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THE MONTESSORI ADVANTAGE IN HOLISTIC CHILD DEVELOPMENT: A CRITICAL INTEGRATIVE REVIEW OF CHILD AGENCY, TEACHER AGENCY, AND LEARNING ACROSS MAJOR EARLY CHILDHOOD PERSPECTIVES

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ABSTRACT

Montessori education is frequently described as a holistic, child-centred system, yet claims of its superiority are often made without distinguishing pedagogical philosophy from empirical evidence. This critical integrative review examines how Montessori education conceptualises holistic development, child agency, teacher agency, learning, and the prepared environment, and compares these constructs with Piagetian constructivism, Vygotskian sociocultural theory, Bronfenbrenner's bioecological model, and the Reggio Emilia educational approach. A targeted and transparent evidence-identification strategy prioritised peer-reviewed reviews, meta-analyses, lottery-based comparisons, and foundational theoretical texts published or available through August 2026. The strongest secondary quantitative evidence is a Campbell systematic review of 32 baseline-equivalent studies contributing 204 effect sizes and 132,249 data points. It reported effects favouring Montessori for combined academic outcomes (Hedges' g = 0.24, 95% CI [0.13, 0.36]) and combined nonacademic outcomes (g = 0.33, 95% CI [0.16, 0.50]), with substantial heterogeneity. A 2025 national lottery-based trial additionally reported end-of-kindergarten advantages in reading, short-term memory, theory of mind, and executive function, while finding no notable impacts at earlier preschool endpoints. The synthesis indicates that Montessori offers a distinctive integration of purposeful choice, sequenced materials, movement, concentration, mixed-age community, and indirect adult guidance. However, available evidence does not justify universal superiority claims; outcomes depend on implementation fidelity, teacher preparation, context, measurement, and selection processes. The review proposes an ecological-relational account of Montessori agency and identifies priorities for culturally responsive implementation and future comparative research.

Keywords: *Montessori education; holistic child development; child agency; teacher agency; executive function; prepared environment; early childhood education; integrative review*

1. Introduction

Early childhood education establishes foundations for language, numeracy, executive function, social participation, emotional regulation, physical coordination, identity, and dispositions toward learning. Across contemporary early childhood discourse, children are increasingly recognised as capable participants rather than passive recipients of adult knowledge. Nevertheless, child-centredness is not a single

method. Educational traditions differ in how they understand development, freedom, adult authority, collaboration, culture, and the environment's role in learning.

Montessori education is a comprehensive developmental and pedagogical system created through Maria Montessori's observation of children in carefully organised environments. Its characteristic structures include mixed-age communities, an extended uninterrupted work cycle, sequenced hands-on materials, movement integrated with cognition, individual and small-group presentations, freedom within limits, control of error, and sustained teacher observation. These features are intended to support self-construction rather than simply make learning enjoyable or concrete. Children choose among activities for which they are developmentally ready, repeat them, complete cycles of work, and progressively assume responsibility for themselves and the social environment.

International evidence has expanded substantially, but public and scholarly claims remain polarised. Advocacy sometimes treats Montessori as intrinsically superior, whereas scepticism sometimes evaluates schools carrying the Montessori name without examining fidelity. Because the term Montessori is not legally protected in many jurisdictions, programme quality varies. Sound appraisal therefore requires a distinction between Montessori principles, implementation conditions, and measured outcomes (Marshall, 2017; Randolph et al., 2023).

This review retains the original manuscript's concern with holistic development and agency but corrects two methodological problems common in comparative discussions. First, Piaget, Vygotsky, Bronfenbrenner, Reggio Emilia, and Montessori are not equivalent types of framework: some are developmental theories, one is a bioecological metatheory, and others are educational philosophies and systems. Second, theoretical emphasis cannot be validly expressed through invented percentages. Comparisons must instead use explicit conceptual dimensions and genuine empirical estimates.

1.1 Purpose and review questions

The purpose is to critically examine Montessori education in relation to major early childhood perspectives and the best available secondary quantitative evidence. The review addresses four questions:

1. How does Montessori education conceptualise holistic child development, child agency, and teacher agency?
2. Where does Montessori converge with and diverge from Piagetian, Vygotskian, bioecological, and Reggio Emilia perspectives?
3. What does contemporary quantitative evidence indicate about Montessori academic and nonacademic outcomes?
4. Which contextual and implementation conditions qualify claims of a Montessori advantage?

2. Review Approach

This article is a critical integrative review, not a new empirical study or a de novo systematic review. It combines theoretical texts with high-relevance empirical syntheses to clarify concepts and assess evidence. A targeted search was conducted across publisher platforms, Crossref-indexed records, PubMed, ERIC-oriented web results, and reference lists of major Montessori reviews. Search combinations included Montessori with child development, agency, teacher role, executive function, academic outcomes, meta-analysis, systematic review, lottery, Piaget, Vygotsky, Bronfenbrenner, and Reggio Emilia. Priority was given to English-language peer-reviewed research, systematic and meta-analytic evidence, baseline-equivalent or lottery-based comparisons, and foundational works necessary for conceptual accuracy. The search was updated through August 2026.

Evidence was organised across eight dimensions: image of the child, mechanism of learning, child agency, teacher agency, environment, social relations, developmental breadth, and context. Quantitative estimates were reproduced only when directly reported by identifiable peer-reviewed sources. Because the approach was targeted rather than exhaustive, no PRISMA flow

count is claimed, and the review should not be interpreted as an independent meta-analysis.

3. Montessori Education as a Developmental System

3.1 The child, self-construction, and sensitive periods

Montessori viewed the young child as an active constructor of the person. The absorbent mind describes the distinctive capacity of early childhood to take in language, movement, order, social patterns, and cultural meanings from the environment. Sensitive periods refer to developmentally heightened responsiveness to particular forms of experience. These concepts do not imply that children automatically learn everything when left alone. They explain why timing, order, repetition, and environmental accessibility matter.

Human tendencies - including exploration, orientation, order, communication, movement, work, repetition, exactness, and abstraction - provide a broad account of purposeful activity. In practice, the guide observes how these tendencies appear in the individual child and connects the child with activity that can produce concentration and developmental integration. Normalisation, a historically specific Montessori term, refers to the emergence of concentration, self-discipline, purposeful sociability, and constructive choice through freely chosen work; it should not be confused with forcing children to conform to a statistical norm.

3.2 Prepared environment and materials

A prepared environment is an ordered social, material, temporal, and ethical setting. It includes child-sized furnishings, accessible materials, beauty, sequence, movement, meaningful limits, and a community in which independence and interdependence are cultivated. Montessori materials isolate a difficulty, progress from concrete relations toward abstraction, and frequently contain a control of error. Their educational value therefore lies not in being colourful manipulatives but in how design, presentation, sequence, repetition, and language support conceptual construction.

3.3 Freedom within limits and child agency

Montessori child agency is purposeful rather than unrestricted. Children choose from work that is available, developmentally appropriate, and previously presented; they respect people, materials, and collective routines. Agency is expressed through initiation, sustained attention, repetition, self-correction, help-seeking, contribution to the community, and growing responsibility. This account prevents a false opposition between freedom and structure: carefully designed limits make meaningful freedom possible.

3.4 Teacher agency

The Montessori adult is commonly called a guide, but this term can obscure the expertise involved. Teacher agency is enacted through scientific observation, precise presentation, record keeping, environmental maintenance, protection of concentration, interpretation of readiness, redirection of unproductive activity, grace and courtesy, and restraint. The guide decides when to intervene and when intervention would interrupt self-construction. Thus, reduced whole-class instruction does not mean reduced professional responsibility.

An ecological conception strengthens this account by treating agency as an achievement produced through interaction between professional capacities and environmental conditions, rather than as a fixed personal trait (Priestley et al., 2015). Montessori teachers draw on prior preparation, anticipate developmental possibilities, and make practical-evaluative judgements within the cultural, structural, and material conditions of the classroom. Their agency may therefore be enabled or constrained by leadership, policy, resources, training access, accountability systems, and community expectations.

4. Comparative Theoretical Analysis

Table 1. Conceptual comparison without unsupported numerical scoring.

Perspective	Ontological image of the child	Primary account of learning	Child agency	Adult/teacher agency
Montessori	Self-constructing, active, developmentally guided person	Purposeful activity in a prepared environment; movement, repetition, sequence, abstraction	Choice and responsibility within limits	Observer, precise presenter, guide, environmental custodian
Piagetian constructivism	Active constructor of cognitive structures	Assimilation, accommodation, equilibration, action on objects and problems	Exploration and cognitive coordination	Designs experiences and productive disequilibrium
Vygotskian sociocultural theory	Culturally situated participant	Language, cultural tools, joint activity, internalisation, ZPD	Participation and increasing regulation through mediated activity	More knowledgeable participant providing contingent guidance
Bioecological model	Developing person in interacting systems	Recurring proximal processes across person, process, context, and time	Emerges relationally within family, school, culture, policy, and history	Participant and connector across interdependent systems
Reggio Emilia approach	Competent, relational, rights-bearing citizen	Co-construction, inquiry, documentation, progettazione, hundred languages	Negotiation, expression, participation, democratic contribution	Co-learner, researcher, collaborator, and documenter

4.1 Montessori and Piaget

Montessori and Piaget converge in treating children as active constructors rather than passive recipients. Both recognise the significance of action on the environment and developmental transformation. Their differences are equally important. Piaget's theory explains cognitive structures and mechanisms such as assimilation and accommodation, whereas Montessori provides a comprehensive educational system with specified environments, materials, presentations, age groupings, and social practices. It is therefore inaccurate to rank one through percentages: they answer partly different questions.

4.2 Montessori and Vygotsky

Vygotsky foregrounds language, culture, social interaction, and the zone of proximal development. Montessori places greater visible emphasis on individual concentration and indirect preparation, yet Montessori classrooms are social communities: children observe one another, assist peers, engage in grace and courtesy, converse, collaborate, and participate across ages. Montessori presentation and calibrated intervention may resemble scaffolding functionally, but the traditions use different conceptual vocabularies and assumptions. Their

relationship is best described as partial convergence, not equivalence.

4.3 Montessori and the bioecological model

Bronfenbrenner's mature bioecological model extends analysis beyond classroom design. Development occurs through reciprocal proximal processes involving characteristics of the person and nested contexts over time. This lens exposes how family-school relationships, language, socioeconomic inequality, teacher education, accreditation, policy, and historical conditions influence Montessori implementation. It also challenges the assumption that a prepared classroom can be understood independently of the systems that sustain it.

4.4 Montessori and Reggio Emilia

Both traditions reject a deficit image of the child and assign importance to environment, observation, and meaningful activity. Montessori offers sequenced materials and an organised pathway toward independent mastery; Reggio Emilia emphasises emergent inquiry, pedagogical documentation, collaborative projects, the hundred languages, and democratic participation. The contrast between individual and group learning should not be exaggerated: both contain individual and collective activity, but they organise curriculum, materials, documentation, and adult-child negotiation differently.

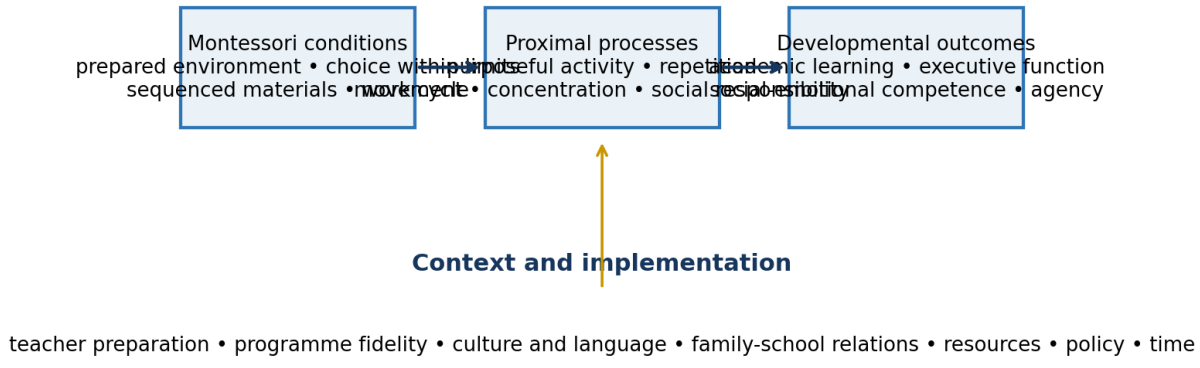


Figure 1. Ecological-relational synthesis of Montessori conditions, developmental processes, and outcomes.

5. Evidence on Academic and Nonacademic Outcomes

5.1 Systematic review evidence

Randolph et al. (2023) provide the most comprehensive quantitative synthesis currently available. Their Campbell systematic review searched 19 academic databases and additional grey-literature sources and included studies published through February 2020. From 2,012 records, 32 studies met eligibility criteria requiring a Montessori-traditional comparison and evidence of baseline equivalence. The included studies contributed 204 effect sizes (113 academic and 91 nonacademic) across 132,249 data points.

This synthesis builds on earlier controlled work. Lillard and Else-Quest (2006) used a school-lottery comparison and reported stronger performance among Montessori children on several academic and social-cognitive measures, although the preschool sample was small. A later three-year longitudinal lottery study followed 141 children and found stronger growth in academic achievement, social understanding, mastery orientation, and liking of academic tasks in high-fidelity Montessori settings (Lillard et al., 2017).

These studies are influential but should be interpreted alongside their setting, sample, fidelity, and attrition limitations.

Table 2. Genuine secondary estimates reported by Randolph et al. (2023). Positive values favour Montessori.

Outcome	Hedges' g	95% CI	Studies	Effect sizes	Evidence interpretation
All academic outcomes	0.24	0.13 to 0.36	24	113	Modest positive average; substantial heterogeneity
General academic ability	0.26	0.06 to 0.46	9	24	Positive; high-certainty rating in review
Language/literacy	0.17	0.03 to 0.31	16	45	Small positive effect; publication-bias concern
Mathematics	0.22	0.06 to 0.39	12	36	Small positive effect; high-certainty rating
Science	0.15	-0.61 to 0.90	3	5	Imprecise and nonsignificant
All nonacademic outcomes	0.33	0.16 to 0.50	18	91	Positive average; substantial heterogeneity
Executive function	0.36	0.15 to 0.58	11	34	Positive; moderate-certainty rating
Creativity	0.26	-0.21 to 0.74	6	24	Positive point estimate but imprecise
Social skills	0.23	Not reported here	Multiple	23	Positive estimate; lower certainty

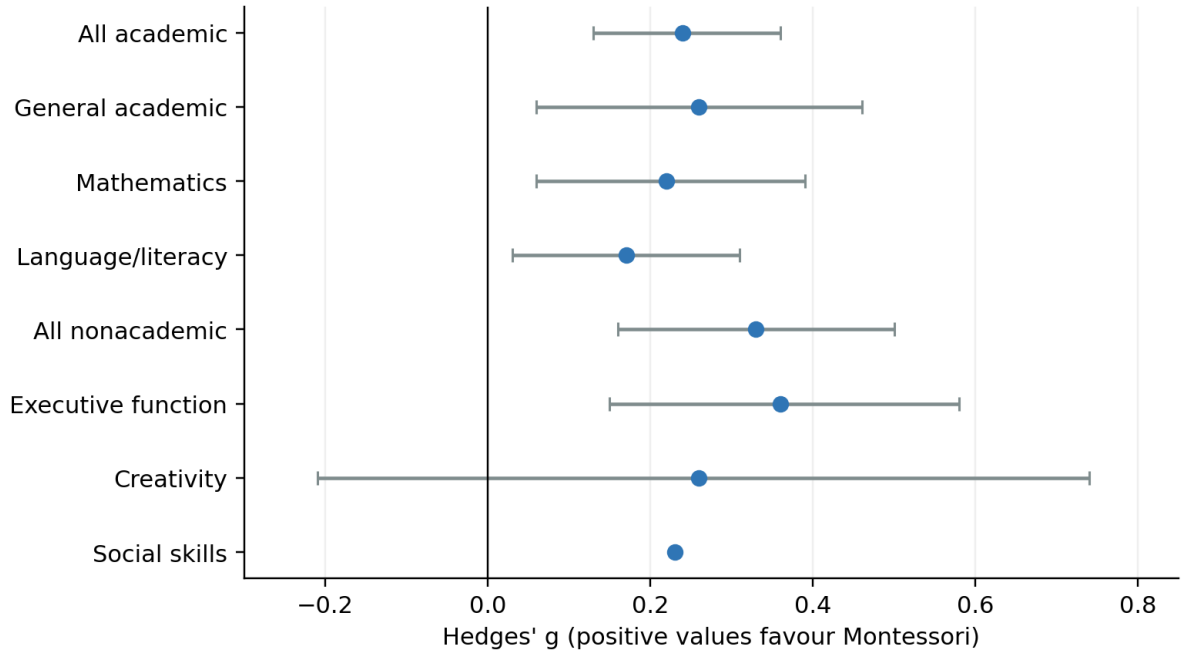


Figure 2. Selected effects reported by Randolph et al. (2023). Error bars show 95% confidence intervals where available in the review table.

These averages support cautious claims of advantage, not universal superiority. Heterogeneity was substantial for combined academic outcomes (I^2 = 76.54%) and combined nonacademic outcomes (I^2 = 85.73%). Publication-bias sensitivity analysis reduced the random-effects academic composite from approximately g = 0.23 to 0.14 after trim-and-fill imputation and reduced the nonacademic composite from g = 0.23 to 0.16. Although the direction remained favourable, the smaller adjusted estimates demonstrate why promotional language should be avoided.

5.2 Meta-analysis and recent lottery evidence

Demangeon et al. (2023) independently meta-analysed Montessori effects across five fields of development and learning and reported generally positive effects whose magnitude varied by domain and design. Convergence between the two 2023 syntheses strengthens the overall conclusion that Montessori can yield meaningful benefits, while variability cautions against treating all outcomes and implementations alike.

The evidence base has continued to develop. Lillard et al. (2025) conducted a national lottery-based study across 24 public Montessori schools. At the end of kindergarten, children offered Montessori admission showed significantly higher reading, short-term memory, theory of mind, and executive-function scores; intention-to-treat effects exceeded one fifth of a standard deviation for these outcomes. However, the study reported no notable impacts at the end of the earlier PK3 or PK4 assessments, and only about half of the treatment sample remained in Montessori by kindergarten. These results suggest that duration, developmental timing, actual attendance, and programme continuity matter.

5.3 Interpreting holistic development

Holistic development should not be operationalised as a single unsupported percentage. It refers to relationships among cognitive, linguistic, executive, social, emotional, physical, moral, creative, and identity-related development. Montessori practical life activity can integrate movement, order, executive control, independence, social contribution, and dignity. Sensorial activity can refine perception while supporting language and mathematical abstraction. Grace and courtesy embeds

individual freedom within ethical community life. Nevertheless, evidence is stronger for some measured outcomes than others, and no available review demonstrates superiority in every developmental domain.

6. Child Agency, Teacher Agency, and Mechanisms

6.1 From choice to agentic participation

Choice is necessary but insufficient for agency. A child selecting an activity without sustained engagement, understanding, responsibility, or opportunity to influence classroom life may exercise preference rather than robust agency. Montessori structures can support agency through accessible materials, voluntary repetition, control of error, real responsibility, mixed-age participation, and increasing independence. At the same time, rigid presentation, culturally narrow materials, excessive adult nonintervention, or fidelity interpreted as inflexibility can constrain voice and belonging.

6.2 Teacher agency and fidelity

The review evidence indicates that implementation cannot be separated from outcomes. Randolph et al. (2023) reported variation between public and private settings and noted incomplete fidelity information in several studies. Fidelity should not mean mechanical reproduction. It requires preservation of core developmental mechanisms while teachers respond ethically to disability, culture, language, resources, and family knowledge. Useful fidelity dimensions include teacher preparation, uninterrupted work time, mixed-age grouping, completeness and sequencing of materials, observation-led presentation, freedom within limits, and absence of extrinsic reward structures that displace intrinsic motivation.

6.3 Plausible developmental mechanisms

- Executive function: remembering sequences, inhibiting impulsive action, monitoring error, sustaining attention, and completing cycles of work.
- Academic abstraction: materials make relations visible and manipulable before symbols are used independently.
- Intrinsic motivation: meaningful choice and optimal challenge can support sustained voluntary engagement.
- Social responsibility: mixed-age community, care of the environment, and grace and courtesy link autonomy with interdependence.
- Embodied cognition: coordinated movement is integrated with perception, language, mathematics, and practical competence.

These mechanisms are theoretically plausible but should not be treated as established mediators without direct empirical testing. Future studies should measure the proposed processes rather than infer them from school labels.

7. Critical Challenges and Contextual Adaptation

Three tensions require explicit attention. First, Montessori materials are deliberately constrained and sequenced, whereas some contemporary approaches prioritise open-ended fantasy, collaborative projects, and negotiated curriculum. The appropriate conclusion is not that one mode is universally better, but that educators should understand what forms of cognition and participation each arrangement supports.

Second, the global circulation of Montessori can reproduce cultural and socioeconomic exclusion when materials, language, fees, accreditation, or teacher education remain inaccessible. De Souza (2025) argues that Montessori's inclusive potential in Southern Africa depends on community-responsive adaptation, local materials, inclusive training, and dismantling its elitist image. Similar questions are relevant in South Asian and other resource-constrained settings.

Third, inclusion requires more than individual pacing. Children with disabilities may need environmental modifications, augmentative communication, additional adult support, interdisciplinary collaboration, and accessible versions of materials. Such adaptation can remain Montessorian when it protects dignity, independence, purposeful participation, and developmental coherence.

8. Implications for Early Childhood Education

- Describe Montessori implementation precisely; do not infer quality from the school label.
- Treat child agency as responsible participation within relationships and limits, not unrestricted choice.
- Invest in teacher observation, developmental knowledge, inclusive practice, and culturally responsive adaptation.
- Preserve the uninterrupted work cycle and coherent sequence of materials when evaluating Montessori outcomes.
- Measure academic and nonacademic outcomes with independent, valid instruments and report null findings.
- Use Piagetian, Vygotskian, bioecological, and Reggio perspectives as complementary analytical lenses rather than as percentage-ranked competitors.

9. Limitations and Future Research

This review is integrative and targeted rather than exhaustive; it does not claim independent systematic-review completeness or reanalyse primary datasets. Much of the outcome literature is concentrated in North America and Europe, limiting transfer to culturally and materially different settings. Programme fidelity is inconsistently documented, selection into Montessori can bias nonrandom comparisons, and outcome measures vary. The 2023 Campbell review also identified heterogeneity and possible publication bias. Furthermore, child and teacher agency are often discussed theoretically but rarely measured with validated instruments in Montessori settings.

Future research should preregister designs, use lottery or carefully matched comparisons where random assignment is not possible, collect longitudinal data, measure fidelity independently, and employ multilevel analyses that account for children nested within classrooms and schools. Research should examine mechanisms, disability inclusion, cultural adaptation, teacher agency, family perspectives, child voice, cost, and outcomes in low- and middle-income countries. Qualitative observation and participatory methods are essential companions to standardised tests because agency and belonging cannot be reduced to scores alone.

10. Conclusion

Montessori education offers a distinctive synthesis of purposeful freedom, sequenced materials, embodied activity, concentration, mixed-age community, and indirect but highly skilled adult guidance. The best available quantitative synthesis indicates modest positive average effects on academic outcomes and somewhat larger positive average effects on nonacademic outcomes, especially executive function. Recent lottery-based evidence adds support at the end of kindergarten while showing that benefits may not appear uniformly or immediately.

The defensible claim is therefore not that Montessori is the best educational approach in every domain and context. Rather, well-implemented Montessori education appears capable of supporting meaningful academic and nonacademic development, with outcomes shaped by fidelity, teacher preparation, culture, resources, continuity, and the wider ecology of childhood. A critical, relational, and context-sensitive interpretation strengthens rather than weakens the Montessori contribution to contemporary early childhood education.

Declarations

Ethics approval: Not applicable. This article analyses published literature and reports no new data from human participants.

Data availability: No new dataset was generated. Numerical estimates are reproduced from the cited published sources.

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References

Biesta, G., Priestley, M., & Robinson, S. (2015). The role of beliefs in teacher agency. Teachers and Teaching, 21(6), 624–640. https://doi.org/10.1080/13540602.2015.1044325

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner (Ed.), Handbook of child psychology: Vol. 1. Theoretical models of human development (6th ed., pp. 793–828). Wiley.

De Souza, B. (2025). Inclusivity in early childhood education in Southern Africa: A Montessorian critique. South African Journal of Childhood Education, 15(1), a1808. https://doi.org/10.4102/sajce.v15i1.1808

Demangeon, A., Claudel-Valentin, S., Aubry, A., & Tazouti, Y. (2023). A meta-analysis of the effects of Montessori education on five fields of development and learning in preschool and school-age children. Contemporary Educational Psychology, 73, 102182. https://doi.org/10.1016/j.cedpsych.2023.102182

Lillard, A. S. (2017). Montessori: The science behind the genius (3rd ed.). Oxford University Press.

Lillard, A. S. (2019). Shunned and admired: Montessori, self-determination, and a case for radical school reform. Educational Psychology Review, 31, 939–965. https://doi.org/10.1007/s10648-019-09483-3

Lillard, A. S., & Else-Quest, N. (2006). Evaluating Montessori education. Science, 313(5795), 1893–1894. https://doi.org/10.1126/science.1132362

Lillard, A. S., Heise, M. J., Richey, E. M., Tong, X., Hart, A., & Bray, P. M. (2017). Montessori preschool elevates and equalizes child outcomes: A longitudinal study. Frontiers in Psychology, 8, 1783. https://doi.org/10.3389/fpsyg.2017.01783

Lillard, A. S., Loeb, D., Berg, J., Escueta, M., Manship, K., Hauser, A., & Daggett, E. D. (2025). A national randomized controlled trial of the impact of public Montessori preschool at the end of kindergarten. Proceedings of the National Academy of Sciences, 122(43), e2506130122. https://doi.org/10.1073/pnas.2506130122

Marshall, C. (2017). Montessori education: A review of the evidence base. npj Science of Learning, 2, 11. https://doi.org/10.1038/s41539-017-0012-7

Montessori, M. (1967). The absorbent mind (C. A. Claremont, Trans.). Holt, Rinehart and Winston. (Original work published 1949)

Montessori, M. (1989). The child in the family. Clio Press. (Original work published 1923)

Piaget, J. (1952). The origins of intelligence in children (M. Cook, Trans.). International Universities Press. (Original work published 1936)

Priestley, M., Biesta, G., & Robinson, S. (2015). Teacher agency: An ecological approach. Bloomsbury Academic.

Randolph, J. J., Bryson, A., Menon, L., Henderson, D. K., Kureethara Manuel, A., Michaels, S., Rosenstein, D. L. W., McPherson, W., O'Grady, R., & Lillard, A. S. (2023). Montessori education's impact on academic and nonacademic outcomes: A systematic review. Campbell Systematic Reviews, 19(3), e1330. https://doi.org/10.1002/cl2.1330

Rinaldi, C. (2006). In dialogue with Reggio Emilia: Listening, researching and learning. Routledge.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

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