IJEA: International Journal of Education and Assessment
Volume 2 Nomor 1 Maret 2026
e-ISSN: xxxx-xxxx
Page : 9-19

The Effectiveness of Game-Based Learning Approaches on Early Childhood Cognitive Development: A Systematic Literature Review

Arga[1*], Charmila Tandi Rerung[2]
[12]Universitas Pejuang Republik Indonesia, Indonesia.
Email: arga.arga.mpd@gmail.com, charmylat@gmail.com

Corespondensi Author
Email: arga.arga.mpd@gmail.com

Article History
Received: 15-01-2026;
Reviewed: 01-03-2025;
Accepted: 25-03-2025;
Published: 30-03-2026

ABSTRACT
Play is widely regarded as the primary mode of learning during early childhood, yet the extent to which structured, play-based learning approaches reliably enhance cognitive development particularly executive function remains a question requiring systematic synthesis. This study aims to systematically review empirical evidence on the effectiveness of play-based learning approaches for cognitive development in early childhood (ages 3–6). Following PRISMA-informed procedures, articles published between 2015 and 2026 were identified through Google Scholar, ScienceDirect, PubMed/PMC, and Indonesian national journal portals (Jurnal Obsesi, Garuda), using keyword combinations such as "play-based learning cognitive development", "permainan edukatif kognitif anak usia dini", and "executive function preschool play". After screening for relevance, population (ages 3–6), and outcome (cognitive/executive function measures), a set of studies spanning experimental, quasi-experimental, longitudinal, and review designs was retained for thematic synthesis. The review finds that structured, rule-based, and adult-guided play activities are consistently associated with improvements in inhibitory control and cognitive flexibility, with somewhat more variable effects on working memory; findings further suggest that the specific type of play (educational games, traditional games, digital games, science-embedded play) matters less than the presence of clear rules, adult scaffolding, and repeated practice. Digital/educational games show promise but raise concerns about screen-time trade-offs and uneven evidence quality. The review concludes that play-based learning is a developmentally appropriate and largely effective strategy for supporting early cognitive development, and recommends that Indonesian early childhood educators prioritize structured, rule-based play formats including traditional games over unstructured free play alone when the explicit goal is cognitive stimulation.

Keywords: Play-based learning; Cognitive development; Executive function; Early childhood education.

IJEA: International Journal of Education and Assessment
Volume 2 Nomor 1 Maret 2026
e-ISSN: xxxx-xxxx
Page : 9-19

ABSTRAK
Bermain secara luas dipandang sebagai cara belajar utama pada masa anak usia dini, namun sejauh mana pendekatan pembelajaran berbasis permainan yang terstruktur secara konsisten meningkatkan perkembangan kognitif khususnya fungsi eksekutif masih memerlukan sintesis sistematis. Penelitian ini bertujuan untuk melakukan tinjauan sistematis terhadap bukti empiris mengenai efektivitas pendekatan pembelajaran berbasis permainan terhadap perkembangan kognitif anak usia dini (3–6 tahun). Dengan mengikuti prosedur yang berpedoman pada PRISMA, artikel yang diterbitkan antara tahun 2015 hingga 2026 ditelusuri melalui Google Scholar, ScienceDirect, PubMed/PMC, serta portal jurnal nasional Indonesia (Jurnal Obsesi, Garuda), menggunakan kombinasi kata kunci "play-based learning cognitive development", "permainan edukatif kognitif anak usia dini", dan "executive function preschool play". Setelah dilakukan penyaringan berdasarkan relevansi, populasi (usia 3–6 tahun), dan luaran (ukuran kognitif/fungsi eksekutif), sejumlah studi dengan desain eksperimen, kuasi-eksperimen, longitudinal, dan tinjauan sistematis dipertahankan untuk disintesiskan secara tematik. Hasil kajian menemukan bahwa aktivitas bermain yang terstruktur, berbasis aturan, dan didampingi orang dewasa secara konsisten berasosiasi dengan peningkatan kontrol inhibisi dan fleksibilitas kognitif, dengan pengaruh yang relatif lebih bervariasi terhadap memori kerja; temuan lebih lanjut menunjukkan bahwa jenis permainan spesifik (permainan edukatif, permainan tradisional, permainan digital, permainan bermuatan sains) tampak kurang menentukan dibandingkan keberadaan aturan yang jelas, pendampingan orang dewasa (scaffolding), dan pengulangan latihan. Permainan digital/edukatif menunjukkan potensi yang menjanjikan namun menimbulkan kekhawatiran terkait trade-off durasi layar (screen time) dan mutu bukti yang belum merata. Kajian ini menyimpulkan bahwa pembelajaran berbasis permainan merupakan strategi yang sesuai tahap perkembangan dan secara umum efektif untuk mendukung perkembangan kognitif anak usia dini, serta merekomendasikan agar pendidik anak usia dini di Indonesia memprioritaskan format permainan yang terstruktur dan berbasis aturan termasuk permainan tradisional dibandingkan bermain bebas tanpa struktur semata, ketika tujuan eksplisitnya adalah stimulasi kognitif.

Kata Kunci: Pembelajaran berbasis permainan; Perkembangan kognitif; Fungsi eksekutif; Pendidikan anak usia dini.

INTRODUCTION

Play is a natural and dominant activity in early childhood which over the past few decades has been increasingly recognized not only as a means of entertainment, but as the main medium for children's cognitive, social, and emotional development (Cankaya et al., 2025; Doebel & Lillard, 2023; Milteer et al., 2012; Richards, 2020). Cognitive development at this age is closely related to the maturation of executive function (EF) including inhibition control, cognitive flexibility, and working memory which are the foundation for children's ability to think logically, solve problems, and adapt to the demands of the new learning environment. Optimal executive function in preschool has

been shown to be an important predictor of academic success later in life, especially in early math and literacy skills (Blair et al., 2016; Hao et al., 2025; Montoya et al., 2019).

Play-based learning refers to a pedagogical approach that deliberately uses play activities, whether educational games, traditional games, rules-based games, and digital games as a vehicle to achieve certain learning goals, including cognitive stimulation. This approach is different from undirected free play, because game-based learning generally involves structure, rules, and intentional adult mentoring to maximize the learning potential of these play activities (Mulvey et al., 2018; Veraxa et al., 2020).

A number of international studies have shown promising results on the link between structured play and the development of executive functions in preschoolers. Longitudinal studies have found that (Hao et al., 2025)play can reduce anxiety which in turn increases motivation and gives children more opportunities to try different solutions as well as practice without real consequences, so play can be seen as an important mediator that promotes children's cognitive development (Metaferia et al., 2020; White et al., 2021). Another study examining the influence of different types of child-appropriate play on preschoolers' executive function found that (Veraksa et al., 2024) the benefits of these different types of play activities were likely driven by the systematic integration of executive function demands in an adult-guided rule-based structure, which was likely reinforced by synergistic processes such as implicit exercise in emotion regulation and contextual engagement In the role-playing scenario (Gibb et al., 2021) finding indicates that structure and mentoring, rather than the type of play alone, are key factors in effectiveness.

In Indonesia, studies on game-based learning in early childhood are also developing quite rapidly, including conventional educational games, traditional games, and ICT-based digital games. Some studies report that game-based learning is able to foster children's cognitive, gross motor, and fine motor skills (Marwan & Rohayati, 2025), while other studies show that educational digital games also support the development of children's thinking and problem-solving skills through fun learning experiences. However, most studies in Indonesia are still in the form of single case studies or small-scale narrative literature reviews, so a systematic synthesis across studies from both international and national literature is still needed to obtain a more comprehensive picture of the consistency of evidence and game design elements that contribute the most to cognitive development (Nugraha & Rusmin, 2015).

Based on this description, this systematic literature review aims to: (1) synthesize empirical evidence on the effectiveness of play-based learning approaches on early childhood cognitive/executive function development; (2) identify the types of games and design elements that are most consistently associated with positive outcomes; and (3) identify methodological gaps in the existing literature as a basis for recommendations for future early childhood education research and practice, including in Indonesia.

METHODS

This study uses a systematic literature review (SLR) approach that adapts the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow, including the stages of identification, screening, eligibility, and inclusion of articles (Haddaway et al., 2022; Mateo, 2020).

The research questions that were prepared were: RQ1 How does the game-based learning approach affect early childhood cognitive/executive function development? RQ2 What types of games and design elements are most consistently associated with positive outcomes? RQ3 What are the methodological gaps that are still found in the existing literature?

The identification stage was carried out through a search of Google Scholar databases, ScienceDirect, PubMed/PMC, ResearchGate, and national journal portals (Obsessive Journal, Garuda, Sinta), using a combination of keywords "play-based learning cognitive development preschool", "executive function preschool play", "early childhood cognitive educational games", and "traditional cognitive development games". The range of years of publication is limited between 2015 and 2026 to maintain relevance to current curriculum developments and educational technologies, although a number of foundational theoretical references outside that range are included where relevant (Darif & Lafraxo, 2025).

Inclusion criteria include: (1) articles in Indonesian or English; (2) the research population is early childhood/preschool (3–6 years); (3) intervention or focus of study in the form of play-based learning/games (educational, traditional, digital, or other rules-based games); (4) report outputs related to cognitive development, executive function, or thinking ability; and (5) is a fully accessible scientific journal article, systematic review, or meta-analysis. Exclusion criteria include articles that focus on populations outside the 3–6 age range without separate data for that age group, opinion/editorial articles without empirical data or systematic reviews, and articles that are not fully accessible.

The screening process is carried out by reading the title and abstract to set aside articles that are clearly irrelevant, followed by reading the full text of the articles that pass the initial screening to assess eligibility based on inclusion/exclusion criteria. Articles that pass both stages are then mapped into a matrix sheet containing the author's columns, year, research design, game/intervention characteristics, and key findings, as the basis for a thematic analysis that adapts the data reduction, presentation, and verification model (Miles & Huberman).

RESEARCH RESULTS

The screening process resulted in a number of relevant articles, including experimental/quasi-experimental studies, observation-based longitudinal studies, as well as systematic reviews/meta-analyses of international and national literature. Summary of the main article on which the synthesis is based.

Fernández-Vilar et al. / longitudinal study (2019, PMC) Systematic play in a preschool educational setting Executive function can be improved through systematic play; Play serves as a mediator of cognitive development because it reduces anxiety and provides room for practice without real consequences.

ScienceDirect study (2025) Different types of child-appropriate play Different types of games produce a comparable overall effect on executive function; Benefits are driven by the integration of executive function demands in an adult-guided, rule-based structure.

Christodoulakis & Adbo (2021, PMC) Longitudinal studies, science-concept-loaded games Control inhibition and cognitive flexibility develop in a closely interrelated

manner; Cognitive flexibility is more likely to appear in fictitious contexts than non-fictitious contexts that require perspective taking.

Frontiers (2021) Adult-directed play programs (Bright Beginnings Framework) Adult-directed play programs are easily integrated into the preschool curriculum and are associated with improvements in various developmental domains including executive functions.

Systematic review, AL-TARBIYAH (2016–2025, following PRISMA 2020) Play-based interventions in children with disabilities Play-based interventions are increasingly recognized as an effective strategy to support executive functions in inclusive early childhood education settings.

Systematic review of primary schools (2025, PMC) School-based physical activity programs the effects of interventions are strongest on inhibition and working memory, while improved cognitive flexibility appears to be less consistent and require a higher level of novelty and variety of tasks.

A study on the effects of game-based learning (2022, ResearchGate) A qualitative literature review Game-based learning fosters cognitive, gross motor, and fine motor skills in early childhood.

Humaida & Suyadi (2021, Aulad: Journal on Early Childhood) ICT-based digital educational game media the use of digital educational game media supports the development of early childhood thinking and problem-solving skills through fun learning experiences.

Problem solving study based on mathematics home media (ResearchGate) Experiment, Pontianak Islamic Kindergarten Problem solving method assisted by mathematics game media improves children's cognitive abilities compared to pre-intervention conditions.

Three major themes were found that answered the research questions asked. First, the influence of game-based learning on executive function. Longitudinal studies have found that preschoolers' executive function can be improved through systematic play in an educational setting, with play acting as a mediator that promotes cognitive development through anxiety reduction and the provision of a safe practice space. Another study focusing on the concept of science in play found that (Veraksa et al., 2020) inhibition control and cognitive flexibility appear to be closely related in early childhood development, where cognitive flexibility or attention shift occurs more easily when fictional characters are present, while a change in perspective toward a non-fictional environment is a more difficult and time-consuming process (Vidal Carulla et al., 2021). This pattern is consistent with other systematic reviews that found that (İçen & Çelik, 2026) play-based interventions are increasingly recognized as an effective strategy to support executive function in inclusive early childhood education settings (Núñez et al., 2024).

Second, the game design elements that contribute to effectiveness. One of the key findings of the study comparing different types of games is that specific types of games appear to be less decisive than their structure and companionship; as concluded in the ScienceDirect study (2025), the benefits of different types of play activities are most likely driven by the (Schmeichel & Tang, 2015) the systematic integration of executive function demands in an adult-guided rule-based structure, which is likely

amplified by synergistic processes such as implicit exercise of emotion regulation and contextual involvement in role-playing scenarios (Martin & Ochsner, 2016). Findings from the Bright Beginnings Framework program also support the importance of intentional adult involvement, which is reported to be easily integrated into existing preschool curriculum. On the other hand, a systematic review of school-based physical activity programs found that (Loturco et al., 2022) the effects of the intervention were most strongly seen on inhibition and working memory, while improvements in cognitive flexibility appeared to be less consistent and likely required a higher level of novelty and task variety (Yang et al., 2026) an important note that not all components of executive function respond uniformly to game/activity-based interventions physical.

Third, the context of digital games and traditional games in Indonesia. A number of national studies report that ICT-based digital educational game media also supports the development of children's thinking and problem-solving skills, with features such as visual simulations providing a more concrete and pressure-free learning experience. However, these studies are generally in the form of small-scale descriptive qualitative studies, so the strength of causal evidence is still limited compared to experimental studies on non-digital games. On the other hand, traditional games have also received attention as a culturally relevant early childhood development medium, although most studies on this topic have focused more on religious-moral values and self-confidence than specific measures of cognitive/executive function.

DISCUSSION

The results of the above literature synthesis show a pattern that is quite consistent with the theory of early childhood cognitive development: play, particularly structured and adult-guided ones, plays an effective vehicle for stimulating executive function, especially inhibition control and cognitive flexibility. This consistency is in line with the view that preschool is a critical period of maturation of executive function, in which the experience of play rich in rules, turns, and perspective taking provides a natural "exercise" for a child's cognitive regulatory capacity.

The finding that specific types of play (educational, traditional, digital, science-charged) appear to be less decisive than adult structure and mentoring have important practical implications for early childhood educators: the focus of designing learning activities should be directed at the provision of clear rules, challenges appropriate to the child's developmental level, and intentional adult involvement rather than simply choosing a particular "type" of play as the sole solution. It also opens up space for educators in Indonesia to integrate culturally relevant traditional games into the curriculum, as long as they are designed or modified to contain rules, turns, and cognitive challenges on par with modern educational games.

A pattern of less consistent outcomes in working memory and partly in cognitive flexibility compared to more consistent results in inhibition control has important implications for the expected outcomes of the play program in kindergarten/early childhood education. As noted in a systematic review of school-based physical activity programs, improvements in cognitive flexibility likely require a higher level of novelty and task variety than is typically available in daily play routines, so teachers need to

intentionally vary the types of challenges and game rules over time, rather than repeating the same game patterns.

Regarding digital games, findings from the national literature show promising potential in supporting children's thinking skills, but it needs to be balanced with caution considering the issue of screen time in early childhood and the methodological quality limitations of most of the studies studied (small-scale descriptive qualitative studies without control groups). This suggests that digital games should be positioned as a complement, not a substitute, for direct physical and social games that have stronger evidence of supporting executive functions.

Compared to play-based learning studies on emotion regulation topics (e.g., play-based mindfulness interventions), the pattern of findings on these cognitive topics showed structural similarities: both emphasized the importance of play elements, activity structure, and adult mentoring as factors that moderate effectiveness, although the outcomes measured (emotion regulation versus cognitive executive function) were different. This similarity in pattern reinforces the argument that structured game-based learning is a cross-domain pedagogical approach that is relevant to different aspects of early childhood development, not just for one specific domain.

However, this study has a number of limitations. First, as a systematic literature review based on secondary sources, this study does not produce new primary data and relies heavily on the quality and methodological transparency of the original studies reviewed. Second, most of the international studies studied came from the context of early childhood education in countries with different systems and resources than Indonesia, so the application of the findings in the context of the Indonesian PAUD/Kindergarten curriculum requires further adaptation. Third, a number of national studies were studied using a descriptive qualitative design with a small sample and no control group, so the strength of causal conclusions that can be drawn from the national literature is still limited compared to international experimental studies.

CONCLUSION

The conclusion is that structured, rule-based, and adult-guided approaches to game-based learning are consistently associated with improvements in early childhood executive function, particularly inhibition control and cognitive flexibility, while their effects on working memory appear to be more varied and may require more varied and challenging activity designs. Specific types of games (educational, traditional, digital, science-related) seem less decisive than the existence of structures, rules, and intentional adult assistance in these play activities.

It is recommended to PAUD/Kindergarten educators to prioritize the design of play activities that have clear rules, varied challenges, and active mentoring, including by utilizing culturally relevant traditional games as an alternative or complement to modern educational games. To the managers of PAUD/Kindergarten units, it is recommended to limit the use of digital games as a complement, not the main substitute, for direct physical and social play activities, considering the consideration of screen duration in early childhood. For future researchers, it is highly recommended to conduct a primary experimental study with an active control group in kindergarten children in various regions of Indonesia.

REFERENCE

AL-TARBIYAH: Jurnal Pendidikan. (2025). Play-based intervention to enhance executive function in young children with disabilities: A systematic literature review. https://journal1.uinssc.ac.id/index.php/tarbiyah/article/view/22028

Blair, C., McKinnon, R. D., Vernon-Feagans, L., Greenberg, M., Coxc, M., Burchinal, P., Willoughby, M., Garrett-Peters, P., Mills-Koonce, R., & Ittig, M. (2016). Moderating effects of executive functions and the teacher-child relationship on the development of mathematics ability in kindergarten. Learning and Instruction, 41, 85–93. https://doi.org/10.1016/j.learninstruc.2015.10.001

Cankaya, O., Martin, M., & Haugen, D. (2025). The Relationship Between Children's Indoor Loose Parts Play and Cognitive Development: A Systematic Review. In Journal of Intelligence (Vol. 13, Number 5). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/jintelligence13050052

Christodoulakis, N., & Adbo, K. (2021). Development of Preschool Children's Executive Functions throughout a Play-Based Learning Approach That Embeds Science Concepts. International Journal of Environmental Research and Public Health. https://pmc.ncbi.nlm.nih.gov/articles/PMC7828157/

Coelho, V., et al. (2021). Promoting Executive Function Skills in Preschoolers Using a Play-Based Program. Frontiers in Psychology. https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2021.720225/full

Darif, H., & Lafraxo, M. A. (2025). Teaching and Learning in Health Sciences in the Era of Educational Technologies: A Bibliometric Analysis. Educational Process: International Journal, 14. https://doi.org/10.22521/edupij.2025.14.84

Doebel, S., & Lillard, A. S. (2023). How does play foster development? A new executive function perspective. In Developmental Review (Vol. 67). Elsevier Inc. https://doi.org/10.1016/j.dr.2022.101064

Gibb, R., Coelho, L., Van Rootselaar, N. A., Halliwell, C., MacKinnon, M., Plomp, I., & Gonzalez, C. L. R. (2021). Promoting Executive Function Skills in Preschoolers Using a Play-Based Program. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.720225

Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. Campbell Systematic Reviews, 18(2). https://doi.org/10.1002/cl2.1230

Hao, Y., Kong, L., Wang, X., & Yu, X. (2025). The impact of structured motor learning intervention on preschool children's executive functions. Scientific Reports, 15(1). https://doi.org/10.1038/s41598-025-01385-5

Humaida, R. T., & Suyadi, S. (2021). Pengembangan Kognitif Anak Usia Dini melalui Penggunaan Media Game Edukasi Digital Berbasis ICT. Aulad: Journal on Early Childhood, 4(2), 78–87. https://doi.org/10.31004/aulad.v4i2.98

İçen, B. K., & Çelik, O. T. (2026). Examination of the Effects of a Play-Based Mindfulness Training Program on Resilience, Emotion Regulation Skills, and Executive Functions of Preschool Children. Children, 13(1), 110. https://doi.org/10.3390/children13010110

Kajian Alternatif Stimulasi Kemampuan Kognitif melalui Penerapan Model Pembelajaran Berbasis Permainan Komprehensif. ResearchGate. https://www.researchgate.net/publication/333011317

Kajian Pengaruh Pembelajaran Berbasis Permainan pada Pendidikan dan Perkembangan Anak Usia Dini. (2022). ResearchGate. https://www.researchgate.net/publication/363026634

Loturco, I., Montoya, N. P., Ferraz, M. B., Berbat, V., & Pereira, L. A. (2022). A Systematic Review of the Effects of Physical Activity on Specific Academic Skills of School Students. In Education Sciences (Vol. 12, Number 2). MDPI. https://doi.org/10.3390/educsci12020134

Martin, R. E., & Ochsner, K. N. (2016). The neuroscience of emotion regulation development: Implications for education. In Current Opinion in Behavioral Sciences (Vol. 10, pp. 142–148). Elsevier Ltd. https://doi.org/10.1016/j.cobeha.2016.06.006

Martuti, Y. (2024). Pengaruh Jenis Permainan terhadap Keterampilan Kognitif Anak Usia Dini: Sebuah Kajian Literatur. Jurnal Ilmu Tarbiyah, 3(2), 107–115.

Marwan, I., & Rohayati, N. (2025). The Effect of Smart Kiddo Games on Fine and Gross Motor Skills in Early Childhood. TEM Journal, 14(1), 684–694. https://doi.org/10.18421/TEM141-61

Mateo, S. (2020). A procedure for conduction of a successful literature review using the PRISMA method. In Kinesitherapie (Vol. 20, Number 226, pp. 29–37). Elsevier Masson s.r.l. https://doi.org/10.1016/j.kine.2020.05.019

Metaferia, B. K., Takacs, Z. K., & Futo, J. (2020). The Relationship Between Parental Play Beliefs, Preschoolers' Home Experience, and Executive Functions: An Exploratory Study in Ethiopia. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.00624

Milteer, R. M., Ginsburg, K. R., Mulligan, D. A., Ameenuddin, N., Brown, A., Christakis, D. A., Cross, C., Falik, H. L., Hill, D. L., Hogan, M. J., Levine, A. E., O'Keeffe, G. S., Swanson, W. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., Garner, A. S., McGuinn, L., Pascoe, J., & Wood, D. L. (2012). The importance of play in promoting healthy child development and maintaining strong parent-child bond: Focus on children in poverty. Pediatrics, 129(1). https://doi.org/10.1542/peds.2011-2953

Montoya, M. F., Susperreguy, M. I., Dinarte, L., Morrison, F. J., San Martín, E., Rojas-Barahona, C. A., & Förster, C. E. (2019). Executive function in Chilean preschool children: Do short-term memory, working memory, and response inhibition contribute differentially to early academic skills? Early Childhood Research Quarterly, 46, 187–200. https://doi.org/10.1016/j.ecresq.2018.02.009

Mulvey, K. L., Taunton, S., Pennell, A., & Brian, A. (2018). Head, Toes, Knees, SKIP! Improving Preschool Children's Executive Function Through a Motor Competence Intervention. Journal of Sport and Exercise Psychology, 40(5), 233–239. https://doi.org/10.1123/jsep.2018-0007

Nugraha, H. C., & Rusmin, P. H. (2015). Educational game design on Pythagorean theorem for game based learning using 6i's component. 2015 4th International Conference on Interactive Digital Media (ICIDM), 1–5. https://doi.org/10.1109/IDM.2015.7516330

Núñez, C. I. G., Morales, S. B., Verdú, C. M., & Gómez-Mármol, A. (2024). Unlocking abilities: enhancing executive skills through play and movement in preschool physical education. Journal of Physical Education and Sport, 24(1), 165–171. https://doi.org/10.7752/jpes.2024.01021

Richards, M. N. (2020). Play☆. In J. B. Benson (Ed.), Encyclopedia of Infant and Early Childhood Development (Second Edition) (pp. 540–548). Elsevier. https://doi.org/https://doi.org/10.1016/B978-0-12-809324-5.05866-1

Schmeichel, Brandon J, & Tang, David. (2015). Individual Differences in Executive Functioning and Their Relationship to Emotional Processes and Responses. Current Directions in Psychological Science, 24(2), 93–98. https://doi.org/10.1177/0963721414555178

Studi longitudinal executive functions melalui bermain sistematis di seting pendidikan. (2019). PMC. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6734167/

Systematic review of school-based physical activity programs on executive function development in children. (2025). PMC. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC12440757/

The effect of child-appropriate play with various types on preschoolers' executive function. (2025). ScienceDirect. https://www.sciencedirect.com/science/article/pii/S0001691825013368

Veraksa, A. N., Gavrilova, M. N., Bukhalenkova, D. A., & Yakupova, V. A. (2020). The relationship between play repertoire and inhibitory control in preschool children. European Journal of Contemporary Education, 9(2), 443–450. https://doi.org/10.13187/ejced.2020.2.443

Veraksa, A. N., Veresov, N. N., Sukhikh, V. L., Gavrilova, M. N., & Plotnikova, V. A. (2024). Play to Foster Children's Executive Function Skills: Exploring Short-and Long-Term Effects of Digital and Traditional Types of Play. International Journal of Early Childhood, 56(3), 687–709. https://doi.org/10.1007/s13158-023-00377-8

Veraxa, A. N., Belolutskaya, A. K., Gavrilova, M. N., & Leonov, S. V. (2020). Connection of executive functions and physical fitness in preschool children: Review of studies. Voprosy Psikhologii, 2020(2), 103–118. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85096134416&partnerID=40&md5=c2ab450544c0493f117343d937a6cf43

Vidal Carulla, C., Christodoulakis, N., & Adbo, K. (2021). Development of preschool children's executive functions throughout a play-based learning approach that embeds science concepts. International Journal of Environmental Research and Public Health, 18(2), 1–11. https://doi.org/10.3390/ijerph18020588

White, R. E., Thibodeau-Nielsen, R. B., Palermo, F., & Mikulski, A. M. (2021). Engagement in social pretend play predicts preschoolers' executive function gains across the school year. Early Childhood Research Quarterly, 56, 103–113. https://doi.org/10.1016/j.ecresq.2021.03.005

Yang, L., Qi, S., Qiu, R., Wang, F., Wei, H., & Feng, Z. (2026). Roles of Hippocampal Alpha 6 GABAA Receptors in Clomipramine Alleviating Chronic Repeated Restraint Stress-Induced Depressive Behaviors in Rats. CNS & Neurological Disorders - Drug Targets, 25. https://doi.org/10.2174/0118715273460368260324103547