empowering and empowered play partner” who engages in “doing-with” rather than “doing-to” the child, which “promotes successful play experiences”. Chambers et al. (2022) found grandparent care was a vital support for families living in areas of high deprivation in Scotland. Grandparents in the study valued outdoor and indoor play activities where their grandchildren could be physically active with grandparents who enabled access to cultural amenities such as visits to swimming pools, ‘soft play’ gyms, art galleries and social outings. Grandparent play interactions were considered “fun caregiving practices” (Chambers et al., 2022, p.9) where grandmothers in the study reported at length about the fun they

experienced when performing caregiving practices. Likewise, according to Duflos, Lane and Brussoni (2024), outdoor play was as beneficial for grandparents as it was for their grandchildren: grandparents shared positive emotions during outdoor play, which the authors posit could benefit the grandparent-grandchild relationship and build positive memories. Further, grandparents experienced a sense of freedom when playing outdoors with their grandchildren (Duflos, Lane and Brussoni, 2024).

Evidence-gaps and future research:

- The nature and frequency of intergenerational family practices within play in the home.
- The impact and outcomes of intergenerational programmes on children and adults involved.
- The role of intergenerational play in diverse cultural contexts.

Theme 6: Everyday loose parts play objects and materials can potentially facilitate children's physical and social activities, spatial skills and creativity.

Loose parts play (LPP) refers to children's play with moveable materials and equipment that typically occurs during child-led play in unstructured, non-formal contexts. Our review indicated that children's play with **toys** can positively impact their learning and socio-emotional outcomes. **Blocks and construction toys** such as Lego have frequently been cited as educational tools (Moon-Seo, Munsell and Kim, 2024) to promote scientific learning (Gomes and Fleer, 2019), as well as the development of mathematical skills (Fenton, MacDonald and McFarland, 2016; Howe et al., 2016), problem-solving skills (Devi, 2022) and spatial skills (Jirout and Newcombe, 2015). Compared to structured games with rules, loose parts toy play has been reported to encourage sibling teaching and interaction (Howe et al., 2016). The notion that toys contribute to children's socio-emotional development is further apparent in Moon-Seo, Munsell and Kim (2024), where mothers expressed that toys designed to encourage children's **imaginary play** such as **toy dolls, figurines and stuffed animals** helped children "learn how to relieve psychological conflict in a healthy way" (p.379).

Similar results linking **toy play** with positive learning and socio-emotional developmental outcomes were not only reported in low-resource settings (San, Myint and Oo, 2021), as well as for children with disabilities (O'Connor, Butler and Lynch, 2021). An included study in the review (Binns et al., 2022) suggested that the **size and amount of visual detail** on toys may have implications for supporting autistic children's social engagement patterns Specifically, smaller and more **complex and visually detailed toy designs** (e.g., action figures and small toy cars) were found to have greater potential in engaging children particularly those with autism to hold their focus, as opposed to larger gross motor toys (e.g., large yoga balls or a trampoline) (Binns et al., 2022). In O'Connor, Butler and Lynch (2021, p.698), parents of children with physical and intellectual abilities also highlighted the important role of toys that were "stimulating" but not "too technical" or "overly complicated" in their child's play. In other words, particularly for children with special needs, toys needed to

be fit-for purpose and adapted to fit the needs of the child. They had to be “ability-appropriate” and “age-appropriate” (O’Connor, Butler and Lynch, 2021, p.698).

Our review found that for children across age groups, play is often the dominant medium where they can use material and toy objects in their play to create new meaning in both real and imaginary situations (Gomes and Fleer, 2019; Palaiologou, Kewalramani and Dardanou, 2021). Everyday **found and manufactured loose part materials** are often **repurposed** by children during play to positively support early learning, physical and social activities, and creativity (Binns et al., 2022; Hashmi et al., 2022; Moon-Seo, Munsell and Kim, 2024). For example, a study by Bateman and Church (2017) using an ethno-methodological approach that observed children’s free play in a rural primary school in mid-Wales, shows how children’s free and unstructured play with selected objects such as an apple, sticker and coin were used as a way to initiate and co-construct interactions with their peers. They concluded that establishing and maintaining social relationships is fundamental in the everyday lives of children, and everyday objects are one of the many resources children exploit to establish relationships and social networks.

Relatedly, this review demonstrated that objects in children’s play are not simply independent props with obvious and explicit uses. Rather, toys can be thought of as **cultural artefacts** where children can take ownership, exchange meaning and create new learning and knowledge. Children’s use of toys as objects can help them to navigate and negotiate new social environments and situations (San, Myint and Oo, 2021). Cultural and environmental contexts also shaped the effectiveness of play and children’s use of play objects and materials. In-depth ethnographic studies of the Guji people in rural Ethiopia by Jirata and Kjorholt (2015) and Jirata (2019) showed how children utilised and created play objects from natural local materials available in their local environment, which supported their ability to sustain meaningful social interactions in their community. Children in the study were also observed collecting and **playing with natural materials** such as leaves, stems, stones or fruits, to enact their experiences of home and family life (Jirata, 2019; Jirata and Kjorholt, 2015). In Myanmar, San, Myint and Oo (2021, p.28) demonstrated how low-cost, handmade toys created with community involvement can significantly improve preschoolers’ social and emotional development: “The play program is crucial for preschool children to gain optimal development in their social and emotional development”. A mixed method study on a sample of 251 seven-year-olds that examined children’s engagement when playing with toy figures showed positive association with their engagement with the virtual world in a video game, potentially facilitating children’s learning and flexible thinking (Hashmi et al., 2022). The study underlines how children’s engagement in imagined and fictional worlds of their play supports their development.

Several studies in the review indicated **toy play** alongside games and other learning materials - particularly between parent and child - is a key part of the home learning environment, and one of the strongest predictors of children’s academic competencies during the later stages of childhood (Anderson, StGeorge and Roggman, 2019; Fagan, Cabrera and Iglesias, 2024; Merculief et al., 2023). An in-depth observational study focused on the quality of father–toddler interactions in a toy play setting revealed a wide range of play activities employed alongside loose part toy play including dramatic play, singing songs, dancing, reading (Anderson, StGeorge and Roggman, 2019). The study showed high-quality rough-and-tumble play was substantively associated with children’s prekindergarten social,

language, and cognitive outcomes, and lower child aggressive behaviour. In another study, **toy play** is shown to be linked to toddlers' and children's socioemotional development (Hoyne and Egan, 2024). While the majority of studies in the review showed promising evidence linking LPP to positive outcomes, the results are mixed in another study which suggest that LPP may not consistently lead to beneficial effects or may only do so under specific conditions. For example, a study using longitudinal survey data to examine the relationship between children's play with toy weapons and juvenile criminality showed insignificant effect sizes and concluded imaginative play with toy guns use in early childhood is "unlikely to be useful as a risk marker for later criminal behaviour" (Smith, Ferguson and Beaver, 2018, p.313). Another piece of research by Sando (2019) on outdoor environments and children's health found that play with loose parts supported children's well-being only when it occurred in outdoor nature play. These findings highlight further research is warranted on the wide-ranging determinants and effect of LPP for fostering children's development.

Evidence-gaps and future research:

- The types and use of loose parts play in supporting early learning and development, and how they differ across different populations such as parents and educators.
- The specific features of toy design and development that can be used to enhance the positive impact of play on children's learning and socio-emotional development.
- The associations between loose parts play and early development related to cognitive or academic, and social and emotional outcomes.
- The different ways in which children's use of toys as cultural artefacts to create new knowledge and meaning in a new or existing social environment.
- Adults' use of loose parts play in supporting children's learning, social and emotional interactions.
- Adults' beliefs, attitudes and practices in using loose parts play to support early learning and development.

Theme 7: Child-led, unstructured free play can facilitate independence and self-regulation

Play outside formal educational settings allows children space to choose and create their own playful activities, to navigate their social worlds, and autonomy to make independent decisions. There is evidence from the review demonstrating that development opportunities afforded by **child-led**, unstructured play activities offer a crucial context for the development of independence and emotional, behavioural self-regulation (Buldu and Buldu, 2023; Parrott and Cohen, 2020). Such unstructured play also promotes children's academic engagement (Parrott and Cohen, 2020), problem-solving (Devi, 2022) and well-being. Children's well-being is evidenced in a qualitative study by Buldu and Buldu (2023) based in Turkey involving 23 four- to six-year-olds exploring children's perceptions of play. The study revealed children's perceptions of their most favourite play times included activities that were child-initiated and external to the school environment, such as the games they played with friends and alone including pretend play, football or drawing (Buldu and Buldu, 2023. Nevertheless, it is important to note that the above does not necessarily apply to all children, and some children found unstructured play to be overwhelming and unfamiliar (McCormack et al., 2024).

Several studies in the review also recognise the benefits of free-play as part of a continuum alongside adult directed or scaffolded play. '**Free-play**' is characterised in the literature as primarily child-initiated and **intrinsically motivated** activities (Buldu and Buldu, 2023). These unstructured and free play activities manifest in different forms. For example, Veiga et al. (2017) found a positive relationship between unstructured **exercise play** and children's social competence. Similarly, Sando, Kleppe and Sandseter (2021) identified a positive relationship between free **risky play** and children's social involvement. Metaferia et al. (2020) established children's **pretend play** as significant predictors of emotional regulation. Hashmi et al. (2022) found that **toy play** that is free, open-ended and enables children to engage in the pretend and fictional worlds can foster language and social development, while another study based in Canada on loose parts and risky play conducted during the pandemic showed how play hubs in informal spaces using loose parts such as milk crates, car and kitchen items can facilitate child-initiated engagement in creativity and free play (McCormack et al., 2024). These examples emphasise the significant impact that free, child-led play has on development.

Likewise, free, unstructured play related to cultural practices and contexts has also been shown to be beneficial for children. The study by Jirata (2019) of the Guji people of Ethiopia shows how free play and the **freedom to play** facilitated children's active participation in multiple forms of traditional play activities and cultural practices in their neighbourhoods. In doing so, the children's participation in symbolic play illuminates how they learn about social values and roles in their cultural environment (Jirata, 2019). Similarly, the qualitative study by Kale and Araptarli (2021) of children in the nomadic Bajau Laut sea gipsy community found children's cultural learning integrated with their natural environment where they can move freely in the community and explore. Finally, a study by Merculief et al. (2023) on American Indian and Alaska Native children in the United States found that children's participation in their respective cultural games were related to increased executive function. The values associated with free play and the significance of learning through play vary across different cultures.

Evidence-gaps and Future research:

- The nature and impact of extended and unstructured free play activity in informal contexts.
- Ways in which children engage with free play and toys across different cultures and societies.
- Adults' perceptions of free and unstructured play and how this affects understanding of their role in facilitating children's learning and development.
- Educators' role in providing free play opportunities for children outside the curriculum and formal learning contexts.

4. Qualitative Research: Focus Groups

The focus group discussions were used to explore themes which arose from the review in greater depth, such as children's play with loose parts and participant experiences of intergenerational and informal play. Three online focus group discussions with five parents/caregivers and six play practitioners were carried out to gather qualitative data on

children's play in practice, as well as participants' perceptions and experiences of children's play. The sessions were an hour long, with a further shorter session focusing specifically on children's loose parts play.

Participants were recruited using convenience sampling, with contacts provided through the research team. Practitioners worked in a range of early years settings, and caregivers had children aged 3-8 years. The discussions were recorded and later thematically coded to find common themes related to the review's research questions.

4.1 Findings: Key Themes

Learning through play

"Everything is an engagement with the world around him, and he is learning from it"

***- Caregiver* A**

All participants across the parent and practitioner focus groups agreed that play is an invaluable activity for children; that as well as playing for enjoyment, children also develop important skills through their play which are social, emotional, physical and cognitive. Play was framed as an activity through which children engage with and try to understand the world around them: *"he is never not playing in a way, everything is an engagement with the world around him and he is learning from it"* (Caregiver A); a means of exploring, experimenting, construction and re-construction. Participants considered play to be a mostly unstructured activity, through which children are able to experiment and try things out: "*It really, really helps them grow... for my kid, ... he thinks that it's just playing, by the time he [is finished], he just tends to talk about the thing that he has made or he has learned, and [will say] "oh, I didn't know that I could make that thing!"* (Caregiver C). This kind of play was also perceived to be highly beneficial for children's social skills, language development, relationships with peers and siblings, and emotional wellbeing.

Role of the adult

"It's really important for adults not to interrupt and take over the play."

- Practitioner B

While play was broadly considered to be an activity chosen and directed by children, participants understood the involvement of adults to be potentially beneficial, especially for learning. Several practitioners in particular thought modelling imaginative and highly social forms of play was important, remarking that they had noticed children were less confident in accessing play independently and with sustained attention, and during home visits had observed increased informal screen use. Modelling notwithstanding, both groups were clear on the benefits of *non-interruption* by adults – that children need chances to develop their own play, "*being able to lead, have their own ideas, follow their ideas having that drive to find things out for themselves*" (Practitioner D).

Grandparents and other older family members such as aunts and uncles were perceived to play an important role in children's play, but this play may look different to that with parents – for example, it is less physical with older caregivers given physical constraints. Rather, play may be more sedentary (for example, playing board games, storytelling or book reading), or

be based around being involved in daily activities such as gardening, looking after animals and cooking together. Caregivers in particular saw great value in spending time with other family members, especially given time and work constraints placed on modern parents: "*[That time together] is something that they look forward to and they're happy to do it, and the kids also enjoy it because they learn,*" (Caregiver C).

Loose parts

"*When you have your imagination, a stick can be a spoon, can be a knife, can be whatever you want it to be.*" - Caregiver D

Both caregivers and practitioners commented on how much children enjoyed playing with loose part toys, which here were understood as found and natural materials – examples included collecting and playing with shells, leaves, sticks and stones. Children's loose parts play (LPP) was imaginative and creative, derived from the affordances of the materials and their ability and agency to control what the materials 'are' (for example, a stone becoming a 'phone'). Participants described this kind of play as necessarily open-ended, completely child-directed and scaffolded by the materials themselves. As one practitioner (C) put it: *"children create their own purpose from those materials... children can use them in countless ways"*. Practitioners also commented that while loose parts play supported children's independence, socio-emotional and physical development and problem-solving skills, children can be under-confident in being able to use them for their own purposes and appreciated guidance through collaborative play with adults: *"They say, 'what does it do? What can I do with it?' and I show them that we can use it to fit into whatever play they want"* (Practitioner B). Practitioners felt caregivers also needed guidance in using LPP methods and materials at home, and that the potential of LPP was sometimes undervalued. Caregivers themselves commented that their children enjoyed LPP, and that assembling and creating using loose parts gave children "*immense satisfaction"* - being able to "*put something together, and you've completed it.*" (Caregiver A).

5. Discussion

In this review, we aimed to generate and share knowledge on the existing evidence-base to promote better understanding of the benefits of play. We examined the evidence in relation to:

- The impact of play on supporting early learning and development, particularly social and emotional development.
- The kinds of play interactions occur in children's everyday informal, naturally-occurring contexts that support meaningful multi-/inter-generational interactions.
- The role and nature of children's engagement with play and play materials (i.e., manufactured or found-objects, small assembleable and loose part toys) in supporting early learning and development, particularly social and emotional development.

Our review has systematically identified and synthesised a vast body of research on a wide range of areas on the nature of play, child-adult play interactions, and explored the impact of play on child outcomes including learning outcomes as well as social and emotional development. Overall, the review's findings and qualitative research revealed **cross-cutting themes** which overwhelmingly demonstrate that play is a crucial part of early childhood and **foundation for children's learning and wellbeing**. The review delineates the variety of ways in which play offers a unique context for enabling supportive and rich learning experiences for young children.

These findings resonate with existing research that shows how play, including loose parts play, contribute to supporting children in developing new skills and competencies with potential impact on their social and emotional development (Lai et al., 2018). Studies from the last two decades indicate that play and playful learning have positive associations with children's learning and development including the opportunity for children to facilitate effective social and emotional dispositions, as well as a sense of self-identity and well-being (Baines and Blatchford, 2010). Pioneering theorists in the field of developmental psychology have espoused the role of play in enhancing children's learning and cognitive development (Bruner, 1972; Piaget, 1972; Vygotsky, 1978). The Effective Provision of Pre-School Education (EPPE) Project, the first major European longitudinal study of a national sample of 3,000 young children's development between the ages of 3 and 7 years, found that creating regular opportunities for children to play at home, in preschool settings or outside the home, were all associated with higher intellectual and social/behavioural scores (Sylva et al., 2004). The study further showed that children's cognitive outcomes appear to be directly related to the quantity and quality of the adult-child interactions, including teacher's interactions in extending children's thinking and child-initiated play.

Existing reviews in the literature presented similar findings. A systematic review on the impact of unstructured play interventions found considerable benefits consistent with supporting children's physical health, social interaction skills, and also wellbeing, especially during times of stress (Lee et al., 2020). Similarly, Cohen and Emmons' (2017) study on children's block play contends that a balanced approach between free play and adult guided play can enhance children's learning. The research asserts that "children need to be able to initiate their own learning and adults need to know when to intervene and pose questions and problems to support new skills" (Cohen and Emmons, 2017, p.969). A scoping review on play-based interventions to support social and communication particularly for children with autism aged two to eight years revealed a wide range of primary studies on play-based intervention and therapies that indicate social play skills as "the largest single type of outcome target" measured in 16.5% of the studies reviewed (Gibson, Pritchard and de Lemos, 2021, p.20). The evidence from these reviews aligns with our findings and support the increasing recognition that play is a crucial tool for supporting learning and development for young children with atypical as well as additional needs. This is particularly the case in the domains of self-regulation and social and emotional development (Toseeb et al., 2020; Weisberg, Hirsh-Pasek and Golinkoff, 2013; Whitebread et al., 2009).

Evidence from our review on effective play contexts for children's development and well-being is also supported by existing research which shows that **naturally-occurring environments** in the home and outdoors such as beaches, parks, playgrounds and gardens

present valuable opportunities for children to interact with a variety of found and repurposed objects and materials to experiment and discover new meaning to support cognitive development (Dankiw et al., 2020). The benefits of natural environments for play are evident for instance in the research on '***bush kinders***', a non-formal educational setting where educators actively encourage children to rely on what is available in nature to play without the use of conventional play equipment such as toys or balls. These 'bush kinders' were found to improve children's physical and mental well-being, as well as enable children to develop a sense of autonomy and self-identity (Speldewinde and Campbell, 2024; Tiplady and Menter, 2020; Christiansen et al., 2018). The availability of **natural materials** such as bark, sticks, and leaves fallen from trees have also been shown to facilitate child-led play (Gibson, Cornell and Gill, 2017). Similarly, **informal contexts** such as playgroups and community-based programmes have also been shown through the review to enhance learning outcomes and school readiness. This resonates with extant research that shows children who attend playgroups have shown increased social and emotional developmental outcomes and a better transition to school compared to those who do not (Sincovich et al., 2020).

Another key finding across the studies and also within our qualitative focus groups is that merely providing children with abundant toys and toy materials is insufficient to improve children's quality of play and development. Rather, it is the **quality interactions** between children and others such as their peers (Veiga et al., 2017), siblings (Howe et al., 2016; Cirelli et al., 2020), parents, grandparents (Keary et al., 2024) and educators (Adams and Fleer, 2016; O'Connor, Butler and Lynch, 2021; Parrott and Cohen, 2020) that are the significant dynamic in supporting early learning and development. Findings of the included study by Anderson, StGeorge and Roggman (2019) reinforced existing evidence (Baker et al., 2015; Malin, Cabrera and Rowe, 2014) showing the potential effect of father-child play in predicting child outcomes including children's socioemotional, language, and cognitive outcomes. This study is also corroborated by a systematic review of empirical studies on father-child play which contends that parent-child play interactions, especially in the first years of life during early childhood, are linked to more positive cognitive and socio-emotional outcomes for children (Amodia-Bidakowska, Laverty and Ramchandani, 2020). The review reported that fathers' play in the early years can positively contribute to children's social, emotional, and cognitive outcomes, where children are not just having fun but also building important skills of communication and collaboration. Our review therefore contributes to the existing evidence-base that adults' supportive interactions with children can facilitate playful learning and improve children's wellbeing.

A further key theme that emerged from both the review and qualitative research is the significance of **loose parts play** in fostering meaningful playful interactions between children and their peers, siblings and **intergenerational play** with parents, grandparents and other adults within and outside the family. The included studies show that loose parts play can contribute to children's development in terms of creativity, learning and enjoyment (McCormack et al., 2024). The review findings support extant evidence that **intergenerational play experiences** between children and adults within and outside the family provide a rich context for learning and development that is enmeshed within children's social and cultural lives (Curdt-Christiansen, Li and Chai, 2024; Reimer and Moreno, 2024).

Additionally, the findings reinforce existing research which shows that **children are drawn to loose parts play** as it allows them autonomy and self-direction over their own play, thereby espousing the importance and benefits of loose parts as central to the play ethos and children's development (Nicholson, 1971; Louv, 2010). Louv (2010) asserts that affording children's direct exposure to play activities and found objects in nature such as picking flowers, branches and leaves is essential for the physical and emotional health of children. This ties in well with the overarching idea that development opportunities afforded by child-led, unstructured play activities offers a crucial context for the development of independence and emotional, behavioural self-regulation (Cohen and Emmons, 2017; Hirsh-Pasek et al., 2008; Pellis and Pellis, 2007; Singer, Golinkoff and Hirsch-Pasek, 2006). Within loose parts play, the **types of toy** and **toy design** therefore play a significant role, positively contributing to children's learning and development. This is well-documented within our review as well as the existing literature (Cankaya, Martin and Haugen, 2025; Dag et al., 2021).

Overall, the evidence base from our study offers a broad and compelling picture of how playful experiences support children's development and learning, particularly in the early years of life. The study has raised important issues for early childhood education and society in general in demonstrating that play is a core component of a child's personal, social, and emotional development. However, there are also key gaps in our knowledge and understanding of the myriad ways in which play has a central role in lifelong learning for both children and adults, and the impact of cultural contexts on play practices and attitudes towards play. This is aligned with the notion that the extent to which play is valued is different across different cultures, with some cultures giving less value to children's play and less significance to the relation between children's play and learning (Gaskins, Haight and Lancy, 2007; Sikder and Fleer, 2017). For example, a scoping review on forager children's learning of social and gender norms showed that children learn **cultural practices** through play and a key feature among the studies reviewed is that respecting children's autonomy is valued by many foraging communities (Lew-Levy et al., 2017). Further research is thus needed to take into account the characteristics of play interactions and play pedagogy in culturally diverse contexts, capturing more varied ways of children engaging with play and toys across different cultures and societies.

6. Limitations

As with all research, there were invariably limitations to this study. Firstly, due to time constraints, the systematic review component was limited to academic journal articles published in English, with concomitant potential risk of publication bias (Winters and Weir, 2017). The review focused primarily on empirical studies and did not include grey literature such as reports published by charities, non-governmental organisations, non-profit organisations or policy documents. Second, the review included only articles on our target age group of children aged 3-8, excluding studies on children who were younger or older. Third, the final studies included varied considerably by the theoretical frameworks employed, sample population, nature of sample recruitment, and degree of rigour and detail in reporting. As such the samples in many of these studies are not representative of the whole population. Finally, given more time and resources, it may have been more robust to conduct a mixed methods synthesis, through which studies of similar designs were grouped and analysed using more fit-for-purpose synthesis methods.

7. Recommendations

The body of evidence presented here on the substantial benefits of play for children provides a clear imperative for stakeholders including educators, play practitioners, researchers, industry partners, and policy makers to foster more positive and playful interactions for and with children. There are considerable implications to inform future research, policy and practice:

Adults' role in play

- Adults encouraging different types of play through varied materials, objects, and technologies fosters creativity, exploration, and engagement and making available these readily available to children.
- Focusing on skills that support adults – particularly parents, caregivers and teachers - to facilitate play with children sensitively and respectfully will in their turn support children's early learning opportunities.
- Recognising the important role of parents, caregivers and other adults within and outside the family as potential play partners in supporting children's social and emotional development.
- Creating opportunities and facilitating intergenerational play activities which enhance social and familial cohesion to deepen social and familial bonds.
- Providing children with diverse play resources and engagement that foster positive play interactions with parents, grandparents and other non-familial adults.

Play environments

- Nature and natural environments are highly beneficial for providing rich play experiences. Recognizing the role of natural environments in enriching play experiences supports children's curiosity, engagement with loose parts, and appreciation of the outdoors.
- Providing play opportunities in informal settings like playgroups and community programmes can enable children to feel proud of their abilities, and creativity can build up their confidence and self-esteem, as well as contribute to their social and emotional well-being and resilience.
- Engaging children to participate in play opportunities in informal settings such as playgroups and community-based programmes has the potential of increasing social, emotional and cognitive developmental outcomes/growth, and can also be beneficial for parents and caregivers.

Loose parts play

- Introducing simple, found and manufactured objects and toys in everyday play can help facilitate children's social interactions, learning and creativity.
- Taking into consideration size and visual details in toy designs that have the potential to engage and encourage children in imaginary play, meaning-making and social interactions, especially for children with additional needs.
- Encouraging children to initiate and develop more flexible ways of repurposing and thinking about loose parts play can foster autonomy and self-confidence.

- Incorporating toys and loose parts play objects that children can engage with in nature and natural environments can facilitate spatial skills, problem-solving and creativity.
- Integrating toy design and development that can be adapted to support play interactions and early learning in a wide range of formal and informal contexts.
- Ensuring toy designs that are both age appropriate and ability appropriate, particularly for children with diverse or additional needs.
- Exploring the use of loose parts in a range of learning contexts across all cultures and curriculum areas to support learning and development.
- Encouraging children to transform everyday natural or found materials into meaningful objects can help them to extend their play and learning.

Evidence-Based Practice

- Advancing the empirical evidence-base on the monitoring and evaluation of play practices and ways in which play fosters children's resilience, resourcefulness, and wellbeing can inform further policy and practice.
- Continuing to build on the evidence-base on children's play in different contexts and cultural practices.

8. Conclusion

This study has systematically identified and synthesised a vast body of research in combination with primary qualitative evidence on a wide range of areas on the nature of play, child-adult play interactions, and explored the impact of play on children's learning and socio-emotional development and wellbeing. Across the many studies reviewed and through discussions with caregivers and educators, play was found to be a primary medium for fostering young children's positive social interactions that underpins the foundation of learning in childhood.

This study therefore contributes to this growing body of research evidence which shows that, through all forms of play, children develop essential skills that lay the foundations for their future learning and development. This includes but is not limited to skills crucial for developing creativity, resilience, executive function, independence, problem-solving and cultural understanding.

In many of the studies we looked at, play is described as a 'protective experience' that enables children to build resilience that can help them navigate and mitigate stressful or adverse experiences throughout their lives. As the world grows increasingly complex and challenging, a deep understanding of play and strategies for fostering playful learning is essential for preparing children to engage with wider society and to empower them to reach their fullest potential.

Reference list

Adams, M. and Fleer, M. (2016). ‘The relations between a 'push-down' and 'push-up' curriculum: A cultural-historical study of home-play pedagogy in the context of structured learning in international schools in Malaysia’, *Contemporary Issues in Early Childhood*, 17(3), pp.328-342. doi: 10.1177/1463949116660955.

Amodia-Bidakowska, A., Laverty, C. and Ramchandani, P.G. (2020). ‘Father-child play: A systematic review of its frequency, characteristics and potential impact on children’s development’, Developmental Review, 57, article number 100924. doi: 10.1016/j.dr.2020.100924.

Anderson, S., StGeorge, J. and Roggman, L.A. (2019). ‘Measuring the Quality of Early Father-Child Rough and Tumble Play: Tools for Practice and Research’, *Child & Youth Care Forum*, 48(6), pp.889-915. doi: 10.1007/s10566-019-09513-9.

Archbell, K.A., Coplan, R.J. and Rose-Krasnor, L. (2020). ‘What did your child do today? Describing young children's daily activities outside of school’, *Journal of Early Childhood Research*, 18(2), pp.189-199. doi: 10.1177/1476718X19898724.

Baines, Ed. and Blatchford, P. (2010). 'Children’s Games and Playground Activities in School and Their Role in Development', in Nathan, P. and Pellegrini, A.D. (eds) *The Oxford Handbook of the Development of Play.* Oxford: Oxford University Press, pp. 261–283. doi: 10.1093/oxfordhb/9780195393002.013.0020.

Baker, C. E., Vernon-Feagans, L. and the Family Life Project Investigators. (2015). ‘Fathers’ language input during shared book activities: Links to children’s kindergarten achievement’, *Journal of Applied Developmental Psychology, 36, pp.*53–59. doi: 10.1016/j.appdev.2014.11.009.

Bateman, A. and Church, A. (2017). ‘Children's use of objects in an early years playground’, *European Early Childhood Education Research Journal*, 25(1), pp.55-71. doi: 10.1080/1350293X.2016.1266221.

Binns, A.V., Casenhiser, D.M., Shanker S.G. and Cardy, J.O. (2022). ‘Autistic Preschoolers' Engagement and Language Use in Gross Motor versus Symbolic Play Settings’, *Autism & Developmental Language Impairments*, 7, pp.1-14. doi: 10.1177/23969415221115045.

Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge, Massachusetts: Harvard University Press.

Bronfenbrenner, U. (2005). *Making human beings human: Bioecological perspectives on human development*. Thousand Oaks, California: Sage Publications, Inc.

Brown, E.D., Shokunbi, F.X. and Garnett, M.L. (2024). ‘Playtime and bedtime relate to cortisol levels for children facing economic hardship’, *Family Relations*, 73(4), pp.2805-2822. doi: 10.1111/fare.13016.

Bruner, J.S. (1972). ‘Nature and uses of immaturity’, *American Psychologist, 27*(8), pp.687–708. doi: 10.1037/h0033144.

Buldu, E and Buldu, M. (2023). ‘Talking over Children's Drawings about Their Favourite Play Times: How Do Children Describe Their Play?’, *Early Child Development and Care*, 193(6), pp.810-823. doi: 10.1080/03004430.2023.2166501.

Cankaya, O., Martin, M. and Haugen, D. (2025). ‘The Relationship Between Children’s Indoor Loose Parts Play and Cognitive Development: A Systematic Review’, *Journal of Intelligence*, *13*(5), article number 52. doi: 10.3390/jintelligence13050052.

Chambers, S.A., Dobbie, F., Radley, A. and Rowa-Dewar, N. (2022). ‘Grandmothers' care practices in areas of high deprivation of Scotland: the potential for health promotion’, *Health Promotion International*, 37(2), article number daab104. doi: 10.1093/heapro/daab104.

Christiansen, A., Hannan, S., Anderson, K., Coxon, L. and Fargher, D. (2018). ‘Place-based nature kindergarten in Victoria, Australia: No tools, no toys, no art supplies’, *Journal of Outdoor and Environmental Education, 21*, pp.61–75. Doi: 10.1007/s42322-017-0001-6.

Cirelli, L.K., Peiris, R., Tavassoli, N., Recchia, H. and Ross, H. (2020). ‘It takes two to tango: Preschool siblings' musical play and prosociality in the home’, *Social Development*, 29(4), pp.964-975. doi: 10.1111/sode.12439.

Cohen, L.E. and Emmons, J. (2017). ‘Block play: spatial language with preschool and school-aged children’, *Early Child Development and Care*, 187(5-6), pp.967-977. doi: 10.1080/03004430.2016.1223064.

Creighton, G., Brussoni, M., Oliffe, J. and Olsen, L. (2015). ‘Fathers on Child's Play: Urban and Rural Canadian Perspectives’, *Men and Masculinities*, 18(5), pp.559-580. doi: 10.1177/1097184X14562610.

Cuartas, J., McCoy, D., Sánchez, J., Behrman, J., Cappa, C., Donati, G., Heymann, J., Lu, CL., et al. (2023). Family play, reading, and other stimulation and early childhood development in five low-and-middle-income countries. *Developmental Science*, article number e13404. doi: 10.1111/desc.13404.

Cun, A.J. (2022). ‘"You need to learn the spelling": Playing, teaching, and learning of trilingual siblings with refugee backgrounds’, *Journal of Early Childhood Literacy*, pp.109-132. doi: 10.1177/14687984221118985.

Curdt-Christiansen, X.L., Li, L. and Chai, S. (2024). ‘来来, 大家一起玩’ (C’mon, let’s play together): grassroots planning from a Bourdieusian perspective’, *Journal of Multilingual and Multicultural Development*, pp.1–15. doi: 10.1080/01434632.2024.2321392.

Dag, N.C., Turkkan, E., Kacar, A. and Dag, H. (2021). ‘Children's only profession: Playing with toys’, *Northern clinics of Istanbul*, *8*(4), pp.414–420. doi: 10.14744/nci.2020.48243

Danby, S., Evaldsson, A.C., Melander, H. and Aarsand, P. (2018). ‘Situated collaboration and problem solving in young children's digital gameplay’, *British Journal of Educational Technology*, 49(5), pp.959-972. doi: 10.1111/bjet.12636.

Dankiw, K.A., Tsiros, M.D., Baldock, K.L. and Kumar, S. (2020). ‘The impacts of unstructured nature play on health in early childhood development: A systematic review’, *PLoS ONE*, 15(2), article number e0229006. doi:10.1371/journal.pone.0229006.

Davidson, C., Caes, L., Shing, Y.L., McKay, C., Rafetseder, E. and Wijeakumar, S. (2024). ‘Home Enrichment Is Associated with Visual Working Memory Function in Preschoolers’, *Mind Brain and Education*, 18(1), pp.72-84. doi: 10.1111/mbe.12383.

Dawes, A., Biersteker, L., Snelling, M., Horler, J. and Girdwood, E. (2023). ‘To What Extent Can Community-Based Playgroup Programmes Targeting Low-Income Children Improve Learning Outcomes Prior to Entering the Reception Year in South Africa? A Quasi-Experimental Field Study’, *Early Education and Development*, 34(1), pp.256-273. doi: 10.1080/10409289.2021.2005748.

Devi, A. (2022). ‘Understanding play participants' perspectives in play-based learning: a cultural-historical analysis in a home context’, *Pedagogies*, 17(2), pp.139-161. doi: 10.1080/1554480X.2020.1826949

Duflos, M., Lane, J. and Brussoni, M. (2024). ‘Motivations and challenges for grandparent-grandchild outdoor play in early childhood: Perception of Canadian grandparents’, *Family Relations*, 73(2), pp.1107-1120. doi: 10.1111/fare.12952.

Eberle, S.G. (2014). ‘The Elements of Play: Toward a Philosophy and a Definition of Play’, Journal of Play, 6(2), pp.214-233. Available at: https://www.museumofplay.org/app/uploads/2022/01/6-2-article-elements-of-play.pdf

Edwards, S., McLean, K., Bartlett, J., Nolan, A., Evangelou, M., Henderson, M., Skouteris, H. and Tarasuik, J. (2022). ‘School playgroups: Which features of provision matter?’, *British Educational Research Journal*, 48(3), pp.598-616. doi: 10.1002/berj.3785.

Fabrizi, S. and Hubbell, K. (2017). ‘The role of occupational therapy in promoting playfulness, parent competence, and social participation in early childhood playgroups: A pretest posttest design’, *Journal of Occupational Therapy Schools and Early Intervention*, 10(4), pp.346-365. doi: 10.1080/19411243.2017.1359133.

Fagan, J., Cabrera, N. and Iglesias, A. (2024). ‘Trajectories of Low-income Mothers' and Fathers' Engagement in Learning Activities and Child Academic Skills’, *Journal of Child and Family Studies*, 33(3), pp.805-821. doi: 10.1007/s10826-023-02682-1.

Fenton, A., MacDonald, A. and McFarland, L. (2016). ‘A Strengths Approach to supporting early mathematics learning in family contexts’, *Australasian Journal of Early Childhood*, 41(1), pp.45-53. doi: 10.1177/183693911604100107.

Gaskins, S., Haight, W. and Lancy, D.F. (2007). ‘The cultural construction of play’, in Göncü, A. and Gaskins, S. (eds.) *Play and development: Evolutionary, sociocultural and functional perspectives*. Psychology Press, Lawrence Erlbaum Associates, pp.179-202.

Ghandour, R.M., Hirai, A.H., Moore, K.A., Paschall, K., LaForett, D.R., Reddington, E. and Kogan, M.D. (2024). ‘School Readiness Among United States Children: Results From the 2022 National Survey of Children's Health’, *Academic Pediatrics*, 24(7), pp.1049-1061. doi: 10.1016/j.acap.2024.02.013.

Gibson, J.L., Cornell, M. and Gill, T. (2017). ‘A systematic review of research into the impact of loose parts play on children’s cognitive, social and emotional development’, *School Mental Health*, 9(4), pp.295-309. doi: 10.1007/s12310-017-9220-9.

Gibson, J.L., Pritchard, E. and de Lemos, C. (2021). ‘Play-based interventions to support social and communication development in autistic children aged 2–8 years: A scoping review’, *Autism & Developmental Language Impairments*, 6, pp.1-30. doi: 10.1177/23969415211015840.

Giraudeau, C. and Bailly, N. (2019). ‘Intergenerational programs: What can school-age children and older people expect from them? A systematic review’, *European Journal of Ageing*, *16*(3), pp.363–376. doi: 10.1007/s10433-018-00497-4.

Gomes, J. and Fleer, M. (2019). ‘The Development of a Scientific Motive: How Preschool Science and Home Play Reciprocally Contribute to Science Learning’, *Research in Science Education*, 49(2), pp.613-634. doi: 10.1007/s11165-017-9631-5.

Gough, D. (2007) ‘Weight of Evidence: a framework for the appraisal of the quality and relevance of evidence’, *Research Papers in Education*, 22(2), pp. 213–228. doi: 10.1080/02671520701296189.

Gull, C., Goldstein, S.L. and Rosengarten, T. (2020). ‘Fathers' Roles, Attitudes, and Practices Regarding Tree Climbing’, *International Journal of Early Childhood Environmental Education*, 7(2), pp.51-63. Available at: https://files.eric.ed.gov/fulltext/EJ1280474.pdf

Harris, E. and Winterbottom, M. (2018). ''Why do parrots talk?' co-investigation as a model for promoting family learning through conversation in a natural history gallery’, *Journal of Biological Education*, 52(1), pp.89-100. doi: 10.1080/00219266.2017.1408934.

Hashmi, S., Paine, A.L., Johansen, M.K., Robinson, C. and Hay, D.F. (2022). ‘Engaged in play: Seven-year-olds? engagement with the play frame when playing with toy figures and their engagement with the fictional world of a video game’, *Cognitive Development*, 63, article number 101230. doi: 10.1016/j.cogdev.2022.101230.

Hassinger-Das, B., Toub, T.S., Zosh, J.M., Michnick, J., Golinkoff, R. and Hirsh-Pasek, K. (2017). ‘More than just fun: a place for games in playful learning/Más que diversión: el lugar de los juegos reglados en el aprendizaje lúdico’, *Journal for the Study of Education and Development*, 40(2), pp.191–218. doi: 10.1080/02103702.2017.1292684.

Hernandez, G.B.R., Murray, C.M. and Stanley, M. (2022). ‘An intergenerational playgroup in an Australian residential aged-care setting: A qualitative case study’, *Health & Social Care in the Community*, 30(2), pp.488-497. doi: 10.1111/hsc.13149.

Hirsh-Pasek, K., Golinkoff, R.M., Berk, L.E. and Singer, D.G. (2008). *A mandate for playful learning in preschool: Applying the scientific evidence*. New York, NY: Oxford University Press.

Holmes, C.L. (2009). ‘An intergenerational program with benefits’, *Early Childhood Education Journal*, *37*(2), pp.113–119. doi: 10.1007/s10643-009-0329-9.

Howe, N., Adrien, E. Porta, S.D., Peccia, S., Recchia, H., Osana, H.P. and Ross, H. (2016). ''Infinity Means it Goes on Forever': Siblings' Informal Teaching of Mathematics’, *Infant and Child Development*, 25(2), pp.137-157. doi: 10.1002/icd.1928.

Hoyne, C. and Egan, S.M. (2024). ‘Exploring the role of home play and learning activities in socioemotional development at 36-months: Findings from a large birth cohort study’, *Infant Behaviour & Development*, 77, article number 102000. doi: 10.1016/j.infbeh.2024.102000.

Ihmeideh, F. (2019). ‘Getting Parents Involved in Children's Play: Qatari Parents' Perceptions of and Engagement with Their Children's Play’, *Education 3-13*, 47(1), pp.47-63. doi: 10.1080/03004279.2017.1399152.

Izzo, F., Saija, E., Pallini, S., Ioverno, S., Baiocco, R. and Pistella, J. (2024). ‘Happy Moments between Children and Their Parents: A Multi-method and Multi-informant Perspective’, *Journal of Happiness Studies*, 25(3), pp. 1-28. Doi: 10.1007/s10902-024-00735-w.

Jirata, T.J. (2019). ‘The cultural spaces of young children: Care, play and learning patterns in early childhood among the Guji people of Ethiopia’, *Global Studies of Childhood*, 9(1), pp.42-55. doi: 10.1177/2043610618817317.

Jirata, T.J. and Kjorholt, A.T. (2015). ‘The place of children among the Guji of southern Ethiopia: school, work and play’, *Children’s Geographies*, 13(2), pp.226-239. doi: 10.1080/14733285.2013.829661.

Jirout, J.J. and Newcombe, N.S. (2015). ‘Building blocks for developing spatial skills: Evidence from a large, representative U.S. sample’, *Psychological Science*, 26(3), pp.302-310. doi: 10.1177/0956797614563338.

Kale, M. and Araptarli, H.C. (2021). ‘Description of children's daily life participation processes in the sea gypsies community: visual narrative technique’, *Early Child Development and Care*, 191(9), pp.1361-1375. doi: 10.1080/03004430.2019.1703112.

Keary, A., Garvis, S., Slaughter, Y. and Walsh, L. (2024). ‘Young Children's Play and the Role of Grandparents as Play Partners during the COVID-19 Pandemic’, *Education Sciences*, 14(7), article number 771. doi: 10.3390/educsci14070771.

Kervin, L. (2016). ‘Powerful and playful literacy learning with digital technologies’, *Australian Journal of Language and Literacy*, 39(1), pp.64-73. doi: 10.1007/BF03651907.

Lacey, A.J., Banerjee, R.A. and Lester, K.J. (2023). ‘"Are They Going to Play Nicely?" Parents' Evaluations of Young Children's Play Dates’, *Journal of Child and Family Studies*, 32(8), pp.2240-2253. doi: 10.1007/s10826-022-02499-4.

Lai, N.K., Ang, T.F., Por, L.Y. and Liew, C.S. (2018). ‘The impact of play on child development - a literature review’, *European Early Childhood Education Research Journal*, 26(5), pp.625–643. doi: 10.1080/1350293X.2018.1522479.

Lee, R.L.T., Lane, S., Brown, G., Leung, C., Kwok, S.W.H. and Chan, S.W.C. (2020). ‘Systematic review of the impact of unstructured play interventions to improve young children's physical, social, and emotional wellbeing’, *Nursing & Health Sciences,* 22(2), pp.184-196. doi: 10.1111/nhs.12732.

Lew-Levy, S., Lavi, N., Reckin, R., Cristóbal-Azkarate, J. and Ellis-Davies, K. (2017). ‘How Do Hunter-Gatherer Children Learn Social and Gender Norms? A Meta-Ethnographic Review’, *Cross-Cultural Research*, *52*(2), pp.213-255. doi: 10.1177/1069397117723552.

Louv, R. (2010). *Last child in the woods: Saving our Children from Nature-Deficit Disorder*. Atlantic Books.

Malin, J.L., Cabrera, N.J. and Rowe, M. L. (2014). ‘Low-income minority mothers’ and fathers’ reading and children’s interest: Longitudinal contributions to children’s receptive vocabulary skills’, *Early Childhood Research Quarterly, 29, pp.*425–432. doi: 10.1016/j.ecresq.2014.04.010.

McCormack, G.R., Naish, C., Petersen, J. and Doyle-Baker, P.K. (2024). ‘Loose parts and risky play: playworker perspectives on facilitating a community-based intervention in local parks during the COVID-19 pandemic’, *Journal of Adventure Education and Outdoor Learning*, 24(4), pp.765-779. doi: 10.1080/14729679.2023.2254863.

Merculief, A., Lipscomb, S., McClelland, M.M., Geldhof, G.J. and Tsethlikai, M. (2023). ‘Nurturing resilience in American Indian/Alaska Native preschool children: the role of cultural socialization, executive function, and neighborhood risk’, *Frontiers in Psychology*, 14, article number 1279336. doi: 10.3389/fpsyg.2023.1279336.

Metaferia, B.K., Futo, J., Drew, R. and Takacs, Z.K. (2020). ‘Parents' Beliefs About Play and the Purpose of Preschool Education, Preschoolers' Home Activity and Executive Functions’, *Frontiers in Psychology*, 11, article number 1104. doi: 10.3389/fpsyg.2020.01104.

Moon-Seo, S.K., Munsell, S.E. and Kim, N. (2024). ‘Mothers' and Fathers' Perceptions of Children's Play’, *Early Childhood Education Journal*, 52(2), pp.373-385. doi: 10.1007/s10643-022-01439-7.

Nicholson, S. (1971). ‘How Not To Cheat Children: The Theory of Loose Parts’, *Landscape Architecture*, 62, pp.30-34. Available at: http://media.kaboom.org/docs/documents/pdf/ip/Imagination-Playground-Theory-of-Loose-Parts-Simon-Nicholson.pdf

Noblit, G.W. and Hare, R.D. (1988). ‘Meta-ethnography: synthesizing qualitative studies’. Newbury Park: Sage Publications.

O'Connor, D., Butler, A. and Lynch, H. (2021). ‘Partners in play: Exploring 'playing with' children living with severe physical and intellectual disabilities’, *British Journal of Occupational Therapy*, 84(11), pp.694-702. Doi: 10.1177/0308022620967293.

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., et al. (2021). ‘The PRISMA 2020 statement: an updated guideline for reporting systematic reviews’, *BMJ*, 29(372), article number n71. doi: 10.1136/bmj.n71.

Palacios, N., Kibler, A.K., Yoder, M., Baird, A.S. and Bergey, R. (2016). ‘Older Sibling Support of Younger Siblings' Socio-Emotional Development: A Multiple-Case Study of Second-Generation Mexican and Honduran Children's Initiative and Co-Construction', *Hispanic Journal of Behavioral Sciences*, 38(3), pp.395-419. doi: 10.1177/0739986316658865.

Palaiologou, I., Kewalramani, S. and Dardanou, M. (2021). ‘Make-believe play with the Internet of Toys: A case for multimodal playscapes’, *British Journal of Educational Technology*, 52(6), pp.2100-2117. doi: 10.1111/bjet.13110.

Parrott, H.M. and Cohen, L.E. (2020). ‘Advocating for play: The benefits of unstructured play in public schools’, *The School Community Journal*, 30(2), pp.229-254. Available at: https://www.adi.org/journal/2020fw/ParrottCohenFW2020.pdf

Peach, L. (2024). ‘Missing Middles: Toward a Feminist New Materialist Approach for Understanding Intergenerational Inter/Intra-Action’, *Journal of Intergenerational Relationships*, 22(1), pp.1-16. doi: 10.1080/15350770.2022.2126914.

Pellis, S.M. and Pellis, V.C. (2007). ‘Rough-and-tumble play and the development of the social brain’, *Current Directions in Psychological in Psychological Science’*, 16(2), pp.95–98. doi: 10.1111/j.1467-8721.2007.00483.x.

Piaget, J. (1972). *Play, Dreams and Imitation in Childhood*. London: Routledge and Kegan Paul.

Pyle, A. and Danniels, E. (2017). ‘A Continuum of Play-Based Learning: The Role of the Teacher in Play-Based Pedagogy and the Fear of Hijacking Play’, *Early Education and Development*, 28(3), pp. 274–289. doi: 10.1080/10409289.2016.1220771.

Raising the Nation Play Commission. (2025). *State of Play*. Available at: https://www.centreforyounglives.org.uk/news-centre/inquiry-report-calls-on-the-government-to-restore-school-playtime-amid-warning-that-play-is-being-squeezed-out-of-childrens-lives

Reimer, P.N. and Moreno, C. (2024). ‘Invitations to play: designing for family engagement through STEAM exhibits in community settings’, *Frontiers in Computer Science*, 6, article number 1387202. doi: 10.3389/fcomp.2024.1387202.

Salminen, J., Khanolainen, D., Koponen, T., Torppa, M. and Lerkkanen, M.K. (2021). ‘Development of Numeracy and Literacy Skills in Early Childhood-A Longitudinal Study on the Roles of Home Environment and Familial Risk for Reading and Math Difficulties’, *Frontiers in Education*, 6, article number 725337. doi: 10.3389/feduc.2021.725337.

San, N.M.H., Myint, A.A. and Oo, C.Z. (2021). ‘Using Play to Improve the Social and Emotional Development of Preschool Children’, *Southeast Asia Early Childhood Journal*, 10(2), pp.16-35. Available at: https://files.eric.ed.gov/fulltext/EJ1327445.pdf

Sando, O.J. (2019). ‘The outdoor environment and children's health: A multilevel approach’, *International Journal of Play*, 8(1), pp.39-52. doi: 10.1080/21594937.2019.1580336.

Sando, O.J., Kleppe, R. and Sandseter, E.B.H. (2021). ‘Risky Play and Children's Well-Being, Involvement and Physical Activity’, *Child Indicators Research*, 14(4), pp.1435-1451. doi: 10.1007/s12187-021-09804-5.

Schmitt, K.L., Hurwitz, L.B., Duel, L.S. and Linebarger, D.L.N. (2018). ‘Learning through play: The impact of web-based games on early literacy development’, *Computers in Human Behaviour*, 81, pp.378-389. doi: 10.1016/j.chb.2017.12.036.

Sikder, S. and Fleer, M. (2017). ‘The relations between ideal and real forms of small science: Conscious collaboration among parents and infants-toddlers', *Cultural studies of science education, 13*, pp.865-888. doi: 10.1007/s11422-018-9869-x.

Sincovich, A., Gregory, T., Harman-Smith, Y. and Brinkman, S.A. (2020). ‘Exploring associations between playgroup attendance and early childhood development at school entry in Australia: A cross-sectional population-level study’, *American Educational Research Journal*, *57*(2), pp.475-503. doi: 10.3102/0002831219854369.

Singer, D.G., Golinkoff, R.M. and Hirsch-Pasek, K. (eds.). (2006). *Play = learning: How play motivates and enhances children's cognitive and social-emotional growth*. USA: Oxford University Press.

Smith, S., Ferguson, C.J. and Beaver, K.M. (2018). 'Learning to blast a way into crime, or just good clean fun? Examining aggressive play with toy weapons and its relation with crime', *Criminal Behaviour and Mental Health*, 28(4), pp.313-323. doi: 10.1002/cbm.2070.

Speldewinde, C. and Campbell, C. (2024). 'Building a Better Wall: Assessing Children's Design Technology Learning in Nature-Based Early Childhood Education', Canadian Journal of Science, Mathematics and Technology Education, 24, pp.39–56. doi: 10.1007/s42330-024-00320-6.

Sylva, K., Melhuish, E., Sammons, P., Blatchford, I.S. and Taggart, B. (2004). *The Effective Provision of Pre-School Education [EPPE] Project*. Available at: https://dera.ioe.ac.uk/id/eprint/18189/2/SSU-SF-2004-01.pdf

Taylor, E.K. and Kervin, L. (2022). 'Parent/Caregiver Perspectives on Children's Play and Learning at a Children's Museum: A Qualitative Descriptive Study', *Journal of Museum Education*, 47(2), pp.275-285. doi: 10.1080/10598650.2021.2023312.

Thomas, J. and Harden, A. (2008). 'Methods for the thematic synthesis of qualitative research in systematic reviews', *BMC Med Research Methodology,* 8, article number 45. doi: 10.1186/1471-2288-8-45.

Tiplady, L.S.E. and Menter, H. (2020). 'Forest School for wellbeing: an environment in which young people can 'take what they need'', *Journal of Adventure Education & Outdoor Learning*, 21(2), pp.99-114. doi: 10.1080/14729679.2020.1730206.

Toseeb, U., Gibson, J.L., Newbury, D.F., Orlik, W., Durkin, K., Pickles, A. and Conti-Ramsden, G. (2020). 'Play and prosociality are associated with fewer externalizing problems in children with developmental language disorder: The role of early language and communication environment', *International Journal of Language & Communication Disorders*, 55(4), pp.583-602. doi: 10.1111/1460-6984.12541.

United Nations. (1989). *Convention on the Rights of the Child*. Retrieved 10th June 2025 from http://www.ohchr.org/Documents/ProfessionalInterest/crc.pdf

Veiga, G., de Leng, W., Cachucho, R., Ketelaar, L., Kok, J.N., Knobbe, A., Neto, C. and Rieffe, C. (2017). 'Social Competence at the Playground: Preschoolers during Recess', *Infant and Child Development*, 26(1), article number e1957. doi: 10.1002/icd.1957.

Vygotsky, L.S. (1978). *Mind in Society: Development of Higher Psychological Processes.* Edited by Cole M., Jolm-Steiner, V., Scribner, S. and Souberman, E. Harvard University Press. Available at: https://doi.org/10.2307/j.ctvjf9vz4

Wang, X.X., Lam, C.B., Ye, P.Z. and Qiao, T.Q. (2024). 'A visual ethnography of parent-child interactions during 'story-time' in Chinese family settings', *European Early Childhood Education Research Journal*, pp.1-19. doi: 10.1080/1350293X.2024.2408603.

Weisberg, D.S., Dunlap, L.C. and Sobel, D.M. (2023). ‘Dinos and GoPros: Children's exploratory behaviors in a museum and their reflections on their learning’, *Frontiers in Psychology*, 14, pp.1-11. doi: 10.3389/fpsyg.2023.1110612.

Weisberg, D.S., Hirsh-Pasek, K. and Golinkoff, R.M. (2013). ‘Guided play: Where curricular goals meet a playful pedagogy’, *Mind, Brain and Education, 7*(2), pp.104–112. doi: 10.1111/mbe.12015.

Whitebread, D., Coltman, P., Jameson, H. and Lander, R. (2009). ‘Play, cognition and self-regulation: What exactly are children learning when they learn through play?’, *Educational and Child Psychology*, 26(2), pp.40–52. doi: 10.53841/bpsecp.2009.26.2.40.

Williams, K.E., Berthelsen, D., Viviani, M. and Nicholson, J.M. (2017). ‘Participation of Australian Aboriginal and Torres Strait Islander families in a parent support programme: longitudinal associations between playgroup attendance and child, parent and community outcomes’, *Child Care Health and Development*, 43(3), pp.441-450. doi: 10.1111/cch.12417.

Winters, M. and Weir, A. (2017). ‘Grey matters; on the importance of publication bias in systematic reviews’, *British Journal of Sports Medicine,* 51(6), pp.488-489. doi: 10.1136/bjsports-2016-096679.

Wu, A., Tian, Y., Chen, S. and Cui, L. (2024). ‘Do Playful Parents Raise Playful Children? A Mixed Methods Study to Explore the Impact of Parental Playfulness on Children's Playfulness’, *Early Education and Development*, 35(2), pp.283-306. doi: 10.1080/10409289.2022.2148072.

Wutich, A., Beresford, M., SturtzSreetharan, C., Brewis, A., Trainer, S. and Hardin, J. (2021). ‘Metatheme Analysis: A Qualitative Method for Cross-Cultural Research’, *International Journal of Qualitative Methods*, *20*. doi: 10.1177/16094069211019907.

Yoo, J. (2024). ‘Art Play with Daddy: Father-Child Play with Art Materials at Home’, *Early Childhood Education Journal*, 52(1), pp.101-112. doi: 10.1007/s10643-022-01411-5.

Zhu, W.J., Luo, X., Werneck, A.O., Pindus, D., Kramer, L., Kramer, A.F., Hillman, C.H., Herold, F., et al. (2024). ‘Nature and success: Outdoor play is linked to school readiness’, *Complementary Therapies in Clinical Practice*, 57, article number 101895. doi: 10.1016/j.ctcp.2024.101895.

Zoghi, A., Gabbard, C., Shojaei, M. and Shahshahani, S. (2019). ‘The Impact of Home Motor Affordances on Motor, Cognitive and Social Development of Young Children’, *Iranian Journal of Child Neurology*, 13(2), pp.61-69. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC6451863/

Appendix

Appendix 1 Search Strings and Results

Source	Search string	No. of records
British Education Index and ERIC (search conducted together on the same platform, EBSCO)	child* OR children OR kid* OR toddler* OR infant* OR preschooler* AND play OR play interaction* OR play materials OR play affordance* OR play engagement OR toy* OR small assembleable toy* OR loose part toy* OR loose parts play OR playful learning OR manufactured object* OR found object* OR play-based approach* OR play based pedagog* OR play pedagog* OR play learning OR early years play OR early childhood education play OR creative play OR artful play OR imaginative play OR pretend play OR socio-dramatic play OR role play OR identity play OR outdoor play OR free play OR unstructured play OR non-structured play AND informal setting* OR non-formal setting* OR home OR community OR everyday life OR outside of school OR early childhood OR early years OR learning environment OR preschool OR kindergarten AND learning outcome* OR learning experience* OR early learning OR (early learning and development) OR play-based learning OR play based learning OR (social and emotional learning) OR SEL OR positive impact on learning OR psychosocial learning OR developmental outcome* OR (social and emotional development) OR (well-being or wellbeing or well being) OR skill development OR skill building OR cognitive development OR psychosocial development OR intergenerational interaction* OR multigenerational interaction* OR intergenerational relationship* OR multigenerational relationship* OR interaction* with grandparent* OR interaction* with parent* OR interaction* with family OR interaction* with sibling* OR interaction* with peer* OR interaction* with brother* OR interaction* with sister* OR interaction* with other children OR engagement with grandparent* OR engagement with parent* OR engagement with family OR engagement with sibling* OR engagement with peer* OR engagement with brother* OR engagement with sister* OR engagement with other children OR familial interaction* OR familial engagement **Limiters** - Publication Date: 20150101-20251231 **Narrow by Language:** - english	1869

SCOPUS	(child* OR children OR kid* OR toddler* OR infant* OR preschooler*) AND (play OR play AND interaction* OR play AND materials OR play AND affordance* OR play AND engagement OR toy* OR loose AND part AND toy* OR loose AND parts AND play OR playful AND learning OR manufactured AND object* OR found AND object* OR play-based AND approach* OR play AND based AND pedagog* OR play AND pedagog* OR play AND learning OR early AND years AND play OR early AND childhood AND education AND play OR creative AND play OR artful AND play OR imaginative AND play OR pretend AND play OR socio-dramatic AND play OR role AND play OR identity AND play OR outdoor AND play OR free AND play OR unstructured AND play OR non-structured AND play) AND (informal AND setting* OR non-formal AND setting* OR home OR community OR everyday AND life OR outside AND of AND school OR early AND childhood OR early AND years OR learning AND environment OR preschool OR kindergarten) AND (learning AND outcome* OR learning AND experience* OR early AND learning OR early AND learning AND development OR play-based AND learning OR play AND based AND learning OR social AND emotional AND learning OR sel OR positive AND impact AND on AND learning OR psychosocial AND learning) OR (developmental AND outcome* OR social AND emotional AND development OR well-being OR wellbeing OR well AND being AND skill AND development OR skill AND building OR cognitive AND development OR psychosocial AND development) OR (intergenerational AND interaction* OR multigenerational AND interaction* OR intergenerational AND relationship* OR multigenerational AND relationship* OR interaction* AND with AND grandparent* OR interaction* AND with AND parent* OR interaction* AND with AND family OR interaction* AND with AND sibling* OR interaction* AND with AND peer* OR interaction* AND with AND brother* OR interaction* AND with AND sister* OR interaction* AND with AND other AND children OR engagement AND with AND grandparent* OR engagement AND with AND parent* OR engagement AND with AND family OR engagement AND with AND sibling* OR engagement AND with AND peer* OR engagement AND with AND brother* OR engagement AND with AND sister* OR engagement AND with AND other AND children OR familial AND interaction* OR familial AND engagement) AND PUBYEAR > 2014 AND PUBYEAR < 2025 Filter: English language only	80
Web of Science	(child* OR children OR kid* OR toddler* OR infant* OR preschooler*) AND (play OR play interaction* OR play materials OR play affordance* OR play engagement OR toy* OR small assembleable toy* OR loose part toy* OR loose parts play OR playful learning OR manufactured object* OR found object*) AND	6331

	(informal setting* OR non-formal setting* OR home OR community OR everyday life OR outside of school) AND (learning outcome* OR learning experience* OR early learning OR play-based learning OR play based learning OR social and emotional learning OR SEL OR positive impact on learning psychosocial learning) OR (developmental outcome* OR social and emotional development OR well-being OR wellbeing OR well being skill development OR skill building OR cognitive development OR psychosocial development) OR (intergenerational interaction* OR multigenerational interaction* OR intergenerational relationship* OR multigenerational relationship*) Limit: 2015-current Language: only English language articles	
PsycINFO	child* or children or kid* or toddler* or infant* or preschooler* AND play or play interaction* or play materials or play affordance* or play engagement or toy* or small assembleable toy* or loose part toy* or loose parts play or playful learning or manufactured object* or found object* or play-based approach* or play based pedagog* or play pedagog* or play learning early years play or early childhood education play or creative play or artful play or imaginative play or pretend play or socio-dramatic play or role play or identity play or outdoor play or free play or unstructured play or non-structured play AND informal setting* or non-formal setting* or home or community or everyday life or outside of school or early childhood or early years or learning environment or preschool or kindergarten AND learning outcome* or learning experience* or early learning or early learning) and development) or play-based learning or play based learning or social) and emotional learning) or SEL or positive impact on learning psychosocial learning OR developmental outcome* or social) and emotional development) or well-being or wellbeing or well being skill development or skill building or cognitive development or psychosocial development OR intergenerational interaction* or multigenerational interaction* or intergenerational relationship* or multigenerational relationship* interaction* with grandparent* or interaction* with parent* or interaction* with family or interaction* with sibling* or interaction* with peer* or interaction* with brother* or interaction* with sister* or Interaction* with other children engagement with grandparent* or engagement with parent* or engagement with family or engagement with sibling* or engagement with peer* or engagement with brother* or	1092

	engagement with sister* or engagement with other children familial interaction* familial engagement) Limit: 2015-current Language: only English language articles	

Appendix 2: Inclusion and Exclusion Criteria

	Inclusion criteria	Exclusion criteria (if applicable)
Population	Include studies about children aged 3-8 years old OR experiences/memories of children during that time period. Include studies that sample other populations (e.g., older adults, parents, older siblings) IF they are **in addition** to children.	Exclude studies about newborn babies or infants under the age of 3, young adults, teenagers, and adults.
Exposure	Include studies about informal and unstructured play, play interactions and play materials (particularly small assembleable and loose part toys) in informal environments and contexts.	Exclude studies that are about structured curricula, lesson plans, and activities defined and directed by an adult such as a parent or teacher. Exclude studies that are about any form of play therapy or play intervention which follow a rigid structure.
Outcomes	Include studies that assess or address any outcomes that relate to: • Children's learning and development as defined above. • Children's socialisation. • Children's engagement or interactions with peers or family.	Exclude studies that only assess children's spiritual health and faith/religion as outcomes. Exclude studies that focus only on children's relationships with their teachers or non-family caregivers (e.g., maids or nannies).
Type of evidence and output	Include all empirical studies	Exclude non-empirical studies (e.g., commentaries, editorials, book reviews, protocols, medical guidelines, etc.) Exclude studies that are not journal articles (e.g., books/handbooks, book chapters, government reports, conference abstracts, conference papers, conference proceedings, dissertations, policy briefs, newsletters, etc.)
Language	Include studies published in English.	Exclude non-English studies.
Year of publication	Include studies published on or after 1st January 2015.	Published before 2015.

Appendix 3: Screening Tool

Criteria	Descriptor
EX0 (Non-empirical research or non-reviews)	Use this code if at least one of the following apply: • Erratum and corrections (Record is a correction to a study that has previously been published. • Study has been retracted • Study is a research protocol • Study is a book review • Study is a critical review of another journal article or framework or theory or concept, etc. • Study is a commentary or essay or response or opinion piece or column. • Study is an editorial • Study is an overview/introduction of papers presented in a special issue/series of a journal • Study is a literary analysis of a poem or story • Study is a conceptual/theoretical exploration or theoretical analysis or discourse analysis only without empirical research • Study is a description about the implementation of a programme/ model/mechanism • Study only discusses 'lessons learned' or recommendations from a programme/model/mechanism • Study is a policy review (including historical policy reviews/review of historical documents) • Study is an autoethnography or autobiography • Policy or clinical/medical guidelines Do **NOT** use this code if at least one of the following apply: • Study is a systematic review or scoping review or rapid review or umbrella review
EX1 (Population: Children 3-8)	Use this code if at least one of the following apply: • Study does NOT sample or is not specific to human children • Study does NOT sample children aged 3-8 • Study ONLY samples infants/babies/neonates/newborns less than 3 years (36 months) of age • Study ONLY samples older children aged 9 and above • Study is about the general population or community (e.g., 'individuals/ people/citizens/patients/refugees/subjects') with no specific mention or reference to children or our age group of interest. • Study is about children-friendly spaces but not about children and their play activity per se. • Study is only about pregnant/postpartum women and their childbirth experiences or birth/neonatal outcomes. • Study only focuses on parenting or parental engagement or parental views without specific child-related outcomes. • Study focuses on babies/ newborns/ neonates/ postpartum infants/ preterm infants/adolescents/ teenagers/young adults/young people/youth/juveniles/university students/college students AND does not provide the age group. • Study talks about breastfeeding or infant feeding practices, which would suggest the infants fall out of the age range of interest.

	Do **NOT** use this code if at least one of the following apply: • Children are of a mixed age class where children MIGHT be 3 or 8 years old. • Study samples BOTH teenagers/adolescents/young people/adults AND children aged 3-8. • Study mentions **students/toddlers/children/infants** but does not mention the age/age group/school grade or provide further age-related context. In this case, it would be impossible to definitively exclude based on age/population. • Study only samples teenagers/adolescents/youth/adults, BUT the **outcomes measured** (e.g., **perspectives** of parents on children's play, outcomes related to child marriage, etc.) directly relate to or are specific to children aged 3-8. • Study's outcomes of interest related to play are apparent in children over 3, even when measurement has taken place before 3 years of age. • Study samples adults and youth but addresses **childhood memories, experiences (e.g., adverse childhood experiences/child maltreatment), trauma, behaviours, illnesses etc**. • The age range of the population sampled is not mentioned, but study considers interventions or systems or programmes that are for children (e.g., intervention for child health) generally.
EX2 (Exposure: Play)	Use this code if at least one of the following apply: • Study does not focus on the use of play/play interactions/play activities as an **intervention** or **exposure** for children. • Study is about homework in the form of games. • Study is about a play intervention or play therapy, which suggests that play is highly structured and adult-led • Study is about consuming content on YouTube or TV or streaming sites in a non-interactive capacity. • Study is about young children's language/language acquisition but is clearly NOT related to play (e.g., only about conversation/ only naming objects in relation to learning). • Study is about the scaling / development / monitoring of an intervention or programme, where play is subsidiary to the focus of the study (i.e. play is not a study variable or exposure). • Study is only about obesity interventions and exercise without any specific reference to play. • Study is about a behaviour management strategy/behavioural intervention, even if play activities are referenced. • Study does not focus on play or play activities as an activity in itself, but as a teacher professional development resource, context or implementation. • Study is about gardening or farming activities where this does not include or incorporate play-based activities. • Study is about broad 'Early Childhood Development' programmes or 'parenting programmes' or 'parenting interventions' that do not specify an element of play. Do **NOT** use this code if • Study is about a digital activity where there is some playful interaction.

	• Study broadly assesses the effectiveness of physical activity/physical education/sports/outdoor activities where play may be an element of that activity. • Study is broadly about nature or nature-related activities or learning which happens in a natural environment where this could include elements of play. • Study talks about home enrichment, home environment, home learning environment, home literacy/math environment. • Study talks about a musical or artistic environment, where play may be involved. • There is reference to role play or language play or free word play in poetry (i.e. without play materials) • Study is about language acquisition but unclear if this relates to / covers language games / language play (look out for phrases like 'decontextualised language learning') • Study is about informal language games and activities such as storytelling, singing and nursery / activity rhymes. • Study focuses on perceptions of adults (including teachers and parents) on their own play or that of children. • Study is about animal-based programmes (e.g. involving dogs) which may also include elements of play.
EX3 (Outcomes of interest)	Use this code if ALL of the following apply: • Study does not assess children's learning outcomes. • Study does not assess children's developmental outcomes, including their general well-being. • Study does not consider intergenerational relationships. • Study focuses on drawing or artistic development as an outcome, without reference to other outcomes of concern for this study. • Study does not assess negative social and emotional learning outcomes such as hyperactivity, inattention, aggression, etc. • Study assesses outcomes related to Teacher-Student relationships as they are not typically considered to be 'intergenerational'. • Study only assesses 'spiritual health' and faith / religion as outcomes. Do **NOT** use this code if • The study measures outcomes related to motor, physical activity or speech motor development. These are still included under our outcomes of interest. • Study addresses school readiness outcomes.

Appendix 4: High-level Coding Tool

Year of Publication (citation date)	• 2025 • 2024 • 2023 • 2022 • 2021 • 2020 • 2019 • 2018 • 2017 • 2016 • 2015
Study Design	• Review (Literature or Systematic) • Quantitative • Randomised Controlled Trials • Qualitative • Mixed-methods • Biological methods (e.g., saliva, blood, stool collection) • Longitudinal design (e.g., cohort study) • Secondary analysis (i.e., secondary datasets) • Case study • Survey/questionnaire (e.g., household, national) • Observational
Country	• America • Australia • Bangladesh • Canada • Chile • China • Denmark • Ethiopia • Finland • Ghana • Hungary • India • Iran • Ireland • Italy • Kazakhstan • Malaysia • Mexico • Myanmar • New Zealand • Norway • Pakistan • Singapore • Somalia • South Africa • South Korea • Sweden

	• Philippines, The • Poland • Portugal • Turkey • UK • United Arab Emirates • Zimbabwe • Other (e.g., Taiwan, Hong Kong) • Multiple • Unclear
Setting	• Home • School • Outdoor setting (e.g., forest, woodland, fields, rural settings) • Community setting (e.g., library, church, museum, playgroup) • Other (e.g., hospital) • Unclear
Population sampled (Select all that apply)	• Children • Parents • Grandparents • Teachers • Other family (e.g., cousins, aunties, uncles, siblings) • Other school staff (e.g., principals) • Unclear
Age range of children	Insert age range of population sampled as recorded by authors in the Info box
Characteristics of children	• General Population/typically developing children • Children with a specific illness or condition • Both
Type of Play (Select all that apply)	• Indoor Play • Outdoor Play (e.g., nature play) • Digital Play (e.g., video games, technology-based play, educational media or apps) • Oral Play (e.g., storytelling, language learning) • Pretend Play/Role Play/Socio dramatic Play • Toy/Equipment Play (e.g., blocks, loose part toys, puzzles, dolls, cards) • Play and Creativity (e.g., art, music, dance) • Physical play (e.g., ball games, jumping, catch, hide & seek, sports games) • General/Other Play
Touches on play interactions as part of the play exposure	• Yes • No
Touches on loose part toys as part of the play exposure	• Yes • No
Outcomes (Select all that apply)	• Cognitive outcomes (e.g., learning, numeracy, language skills, etc) • Socio-emotional development/skills (e.g., self-regulation) • Motor development/fine motor skills

	• General health/wellbeing/quality of life • Inter-generational relationships • Socialisation (i.e., relationships/Interactions with parents/friends/peers/siblings) • Cultural awareness and development • Pleasure and enjoyment • Parental outcomes (e.g., parenting behaviour, parental knowledge) • Sibling outcomes (e.g., siblings engaged in teaching and learning) • Other (Please specify)

Appendix 5: Quality Appraisal Tool (Tailored version of the Weight of Evidence (WOE) framework)

Criteria		Components	Scoring system
Weight of Evidence A: Quality of execution of study	This is a judgement about the coherence and integrity of the evidence in its own terms (i.e., evaluating the quality of this type of evidence by those who generally use and produce it).	• **Transparency (is the study open to scrutiny?)**: The study should make plain how it was generated, clarifying aims, objectives and all the steps of the subsequent argument, so giving readers access to a common understanding of the underlying reasoning. • **Accuracy (is it well-grounded? Are the claims made by the author evidenced in the study?):** The study should demonstrate that all assertions, conclusions, and recommendations are based on relevant and appropriate information. • **Accessibility**: intelligible and understandable • **Method-Specificity:** method-specific quality: are the overall methods adopted coherent and appropriate for the study?	**High:** addresses 3 or all of the components AND must address accuracy. IF the study addresses 3 of the components but not accuracy, mark as **Medium**. This is because accuracy is an indication of whether the findings can be trusted. **Medium:** addresses 2 of the components. IF the study addresses 2 of the components but not accuracy, mark as **Low**. **Low:** addresses 1 or none of the components.
Weight of Evidence B: Appropriateness of method to the review question	This is a judgement about the appropriateness of that form of evidence for answering the review question, that is the fitness for purpose of that form of evidence (i.e., the relevance of certain research designs such as experimental studies for	• **Purposivity**: The study adopts **a methodology for analysis that answers the review question** (i.e. makes clear the link between play and outcomes of play; see research questions on the following page).	**High:** The method adopted is fit for purpose (e.g., correlational studies, RCT, mixed methods if relevant and directly addresses the review questions, especially RQs 1and 3). **Medium:** The method adopted is fit for purpose, but with some queries (e.g., qualitative studies, ethnography, surveys, case studies if relevant and directly addresses the review questions).

	answering questions about process.)		**Low:** The method adopted is not fit for purpose or if the methods are not clearly stated in the paper.
Weight of Evidence C: Utility and propriety of study to the review question	This is a review-specific judgement about the relevance of the focus of the evidence for the review question. For example, a research study may not have the type of sample, the type of evidence gathering or analysis that is central to the review question or it may not have been undertaken in an appropriate context from which results can be generalized to answer the review question. There may also be issues of propriety of how the research was undertaken such as the ethics of the research that could impact on its inclusion and interpretation in a review.	• **Utility (does the study provide relevant answers to the review question?)**: The study findings are 'fit for use', providing answers that are as closely matched as possible to the review question(s). • **Propriety (is the study legally and ethically carried out?)**: the study was carried out legally, ethically and with due care to all relevant stakeholders	**High:** The study fully addresses review question/s and also the legal/ethical research considerations. **Medium:** The study addresses EITHER the review question/s OR the legal/ethical research considerations **OR** One component is addressed and the other one is unclear. **Low:** The study addresses NEITHER the review question/s NOR the legal/ethical research considerations **OR** One component is NOT addressed and the other one is unclear
Weight of Evidence D: Overall rating		• All high ratings for A, B, C	**High**
		• Any combination of ratings that do not fall within the "High" or "Low" categories.	**Medium**
		• Two or more low ratings	**Low**

	OR • Any study with a low rating on WOE A on quality OR • Any study with a low rating on WOE C as this means it's not relevant to the research question	

Appendix (Reference List I): Reviews that were included on full text (n=11), but not in the synthesis

Amodia-Bidakowska, A., Laverty, C. and Ramchandani, P.G. (2020). ‘Father-child play: A systematic review of its frequency, characteristics and potential impact on children's development’, *Developmental Review*, 57, article number 100924. doi:10.1016/j.dr.2020.100924.

Cheung, S.K., Dulay, K.M. Yang, X.J., Mohseni, F. and McBride, C. (2021). ‘Home Literacy and Numeracy Environments in Asia’, *FRONTIERS IN PSYCHOLOGY*, 12, article number 578764. doi: 10.3389/fpsyg.2021.578764.

Dankiw, K.A., Tsiros, M.D., Baldock, K.L. and Kumar, S. (2020). ‘The impacts of unstructured nature play on health in early childhood development: A systematic review’, *PLoS ONE*, 15(2), article number e0229006. doi:10.1371/journal.pone.0229006.

Gibson, J.L., Pritchard, E. and de Lemos, C. (2021). ‘Play-based interventions to support social and communication development in autistic children aged 2–8 years: A scoping review’, *Autism & Developmental Language Impairments*, 6, pp.1-30. doi: 10.1177/23969415211015840.

Lai, N.K., Ang, T.F., Por, L.Y. and Liew, C.S. (2018). ‘The impact of play on child development - a literature review’, *European Early Childhood Education Research Journal*, 26(5), pp.625–643. doi: 10.1080/1350293X.2018.1522479.

Lee, R.L.T., Lane, S., Brown, G., Leung, C., Kwok, S.W.H. and Chan, S.W.C. (2020). ‘Systematic review of the impact of unstructured play interventions to improve young children's physical, social, and emotional wellbeing’, *Nursing & Health Sciences,* 22(2), pp.184–196. doi: 10.1111/nhs.12732.

Lew-Levy, S., Lavi, N., Reckin, R., Cristóbal-Azkarate, J. and Ellis-Davies, K. (2017). ‘How Do Hunter-Gatherer Children Learn Social and Gender Norms? A Meta-Ethnographic Review’, *Cross-Cultural Research*, *52*(2), pp.213-255. doi: 10.1177/1069397117723552.

Loudoun, F.M., Boyle, B. and Larsson-Lund, M. (2022). ‘Children’s experiences of play in digital spaces: A scoping review’, *PLOS ONE*, 17(8), article number e0272630. doi: 10.1371/journal.pone.0272630.

Milajerdi, H.R., Ordooiazar, F. and Dewey, D. (2023). ‘Is active video gaming associated with improvements in social behaviors in children with neurodevelopmental disorders: a systematic review’, *Child Neuropsychology*, 29(1), pp.1-27. doi:10.1080/09297049.2022.2046721. Rashid,

A.A., Cheong, A.T., Hisham, R., Shamsuddin, N.H. and Roslan, D. (2021). ‘Effectiveness of pretend medical play in improving children's health outcomes and well-being: a systematic review’, *BMJ OPEN*, 11(1), article number e041506. doi: 10.1136/bmjopen-2020-041506.

Sterman, J., Naughton, G., Froude, E., Villeneuve, M., Beetham, K., Wyver, S. and Bundy, A. (2016). ‘Outdoor Play Decisions by Caregivers of Children with Disabilities: a Systematic

Review of Qualitative Studies', Journal of Developmental and Physical Disabilities, 28(6), pp.931-957. doi: 10.1007/s10882-016-9517-x.

Appendix (Reference List II): Included Studies in the Synthesis (n=62)

Adams, M. and Fleer, M. (2016). ‘The relations between a 'push-down' and 'push-up' curriculum: A cultural-historical study of home-play pedagogy in the context of structured learning in international schools in Malaysia’, *Contemporary Issues in Early Childhood*, 17(3), pp.328-342. doi: 10.1177/1463949116660955.

Anderson, S., StGeorge, J. and Roggman, L.A. (2019). ‘Measuring the Quality of Early Father-Child Rough and Tumble Play: Tools for Practice and Research’, *Child & Youth Care Forum*, 48(6), pp.889-915. doi: 10.1007/s10566-019-09513-9.

Archbell, K.A., Coplan, R.J. and Rose-Krasnor, L. (2020). ‘What did your child do today? Describing young children's daily activities outside of school’, *Journal OF Early Childhood Research*, 18(2), pp.189-199. doi: 10.1177/1476718X19898724.

Bateman, A. and Church, A. (2017). ‘Children's use of objects in an early years playground’, *European Early Childhood Education Research Journal*, 25(1), pp.55-71. doi: 10.1080/1350293X.2016.1266221.

Binns, A.V., Casenhiser, D.M., Shanker S.G. and Cardy, J.O. (2022). ‘Autistic Preschoolers' Engagement and Language Use in Gross Motor versus Symbolic Play Settings’, *Autism & Developmental Language Impairments*, 7, pp.1-14. doi: 10.1177/23969415221115045.

Brown, E.D., Shokunbi, F.X. and Garnett, M.L. (2024). ‘Playtime and bedtime relate to cortisol levels for children facing economic hardship’, *Family Relations*, 73(4), pp.2805-2822. doi: 10.1111/fare.13016.

Buldu, E and Buldu, M. (2023). ‘Talking over Children's Drawings about Their Favourite Play Times: How Do Children Describe Their Play?’, *Early Child Development and Care*, 193(6), pp.810-823. doi: 10.1080/03004430.2023.2166501.

Chambers, S.A., Dobbie, F., Radley, A. and Rowa-Dewar, N. (2022). ‘Grandmothers' care practices in areas of high deprivation of Scotland: the potential for health promotion’, *Health Promotion International*, 37(2), article number daab104. doi: 10.1093/heapro/daab104.

Cirelli, L.K., Peiris, R., Tavassoli, N., Recchia, H. and Ross, H. (2020). ‘It takes two to tango: Preschool siblings' musical play and prosociality in the home’, *Social Development*, 29(4), pp.964-975. doi: 10.1111/sode.12439.

Creighton, G., Brussoni, M., Oliffe, J. and Olsen, L. (2015). ‘Fathers on Child's Play: Urban and Rural Canadian Perspectives’, *Men and Masculinities*, 18(5), pp.559-580. doi: 10.1177/1097184X14562610.

Cuartas, J., McCoy, D., Sánchez, J., Behrman, J., Cappa, C., Donati, G., Heymann, J., Lu, CL., et al. (2023). Family play, reading, and other stimulation and early childhood development in five low-and-middle-income countries. *Developmental Science*, article number e13404. doi: 10.1111/desc.13404.

Cun, A.J. (2022). ‘"You need to learn the spelling": Playing, teaching, and learning of trilingual siblings with refugee backgrounds’, *Journal of Early Childhood Literacy*, pp.109-132. doi: 10.1177/14687984221118985.

Danby, S., Evaldsson, A.C., Melander, H. and Aarsand, P. (2018). ‘Situated collaboration and problem solving in young children's digital gameplay’, *British Journal of Educational Technology*, 49(5), pp.959-972. doi: 10.1111/bjet.12636.

Davidson, C., Caes, L., Shing, Y.L., McKay, C., Rafetseder, E. and Wijeakumar, S. (2024). ‘Home Enrichment Is Associated with Visual Working Memory Function in Preschoolers’, *Mind Brain and Education*, 18(1), pp.72-84. doi: 10.1111/mbe.12383.

Dawes, A., Biersteker, L., Snelling, M., Horler, J. and Girdwood, E. (2023). ‘To What Extent Can Community-Based Playgroup Programmes Targeting Low-Income Children Improve Learning Outcomes Prior to Entering the Reception Year in South Africa? A Quasi-Experimental Field Study’, *Early Education and Development*, 34(1), pp.256-273. doi: 10.1080/10409289.2021.2005748.

Devi, A. (2022). ‘Understanding play participants' perspectives in play-based learning: a cultural-historical analysis in a home context’, *Pedagogies*, 17(2), pp.139-161. doi: 10.1080/1554480X.2020.1826949.

Duflos, M., Lane, J. and Brussoni, M. (2024). ‘Motivations and challenges for grandparent-grandchild outdoor play in early childhood: Perception of Canadian grandparents’, *Family Relations*, 73(2), pp.1107-1120. doi: 10.1111/fare.12952.

Edwards, S., McLean, K., Bartlett, J., Nolan, A., Evangelou, M., Henderson, M., Skouteris, H. and Tarasuik, J. (2022). ‘School playgroups: Which features of provision matter?’, *British Educational Research Journal*, 48(3), pp.598-616. doi: 10.1002/berj.3785.

Fabrizi, S. and Hubbell, K. (2017). ‘The role of occupational therapy in promoting playfulness, parent competence, and social participation in early childhood playgroups: A pretest posttest design’, *Journal of Occupational Therapy Schools and Early Intervention*, 10(4), pp.346-365. doi: 10.1080/19411243.2017.1359133.

Fagan, J., Cabrera, N. and Iglesias, A. (2024). ‘Trajectories of Low-income Mothers' and Fathers' Engagement in Learning Activities and Child Academic Skills’, *Journal of Child and Family Studies*, 33(3), pp.805-821. doi: 10.1007/s10826-023-02682-1.

Fenton, A., MacDonald, A. and McFarland, L. (2016). ‘A Strengths Approach to supporting early mathematics learning in family contexts’, *Australasian Journal of Early Childhood*, 41(1), pp.45-53. doi: 10.1177/183693911604100107.

Ghandour, R.M., Hirai, A.H., Moore, K.A., Paschall, K., LaForett, D.R., Reddington, E. and Kogan, M.D. (2024). ‘School Readiness Among United States Children: Results From the 2022 National Survey of Children's Health’, *Academic Pediatrics*, 24(7), pp.1049-1061. doi: 10.1016/j.acap.2024.02.013.

Gomes, J. and Fleer, M. (2019). ‘The Development of a Scientific Motive: How Preschool Science and Home Play Reciprocally Contribute to Science Learning’, *Research in Science Education*, 49(2), pp.613-634. doi: 10.1007/s11165-017-9631-5.

Gull, C., Goldstein, S.L. and Rosengarten, T. (2020). ‘Fathers' Roles, Attitudes, and Practices Regarding Tree Climbing’, *International Journal of Early Childhood Environmental Education*, 7(2), pp.51-63. Available at: https://files.eric.ed.gov/fulltext/EJ1280474.pdf

Harris, E. and Winterbottom, M. (2018). ''Why do parrots talk?' co-investigation as a model for promoting family learning through conversation in a natural history gallery', *Journal of Biological Education*, 52(1), pp.89-100. doi: 10.1080/00219266.2017.1408934.

Hashmi, S., Paine, A.L., Johansen, M.K., Robinson, C. and Hay, D.F. (2022). 'Engaged in play: Seven-year-olds? engagement with the play frame when playing with toy figures and their engagement with the fictional world of a video game', *Cognitive Development*, 63, article number 101230. doi: 10.1016/j.cogdev.2022.101230.

Hernandez, G.B.R., Murray, C.M. and Stanley, M. (2022). 'An intergenerational playgroup in an Australian residential aged-care setting: A qualitative case study', *Health & Social Care in the Community*, 30(2), pp.488-497. doi: 10.1111/hsc.13149.

Howe, N., Adrien, E. Porta, S.D., Peccia, S., Recchia, H., Osana, H.P. and Ross, H. (2016). ''Infinity Means it Goes on Forever': Siblings' Informal Teaching of Mathematics', *Infant and Child Development*, 25(2), pp.137-157. doi: 10.1002/icd.1928.

Hoyne, C. and Egan, S.M. (2024). 'Exploring the role of home play and learning activities in socioemotional development at 36-months: Findings from a large birth cohort study', *Infant Behaviour & Development*, 77, article number 102000. doi: 10.1016/j.infbeh.2024.102000.

Ihmeideh, F. (2019). 'Getting Parents Involved in Children's Play: Qatari Parents' Perceptions of and Engagement with Their Children's Play', *Education 3-13*, 47(1), pp.47-63. doi: 10.1080/03004279.2017.1399152.

Izzo, F., Saija, E., Pallini, S., Ioverno, S., Baiocco, R. and Pistella, J. (2024). 'Happy Moments between Children and Their Parents: A Multi-method and Multi-informant Perspective', *Journal of Happiness Studies*, 25(3), pp. 1-28. doi: 10.1007/s10902-024-00735-w.

Jirata, T.J. and Kjorholt, A.T. (2015). 'The place of children among the Guji of southern Ethiopia: school, work and play', *Children's Geographies*, 13(2), pp.226-239. doi: 10.1080/14733285.2013.829661

Jirata, T.J. (2019). 'The cultural spaces of young children: Care, play and learning patterns in early childhood among the Guji people of Ethiopia', *Global Studies of Childhood*, 9(1), pp.42-55. doi: 10.1177/2043610618817317.

Jirout, J.J. and Newcombe, N.S. (2015). 'Building blocks for developing spatial skills: Evidence from a large, representative U.S. sample', *Psychological Science*, 26(3), pp.302-310. doi: 10.1177/0956797614563338.

Kale, M. and Araptarli, H.C. (2021). 'Description of children's daily life participation processes in the sea gypsies community: visual narrative technique', *Early Child Development and Care*, 191(9), pp.1361-1375. doi: 10.1080/03004430.2019.1703112.

Keary, A., Garvis, S., Slaughter, Y. and Walsh, L. (2024). 'Young Children's Play and the Role of Grandparents as Play Partners during the COVID-19 Pandemic', *Education Sciences*, 14(7), article number 771. doi: 10.3390/educsci14070771.

Kervin, L. (2016). 'Powerful and playful literacy learning with digital technologies', *Australian Journal of Language and Literacy*, 39(1), pp.64-73. doi: 10.1007/BF03651907.

Lacey, A.J., Banerjee, R.A. and Lester, K.J. (2023). '"Are They Going to Play Nicely?" Parents' Evaluations of Young Children's Play Dates', *Journal of Child and Family Studies*, 32(8), pp.2240-2253. doi: 10.1007/s10826-022-02499-4.

McCormack, G.R., Naish, C., Petersen, J. and Doyle-Baker, P.K. (2024). 'Loose parts and risky play: playworker perspectives on facilitating a community-based intervention in local parks during the COVID-19 pandemic', *Journal of Adventure Education and Outdoor Learning*, 24(4), pp.765-779. doi: 10.1080/14729679.2023.2254863.

Merculief, A., Lipscomb, S., McClelland, M.M., Geldhof, G.J. and Tsethlikai, M. (2023). 'Nurturing resilience in American Indian/Alaska Native preschool children: the role of cultural socialization, executive function, and neighborhood risk', *Frontiers in Psychology*, 14, article number 1279336. doi: 10.3389/fpsyg.2023.1279336.

Metaferia, B.K., Futo, J., Drew, R. and Takacs, Z.K. (2020). 'Parents' Beliefs About Play and the Purpose of Preschool Education, Preschoolers' Home Activity and Executive Functions', *Frontiers in Psychology*, 11, article number 1104. doi: 10.3389/fpsyg.2020.01104.

Moon-Seo, S.K., Munsell, S.E. and Kim, N. (2024). 'Mothers' and Fathers' Perceptions of Children's Play', *Early Childhood Education Journal*, 52(2), pp.373-385. doi: 10.1007/s10643-022-01439-7.

O'Connor, D., Butler, A. and Lynch, H. (2021). 'Partners in play: Exploring 'playing with' children living with severe physical and intellectual disabilities', *British Journal of Occupational Therapy*, 84(11), pp.694-702. Doi: 10.1177/0308022620967293.

Palacios, N., Kibler, A.K., Yoder, M., Baird, A.S. and Bergey, R. (2016). 'Older Sibling Support of Younger Siblings' Socio-Emotional Development: A Multiple-Case Study of Second-Generation Mexican and Honduran Children's Initiative and Co-Construction', *Hispanic Journal of Behavioral Sciences*, 38(3), pp.395-419. doi: 10.1177/0739986316658865.

Palaiologou, I., Kewalramani, S. and Dardanou, M. (2021). 'Make-believe play with the Internet of Toys: A case for multimodal playscapes', *British Journal of Educational Technology*, 52(6), pp.2100-2117. doi: 10.1111/bjet.13110.

Parrott, H.M. and Cohen, L.E. (2020). 'Advocating for play: The benefits of unstructured play in public schools', *The School Community Journal*, 30(2), pp.229-254. Available at: https://www.adi.org/journal/2020fw/ParrottCohenFW2020.pdf

Peach, L. (2024). 'Missing Middles: Toward a Feminist New Materialist Approach for Understanding Intergenerational Inter/Intra-Action', *Journal of Intergenerational Relationships*, 22(1), pp.1-16. doi: 10.1080/15350770.2022.2126914.

Salminen, J., Khanolainen, D., Koponen, T., Torppa, M. and Lerkkanen, M.K. (2021). 'Development of Numeracy and Literacy Skills in Early Childhood-A Longitudinal Study on the Roles of Home Environment and Familial Risk for Reading and Math Difficulties', *Frontiers in Education*, 6, article number 725337. doi: 10.3389/feduc.2021.725337.

San, N.M.H., Myint, A.A. and Oo, C.Z. (2021). 'Using Play to Improve the Social and Emotional Development of Preschool Children', *Southeast Asia Early Childhood Journal*, 10(2), pp.16-35. Available at: https://files.eric.ed.gov/fulltext/EJ1327445.pdf

Sando, O.J. (2019). ‘The outdoor environment and children's health: A multilevel approach’, *International Journal of Play*, 8(1), pp.39-52. doi: 10.1080/21594937.2019.1580336.

Sando, O.J., Kleppe, R. and Sandseter, E.B.H. (2021). ‘Risky Play and Children's Well-Being, Involvement and Physical Activity’, *Child Indicators Research*, 14(4), pp.1435-1451. doi: 10.1007/s12187-021-09804-5.

Schmitt, K.L., Hurwitz, L.B., Duel, L.S. and Linebarger, D.L.N. (2018). ‘Learning through play: The impact of web-based games on early literacy development’, *Computers in Human Behaviour*, 81, pp.378-389. doi: 10.1016/j.chb.2017.12.036.

Smith, S., Ferguson, C.J. and Beaver, K.M. (2018). ‘Learning to blast a way into crime, or just good clean fun? Examining aggressive play with toy weapons and its relation with crime’, *Criminal Behaviour and Mental Health*, 28(4), pp.313-323. doi: 10.1002/cbm.2070.

Taylor, E.K. and Kervin, L. (2022). ‘Parent/Caregiver Perspectives on Children's Play and Learning at a Children's Museum: A Qualitative Descriptive Study’, *Journal of Museum Education*, 47(2), pp.275-285. doi: 10.1080/10598650.2021.2023312.

Veiga, G., de Leng, W., Cachucho, R., Ketelaar, L., Kok, J.N., Knobbe, A., Neto, C. and Rieffe, C. (2017). ‘Social Competence at the Playground: Preschoolers during Recess’, *Infant and Child Development*, 26(1), article number e1957. doi: 10.1002/icd.1957.

Wang, X.X., Lam, C.B., Ye, P.Z. and Qiao, T.Q. (2024). ‘A visual ethnography of parent-child interactions during 'story-time' in Chinese family settings’, *European Early Childhood Education Research Journal*, pp.1-19. doi: 10.1080/1350293X.2024.2408603.

Weisberg, D.S., Dunlap, L.C. and Sobel, D.M. (2023). ‘Dinos and GoPros: Children's exploratory behaviors in a museum and their reflections on their learning’, *Frontiers in Psychology*, 14, pp.1-11. doi: 10.3389/fpsyg.2023.1110612.

Williams, K.E., Berthelsen, D., Viviani, M. and Nicholson, J.M. (2017). ‘Participation of Australian Aboriginal and Torres Strait Islander families in a parent support programme: longitudinal associations between playgroup attendance and child, parent and community outcomes’, *Child Care Health and Development*, 43(3), pp.441-450. doi: 10.1111/cch.12417.

Wu, A., Tian, Y., Chen, S. and Cui, L. (2024). ‘Do Playful Parents Raise Playful Children? A Mixed Methods Study to Explore the Impact of Parental Playfulness on Children's Playfulness’, *Early Education and Development*, 35(2), pp.283-306. doi: 10.1080/10409289.2022.2148072.

Yoo, J. (2024). ‘Art Play with Daddy: Father-Child Play with Art Materials at Home’, *Early Childhood Education Journal*, 52(1), pp.101-112. doi: 10.1007/s10643-022-01411-5.

Zhu, W.J., Luo, X., Werneck, A.O., Pindus, D., Kramer, L., Kramer, A.F., Hillman, C.H., Herold, F., et al. (2024). ‘Nature and success: Outdoor play is linked to school readiness’, *Complementary Therapies in Clinical Practice*, 57, article number 101895. doi: 10.1016/j.ctcp.2024.101895.

Zoghi, A., Gabbard, C., Shojaei, M. and Shahshahani, S. (2019). ‘The Impact of Home Motor Affordances on Motor, Cognitive and Social Development of Young Children’, *Iranian Journal*

of Child Neurology, 13(2), pp.61-69. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC6451863/