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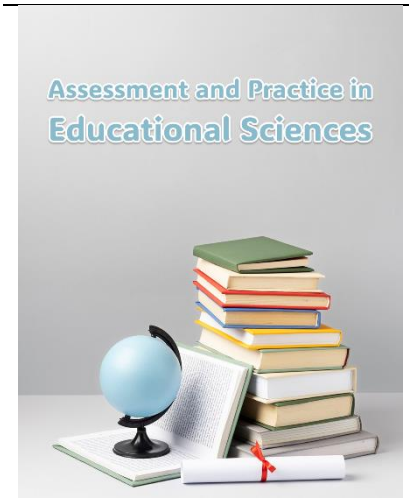

Embodiment and Empathy: Linking Merleau-Ponty's Phenomenology and Montessori Education in Fostering Emotional Understanding in Preschool Children

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ABSTRACT

This study was conducted with the aim of elucidating the role of embodiment in fostering empathy and emotional understanding among preschool children and clarifying the potential of Montessori education to strengthen these skills. The research was designed as a systematic review using a thematic synthesis approach based on the model proposed by Thomas and Harden (2008). Searches were carried out in the Google Scholar, ERIC, PubMed, ScienceDirect, and Scopus databases, along with manual searches of the reference lists of key articles, up to the year 2024. After removing duplicates and screening titles, abstracts, and full texts according to inclusion and exclusion criteria, 15 eligible sources were included in the synthesis. Conceptual data were extracted through line-by-line coding and organized into 12 descriptive themes and 3 analytical themes. The three principal analytical themes were: (1) embodiment in Merleau-Ponty's phenomenology and the mechanisms of emotional understanding; (2) components of Montessori education in emotional development; and (3) the linkage between embodiment and empathy in sensory–social activities. Based on these themes, structured sensory experiences and shared bodily interactions (such as movement imitation, group games, and practical life activities) enhance emotional self-awareness, emotion regulation, and bodily simulation/co-feeling, thereby facilitating the emergence of empathic behaviors. The integration of Merleau-Ponty's embodiment framework with the Montessori pedagogical method opens new horizons for designing bodily–sensory environments and activities in preschool classrooms; activities such as working with tactile materials, practical life exercises, the silence game, and collaborative role-playing can systematically cultivate emotional understanding and empathy. Given the limitations of causal evidence and the absence of indigenous studies in Iran, intervention-based and context-sensitive research is recommended to evaluate the effectiveness of these activities.

Keywords: embodiment; empathy; emotional understanding; Merleau-Ponty's phenomenology; Montessori education; preschool children

Introduction

Empathy and emotional understanding constitute foundational components of children's social competence and long-term psychological adjustment. During the preschool years (ages 3–6), children undergo rapid development in affect recognition, emotional regulation, and perspective-taking capacities, all of which form the groundwork for empathic engagement with others (1, 2). Empathy has been conceptualized as a multidimensional construct encompassing affective resonance, cognitive

perspective taking, and motivational responsiveness toward others' emotional states (3). Early manifestations of concern for others, such as comforting a distressed peer or sharing resources, emerge in the preschool period and are shaped by both neurobiological mechanisms and social learning processes (4). Contemporary evidence further suggests that disruptions in early relational environments—such as maltreatment or neglect—may alter neural circuits associated with empathic processing, underscoring the importance of structured educational contexts in supporting healthy socio-emotional development (5-8).

Within developmental psychology, emotional understanding has been closely linked to children's capacity for self-awareness and self-regulation. Emotional self-awareness enables children to identify and label their internal states, while regulatory capacities allow them to manage impulses and modulate affective responses in social interactions (1). Educational environments that intentionally cultivate these capacities can therefore serve as powerful contexts for fostering empathy. Evidence indicates that structured preschool programs emphasizing social engagement and reflective practice promote both academic and nonacademic outcomes, including socio-emotional skills (9). However, the theoretical foundations underlying these effects remain insufficiently integrated with philosophical accounts of embodied experience.

Phenomenology, particularly the work of Maurice Merleau-Ponty, offers a compelling framework for understanding how embodied experience shapes emotional comprehension. Merleau-Ponty argues that perception is not a detached cognitive operation but is grounded in lived bodily engagement with the world (10, 11). The body is not merely an object among objects; rather, it is the primary site through which the world is encountered and meaning is constituted. In his lectures on child psychology and pedagogy, he emphasizes that children's perceptual and emotional lives unfold through sensorimotor exploration and intersubjective interaction (12). This embodied perspective aligns with broader phenomenological accounts of intersubjectivity, which describe understanding others as emerging through reciprocal bodily engagement rather than abstract inference (13, 14).

From the standpoint of embodied cognition, affective understanding is mediated by bodily simulation processes. According to Shapiro, cognitive processes—including social cognition—are deeply rooted in sensorimotor systems (15). Observing another's action or emotional expression activates corresponding neural and bodily representations in the observer, thereby enabling empathic resonance. This account is supported by neuroscientific research on mirror neuron systems, which demonstrates that neural circuits involved in performing actions are also activated when observing others perform similar actions (16). Such mechanisms provide a plausible biological substrate for early empathic development, particularly in contexts where children engage in shared bodily experiences.

Educational philosophy has long recognized the centrality of experience in learning. Dewey argued that meaningful education must be grounded in active engagement and reflective interaction with the environment (17). Montessori education operationalizes this principle through carefully prepared environments that encourage sensory exploration, autonomy, and collaborative engagement. Maria Montessori's original writings emphasize the formative role of sensorimotor activities and practical life exercises in shaping children's character and social awareness (18-20). In Montessori classrooms, children engage with tactile materials, coordinated movement, and cooperative tasks that integrate cognitive, motor, and emotional processes.

Empirical research has increasingly examined the developmental outcomes associated with Montessori education. Longitudinal evidence suggests that children enrolled in Montessori programs demonstrate enhanced social competence, cooperation, and emotional regulation compared to peers in traditional educational settings (21). Systematic reviews further indicate consistent benefits across both academic and socio-emotional domains (9, 22). Experimental findings reveal that participation in structured sensory and collaborative activities is associated with increased empathic behaviors, including helping and prosocial responsiveness (23). These outcomes suggest that Montessori environments may provide fertile ground for embodied experiences that nurture empathy.

The convergence between phenomenological theory and Montessori pedagogy lies in their shared emphasis on embodied engagement. While phenomenology articulates the ontological and epistemological significance of the body in shaping perception and intersubjective understanding (10, 13), Montessori education translates these insights into pedagogical practice through sensory materials, movement-based activities, and collaborative routines (18, 20). Yet, despite this conceptual alignment, limited scholarship has systematically synthesized philosophical, neuroscientific, and educational evidence to clarify the mechanisms linking embodiment and empathy within Montessori contexts.

Recent interdisciplinary research further underscores the importance of contextual and relational factors in shaping empathic development. Studies examining the effects of early adversity demonstrate alterations in empathy-related neural circuitry, highlighting the plasticity and vulnerability of these systems (5, 6). Interventions that promote mindfulness, child-centered engagement, and structured sensory experiences have shown promise in enhancing empathy and self-esteem among preschool populations (24). These findings reinforce the need for educational frameworks that intentionally integrate embodied interaction, emotional awareness, and social cooperation.

In light of these theoretical and empirical developments, a systematic synthesis of research examining the intersection of embodiment, empathy, and Montessori pedagogy is warranted. Such synthesis can clarify how sensorimotor engagement, intersubjective resonance, and structured educational practice converge to shape emotional understanding in early childhood. By integrating phenomenological theory, embodied cognition, developmental psychology, and empirical educational research, the present study seeks to provide a comprehensive conceptual framework for understanding how bodily experience within Montessori environments fosters empathy and emotional development in preschool children.

Methods and Materials

This study is a systematic review employing a thematic synthesis approach designed in accordance with the method proposed by Thomas and Harden (2008). The aim of the synthesis was to extract and integrate “conceptual/interpretive findings” concerning the linkage between embodiment and empathy within Montessori education. Accordingly, when quantitative studies were included, only the interpretive components related to mechanisms and emotional outcomes were extracted and incorporated into the qualitative synthesis.

The search was conducted up to 2024 in the Google Scholar, ERIC, PubMed, ScienceDirect, and Scopus databases. Keywords in Persian and English were combined using the Boolean operators AND/OR. A sample search string (for one database) was as follows: (“embodied cognition” OR embodiment OR “Merleau-Ponty”) AND (empathy OR “emotional understanding” OR “emotional development”) AND (Montessori OR “Montessori pedagogy” OR “Montessori education”). Manual searches of the reference lists of key articles were also performed.

Inclusion and exclusion criteria were defined as follows: Inclusion criteria comprised (1) direct relevance to embodiment/embodied cognition and empathy/emotional development in children aged 3–6 years or preschool settings; (2) a credible scholarly source (peer-reviewed article, academic book, or reputable institutional website); (3) publication in Persian or English; and (4) availability of full text. Exclusion criteria included lack of topical relevance, absence of full-text access, and low methodological quality (based on a quality appraisal instrument).

The selection process was carried out in three stages. In the initial search, 325 sources were identified from the databases. During the preliminary screening, titles and abstracts were reviewed, and 280 sources were excluded due to lack of relevance. In the full-text review stage, the remaining 45 sources were assessed for eligibility, and 15 sources were selected for the final synthesis.

From each source, the following information was extracted: author(s) and year of publication, type of source (theoretical, empirical, or web-based), study design (for empirical studies, such as longitudinal or experimental), study population (e.g., children aged 3–6 years), and key findings related to embodiment, empathy, or Montessori education. Data extraction was conducted by the principal researcher and subsequently reviewed by two additional researchers to ensure accuracy. The data were organized in a table (Table 2) to facilitate comparison and analysis.

Quality appraisal was conducted as follows. The quality of empirical sources was assessed using the Critical Appraisal Skills Programme (CASP) checklist for qualitative studies. This instrument evaluates criteria such as clarity of aims, appropriateness of methodology, and credibility of findings. Theoretical sources were appraised based on the scholarly authority of the authors (e.g., the academic standing of Merleau-Ponty or Gallagher) and the reputation of publishers (e.g., Routledge or Northwestern University Press). Web-based sources, such as the website of the Association Montessori Internationale (AMI), were evaluated according to institutional credibility and currency of information. All 15 selected sources met the established quality criteria.

Thematic synthesis was conducted in three stages in accordance with Thomas and Harden (2008). In the first stage, line-by-line coding was performed. Each source was read in full, and sections relevant to the research topics were coded. In total, 142 initial codes were identified, including “sensory perception,” “group interactions,” and “emotional imitation.” In the second stage, the codes were organized into 12 descriptive themes, such as “the role of the body in emotional perception,” “Montessori sensory activities,” and “shared bodily experiences.” In the third stage, the descriptive themes were analyzed to generate three overarching analytical themes that addressed the research questions: (1) embodiment in Merleau-Ponty’s phenomenology; (2) Montessori education and emotional development; and (3) the linkage between embodiment and empathy.

Table 1. Examples of Initial Codes and Thematic Organization

Sample Code	Descriptive Theme	Analytical Theme
Sensory perception	The role of the body in perception	Embodiment in Merleau-Ponty’s phenomenology
Tactile materials (e.g., sensory boxes)	Montessori sensory activities	Montessori pedagogy and emotional development
Emotional imitation	Shared bodily experiences	Linkage between embodiment and empathy
Coordinated group movement	Intersubjective bodily interaction	Linkage between embodiment and empathy
Practical life exercises	Structured autonomy and social participation	Montessori pedagogy and emotional development

The coding process was conducted manually in order to maintain direct control over the data. Analyses were continuously compared with the original texts of the sources to ensure analytical rigor and accuracy.

Table 2. Summary of Selected Sources Included in the Synthesis

Author	Year	Type of Source	Description	Language
Merleau-Ponty	2018	Book	*Phenomenology of Perception* (Persian translation)	Persian
Montessori	2009	Book	*The Montessori Method* (Persian translation)	Persian
Merleau-Ponty	2012	Book	*Phenomenology of Perception* (English edition)	English
Merleau-Ponty	2010	Book	*Child Psychology and Pedagogy*	English
Montessori	1912	Book	*The Montessori Method*	English
Montessori	2013	Book	*The Montessori Method: Origins of an Educational Innovation*	English
Gallagher	2008	Book	*The Phenomenological Mind*	English
Welsh	2013	Book	*The Child as Natural Phenomenologist*	English
Shapiro	2019	Book	*Embodied Cognition*	English
Gallese	2014	Article	Mirror neuron system and embodied simulation	English
Zahn-Waxler	1992	Article	Development of concern for others in childhood	English
Lillard	2017	Article	Longitudinal study on Montessori preschool outcomes	English
Marshall	2017	Article	Review of the Montessori evidence base	English
Gentaz	2022	Article	Behavioral effects of Montessori pedagogy	English
Randolph	2023	Article	Systematic review of Montessori educational outcomes	English

Findings and Results

Theme 1: Embodiment in Merleau-Ponty's Phenomenology and Its Role in Preschool Children's Emotional Understanding

Maurice Merleau-Ponty's phenomenology conceptualizes the body as the center of lived experience and human perception, a position that is crucial for understanding emotional development in preschool children aged 3–6 years. In *Phenomenology of Perception*, he argues that the body is not merely an instrument for interacting with the world, but is itself constitutive of perception and experience (10). His assertion that the body is our primary means of being in the world underscores that consciousness and experience are inherently intertwined with embodied existence. For young children, this implies that sensory and motor engagements—such as touching, moving, and exploring—contribute not only to spatial cognition but also to lived experiential encounters that ground emotional understanding. When a child reaches out to touch an object, this act strengthens perceptual-motor coordination while simultaneously situating the child within a relational field of meaning that supports emerging sensitivity to others' affective states.

The relationship between embodiment and the understanding of others' emotions can also be explained through the notion of intersubjectivity. Welsh, in *The Child as Natural Phenomenologist*, demonstrates that children naturally grasp others' emotions through bodily interactions, such as movement imitation or tactile responsiveness (14). This process occurs through what may be described as bodily co-feeling, whereby observing an emotion in another elicits a corresponding embodied response in the child. For instance, when a child observes a peer crying, the child may experience muscular tension or a shift in facial expression that mirrors sadness, thereby facilitating emotional comprehension.

Shapiro extends this idea within the framework of embodied cognition, emphasizing "bodily simulation" as a mechanism through which empathic understanding is formed (15). According to this perspective, understanding others arises through the embodied simulation of their movements and expressive states. This account aligns with neuroscientific findings concerning the mirror neuron system, which supports embodied resonance with others' actions and emotions (16). In early childhood, such mechanisms enable children to interpret others' emotional states through shared bodily experiences, such as imitating a smile or responding to expressions of sadness.

Within educational contexts, this conceptualization suggests that activities engaging the body—such as group play or structured sensory tasks—can enhance emotional understanding. When a child participates in an imitative game, motor skills are refined while embodied simulation simultaneously strengthens the capacity to interpret others' feelings. Rooted in embodiment, this process provides a theoretical foundation for cultivating empathy in educational settings, including those informed by Montessori pedagogy (18).

Theme 2: Montessori Education and Emotional Development

Montessori education is an instructional approach that emphasizes self-directed learning, practical activities, and collaborative interaction. Through the use of structured sensory materials and carefully prepared learning environments, it significantly facilitates emotional development in preschool children aged 3–6 years. Emotional development in this context encompasses the ability to recognize and regulate one's own emotions, develop self-regulation, and form affective connections with others—competencies that are foundational to empathy (1). This theme is organized around two subthemes: the role of sensory activities in fostering self-awareness and interpersonal connection, and empirical evidence supporting the impact of Montessori education on emotional skills.

The Role of Sensory Activities in Fostering Self-Awareness and Interpersonal Connection

Montessori argues that sensory exercises and practical life activities provide children with opportunities to cultivate concentration and self-awareness (19). Emotional self-awareness—the capacity to identify and understand one's own

feelings—is strengthened through sensory engagement because such activities focus attention and bodily responsiveness. For example, the "Silence Game," in which children sit quietly and attend to environmental sounds, promotes mindfulness and self-regulation within a structured yet autonomous setting (20).

Sensory activities also enhance emotional connection with others. Since many Montessori tasks are conducted collaboratively, they naturally foster social interaction. In practical life activities—such as preparing snacks or cleaning a table—children learn cooperation, shared responsibility, and communicative competence. Montessori emphasizes that these practices cultivate the child "as a social being" (18).

Play occupies a central position in this developmental process. Beyond strengthening cognitive and physical capacities, play plays a critical role in emotional growth. When educators create opportunities for children to express and regulate emotions through sensory engagement within a safe and structured environment, children develop more refined emotional regulation skills. Systematic evidence indicates that Montessori environments contribute positively to both academic and nonacademic outcomes, including socio-emotional competencies (9). From the standpoint of embodied cognition, sensory–motor interaction—such as manipulating materials or collaborating in shared tasks—integrates cognitive and emotional processes (15). This interpretation aligns with the concept of embodied simulation, through which children understand others' feelings by reflecting their movements and affective expressions.

Empirical Evidence of the Impact of Montessori Education on Emotional Skills

A growing body of empirical research demonstrates that Montessori educational environments exert meaningful effects on preschool children's emotional skills. A longitudinal study conducted with 141 children found that those enrolled in Montessori programs exhibited stronger empathy, cooperation, and socio-emotional competencies compared with peers in traditional preschool settings (21). These differences may be attributed to distinctive Montessori structures, including sensory-based activities, meaningful social interaction opportunities, and guided freedom within prepared environments.

A comprehensive review of 26 studies similarly concluded that collaborative and sensory-based activities in Montessori settings consistently promote cooperation, mutual respect, and empathic behavior (22). Activities such as caring for plants and animals encourage responsibility and deeper forms of social engagement.

In an experimental study involving behavioral observation of 85 children, sensory and group-based activities—such as object sorting and environmental preparation—were shown to significantly increase empathic behaviors, including helping peers and responding to others' distress (23).

From a neuroscientific perspective, these effects may be mediated by activation of mechanisms associated with embodied resonance, including processes linked to mirror neuron functioning (16). Imitative and sensory activities characteristic of Montessori environments naturally stimulate these mechanisms. Overall, by providing a secure space for the expression and regulation of emotions through sensory play and structured social interaction, Montessori classrooms offer a robust context for fostering emotional and social development in preschool children.

Theme 3: The Linkage Between Embodiment and Empathy in Montessori Education

The third theme emphasizes the relationship between embodiment and empathy within the framework of Montessori pedagogy and examines how preschool children's emotional understanding can be strengthened through bodily experience. Empathy, defined as the cognitive and affective capacity to understand and share the feelings of others, is fundamental to children's social development (3). This theme encompasses two subthemes: the role of bodily experience in cultivating empathy from a theoretical perspective, and the practical application of this linkage in Montessori activities. Drawing on both theoretical and empirical sources, the following discussion explicates the psychological and neuroscientific mechanisms underlying this process.

The Role of Bodily Experience in Cultivating Empathy

"We are in the world through our body" (10). This phenomenological insight is complemented by the notion of intersubjectivity, referring to the shared bodily experience among individuals (13). In children, this entails understanding others' emotions through embodied interactions such as movement imitation, eye contact, and coordinated action in group play. For example, when a child repeats a peer's hand movement in an imitative game, the act of motor resonance contributes to affective simulation, thereby supporting emotional understanding.

Gallagher and Zahavi further elaborate that structured embodied interactions foster deeper affective comprehension (13). They introduce the idea of bodily co-feeling, whereby observing another's emotional expression evokes a corresponding embodied response. For instance, when a child sees a peer crying, muscular tension or a change in facial expression may arise in the observer, forming the experiential basis for affective empathy.

Shapiro analyzes this process through the lens of embodied cognition, emphasizing "bodily simulation" as the mechanism through which empathic understanding emerges (15). Bodily simulation involves recreating another person's affective state through one's own sensorimotor responses. This account aligns with neuroscientific findings concerning the mirror neuron system, which activates both during the execution of an action and during its observation in others (16). In preschool children, such mechanisms are strengthened through motor activities, including imitation during group games or responsiveness to facial expressions, thereby facilitating empathic understanding.

From a developmental psychology perspective, research demonstrates that young children acquire empathy through imitation and social interaction (4). During the preschool years, when peer engagement intensifies, embodied interactions—such as coordinated play or helping behaviors—enable children to recognize nonverbal emotional cues, including facial expressions and tone of voice. These experiences contribute to the development of both cognitive and affective dimensions of empathy.

Table 3: Summary of Key Concepts Across Main Themes

Main Theme	Key Concepts	Related Sources
Theme 1: Embodiment in Merleau-Ponty's Phenomenology and Its Role in Emotional Understanding	• The body as the center of lived experience and perception • Intersubjectivity and reciprocal bodily interaction • Embodied simulation and bodily co-feeling • The role of sensory–motor interaction in understanding others' emotions	(10, 12-16)
Theme 2: Montessori Education and Emotional Development	• Self-directed learning and sensory activities (e.g., tactile materials, Silence Game) • Collaborative interaction and behavioral modeling • Enhancement of emotional self-awareness and regulation • Role of play and environmental care in socio-emotional growth	(9, 18, 20-23)
Theme 3: The Linkage Between Embodiment and Empathy in Montessori Education	• Shared bodily experiences (e.g., imitation, coordinated movement) • Embodied simulation through sensory–motor interaction • Development of empathy through collaborative activities • Neuroscientific mechanisms (e.g., mirror neuron processes)	(4, 10, 13-16)

Table 4: Thematic Synthesis Framework

Main Theme	Subtheme	Key Sources	Main Finding
Embodiment in Merleau-Ponty's Phenomenology	The body as mediator of perception and lived experience	(10, 12)	The body functions as the primary mediator of perception; sensory experience facilitates emotional understanding.
	Embodiment and understanding others' emotions	(13, 14)	Children interpret others' emotions through embodied interaction such as imitation and tactile engagement.
Montessori Pedagogy and Emotional Development	Sensory activities and development of self-awareness	(18, 20)	Sensory and practical life activities enhance emotional self-awareness and interpersonal connection.
	Impact of Montessori education on emotional competencies	(9, 21-23)	Montessori environments improve socio-emotional skills, cooperation, and empathic behavior.
Linkage Between Embodiment and Empathy	Bodily experience in cultivating empathy	(13, 15, 16)	Shared bodily experiences activate embodied simulation mechanisms that support empathy.
	Practical implementation in Montessori environments	(9, 23)	Group-based sensory activities create embodied interaction contexts that promote empathic development.

Discussion and Conclusion

The present thematic synthesis sought to clarify how embodiment, as articulated in phenomenological theory, converges with Montessori pedagogy to foster empathy and emotional understanding in preschool children. The findings indicate that embodiment functions as a foundational mechanism through which children develop affective awareness, and that Montessori educational practices operationalize this mechanism through structured sensory–motor engagement. Across the synthesized studies, three interrelated analytical themes emerged: embodiment as the basis of lived perception and intersubjectivity, Montessori pedagogy as a structured context for emotional growth, and the integration of bodily experience and empathy in preschool education.

First, the results reinforce the phenomenological claim that the body is not merely an instrument of cognition but the primary medium through which perception and meaning are constituted (10, 11). The synthesis demonstrates that children's emotional understanding is grounded in lived bodily engagement with their environment. This interpretation aligns with Merleau-Ponty's account of child psychology, which emphasizes that perceptual and emotional development unfolds through embodied interaction rather than abstract reasoning (12). By identifying shared bodily experience as a precursor to empathic awareness, the findings extend phenomenological insights into educational practice.

The theme of intersubjectivity further clarifies how embodied interaction facilitates emotional comprehension. Intersubjective understanding emerges through reciprocal bodily engagement, including imitation, coordinated movement, and affective resonance (13, 14). The reviewed evidence suggests that preschool children interpret others' emotions through these embodied processes, particularly in social contexts that encourage shared activity. This interpretation is consistent with developmental findings indicating that early concern for others develops through interactive exchanges and behavioral mirroring (4). Thus, the present synthesis situates empathy not solely within cognitive perspective taking, but within dynamic bodily participation in shared experience.

Neuroscientific perspectives further illuminate these mechanisms. The findings align with embodied cognition theory, which posits that social understanding is grounded in sensorimotor systems (15). Mirror neuron research provides empirical support for this claim, demonstrating that observing another's action or emotion activates neural circuits similar to those engaged during first-person experience (16). In the context of early childhood education, activities that involve imitation, coordinated movement, and sensory engagement may therefore stimulate neural pathways associated with empathic resonance. This convergence between phenomenology and neuroscience strengthens the theoretical coherence of the synthesis.

The second major finding concerns the role of Montessori pedagogy in cultivating emotional development. The synthesis indicates that Montessori environments provide structured yet autonomy-supportive contexts that integrate sensory materials, practical life exercises, and collaborative routines. These pedagogical elements align closely with experiential learning principles (17) and with Montessori's original emphasis on sensory education and social responsibility (18-20). Through repeated engagement with tactile materials, coordinated tasks, and peer collaboration, children develop emotional self-awareness and regulatory capacity—competencies that are foundational for empathy (1, 2).

Empirical evidence synthesized in this review corroborates these theoretical claims. Longitudinal research indicates that Montessori preschool attendance is associated with elevated socio-emotional competencies, including cooperation and empathic responsiveness (21). Systematic reviews further demonstrate consistent positive effects across academic and nonacademic domains (9, 22). Experimental findings suggest that structured sensory and group-based activities increase

observable empathic behaviors, such as helping peers or responding to distress (23). These results provide convergent evidence that Montessori pedagogy may serve as an applied framework for cultivating embodied empathy.

The third analytical theme—the explicit linkage between embodiment and empathy in Montessori practice—integrates these theoretical and empirical strands. The synthesis suggests that Montessori classrooms create opportunities for shared bodily experience through coordinated tasks, imitation, care of the environment, and collaborative problem-solving. Such practices likely engage embodied simulation processes and reinforce intersubjective awareness. This interpretation resonates with research showing that relational and environmental factors influence empathy-related neural circuitry (5, 6). It also aligns with evidence that targeted child-centered interventions can enhance empathic skills in early childhood (24).

Importantly, the findings suggest that empathy is not merely an outcome of moral instruction or verbal discussion but emerges through patterned bodily interaction within meaningful contexts. This perspective challenges purely cognitive models of empathy and underscores the pedagogical significance of sensorimotor engagement. By situating empathy within lived experience, the synthesis bridges phenomenological philosophy, developmental psychology, neuroscience, and educational research.

Moreover, the results highlight the reciprocal relationship between self-regulation and empathic responsiveness. Montessori environments emphasize concentration, autonomy, and reflective pause—practices that may strengthen executive functions and emotional regulation, thereby supporting prosocial behavior (7). Given that emotional dysregulation and adverse childhood experiences can negatively influence empathic processing (5, 8), the structured yet supportive Montessori setting may offer a protective and promotive developmental context.

Collectively, the findings indicate that embodiment provides the ontological and psychological foundation for empathy, while Montessori pedagogy offers a practical educational framework that activates and refines embodied processes through sensory-rich, socially structured engagement. The integration of these domains contributes to a more comprehensive understanding of how emotional development unfolds in early childhood educational settings.

Several limitations must be acknowledged. First, although the synthesis incorporated theoretical and empirical sources, the available empirical evidence remains limited in scope and methodological diversity. Many studies rely on observational or quasi-experimental designs, which restrict causal inference. Second, cross-cultural representation within the literature is uneven, and few studies examine embodiment and empathy within diverse sociocultural contexts. Third, the reliance on secondary data limits the ability to directly measure embodied mechanisms in classroom settings. Finally, although neuroscientific findings provide suggestive support, direct neurodevelopmental evidence linking Montessori activities to mirror neuron activation remains limited.

Future research should prioritize rigorous experimental and longitudinal designs to examine causal pathways between embodied Montessori activities and empathic development. Multimethod approaches combining behavioral observation, psychophysiological measures, and neuroimaging could provide more direct evidence of embodied simulation mechanisms in early education. Cross-cultural investigations are also necessary to determine whether the observed relationships generalize across diverse educational systems. Additionally, intervention studies comparing Montessori-informed embodied activities with alternative pedagogical approaches would clarify the specificity of these effects. Finally, integrating measures of executive functioning and emotion regulation may elucidate mediating mechanisms underlying empathy development.

Educational practitioners should intentionally incorporate structured sensory–motor activities that promote shared bodily engagement and cooperative interaction. Montessori-inspired practices—such as coordinated practical life exercises, collaborative environmental care, and guided imitative play—can be integrated into early childhood curricula to foster emotional awareness and prosocial behavior. Teacher training programs should emphasize the theoretical foundations of

embodiment and intersubjectivity, enabling educators to design learning environments that support empathic growth. Furthermore, creating safe, autonomy-supportive classrooms that balance freedom with structure may enhance children's capacity for self-regulation and emotional responsiveness. By recognizing the centrality of embodied experience in social development, educators can more effectively cultivate empathy as a core competency in early childhood education.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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