

A Case Study on Aggressive Behavior in Early Childhood Children with Left-Brain Dominance

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ABSTRACT

Aggressive behavior in early childhood is a multidimensional phenomenon influenced by the interaction between neurobiological and environmental factors. This study aims to analyze aggressive behavior in early childhood with left-hemisphere dominance and to examine its relationship with social learning processes and emotional regulation. A qualitative approach with an instrumental case study design was employed. The subject was a boy aged five years and eleven months identified as having left-brain dominance and a high level of aggressiveness based on psychological assessment results. Data were collected through participatory observation, in-depth interviews with parents and a child psychologist, and analysis of psychological documents. Thematic analysis was conducted based on Bandura's social learning theory, Pavlov's classical conditioning theory, and executive function concepts. The findings indicate that aggressive behavior manifested in physical and verbal forms, triggered by frustration, cognitive rigidity, and limited emotional regulation. Left-brain dominance functioned as an indirect risk factor when not balanced by social-emotional maturity. This study emphasizes the importance of holistic interventions involving family and school to support optimal social-emotional development in early childhood.

Keywords: *Early Childhood Education, Aggressive Behavior, Left Hemisphere Dominance.*

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INTRODUCTION

Early childhood represents a critical period in human development during which rapid brain growth establishes the foundation for cognitive, emotional, and behavioral functioning across the lifespan. Developmental neuroscience highlights that this phase is marked by high neuroplasticity, enabling the brain to form and reorganize synaptic connections in response to environmental stimulation (Shonkoff & Phillips, 2000). Longitudinal evidence further indicates that early experiences exert enduring biological effects on neural architecture and behavioral trajectories (Knudsen, 2004). During the first years of life, neural circuits responsible for language, executive function, and emotional regulation undergo significant maturation, making early childhood a sensitive period for both adaptive and maladaptive developmental outcomes (Center on the Developing Child,

2007). Therefore, understanding behavioral manifestations in early childhood requires consideration of the underlying neurodevelopmental processes that shape them.

Brain development does not occur in isolation but is dynamically influenced by environmental contexts. Bronfenbrenner's ecological systems theory emphasizes that child development results from reciprocal interactions between the child and multiple environmental systems, particularly the family and immediate social surroundings (Bronfenbrenner, 1979). Empirical findings demonstrate that positive stimulation through responsive caregiving, verbal engagement, and structured interaction contributes to cognitive growth and emotional competence (Blair & Raver, 2015; UNICEF, 2021). Conversely, chronic stress and limited emotional scaffolding during early childhood are associated with dysregulation of executive functioning and increased behavioral difficulties (Shonkoff, Boyce, & McEwen, 2009). These findings underscore that behavioral expressions, including aggression, emerge from the interplay between neurobiological maturation and environmental experiences.

Within the broader framework of brain development, hemispheric specialization plays a central role in shaping cognitive and behavioral patterns. The theory of cerebral lateralization posits that the left and right hemispheres exhibit functional specialization while operating in integrated coordination (Kinsbourne, 2013). The left hemisphere is commonly associated with language processing, analytical reasoning, and sequential information management (Gazzaniga, 2018). Research in developmental cognitive neuroscience suggests that enriched linguistic and structured cognitive stimulation may strengthen left-hemispheric processing pathways during early childhood (Diamond, 2013). However, contemporary perspectives caution against oversimplified dichotomies, emphasizing instead the importance of balanced interhemispheric integration for adaptive functioning (Kolb & Whishaw, 2015).

Parallel to cognitive development, social-emotional competence constitutes a foundational domain of early childhood adjustment. Erikson's psychosocial theory identifies early childhood as a stage in which initiative and self-regulation are shaped through supportive social interactions (Erikson, 1963). Empirical studies demonstrate that deficits in emotional regulation, empathy, and impulse control are significantly associated with externalizing behaviors, including aggression (Denham et al., 2012). Emotional regulation skills develop gradually and are strongly influenced by adult guidance and modeling (Morris, Silk, Steinberg, Myers, & Robinson, 2007). When emotional regulation capacities lag behind cognitive-verbal abilities, children may struggle to manage frustration in socially adaptive ways.

Aggressive behavior in early childhood is widely conceptualized as a multidetermined phenomenon involving learned responses and cognitive-emotional processing biases. Bandura's social learning theory proposes that children acquire aggressive behaviors through observation and imitation of salient social models (Bandura, 1986). Experimental evidence from the Bobo Doll study demonstrated that children reproduce aggressive actions observed in adults, particularly when such behaviors appear unpunished (Bandura, Ross, & Ross, 1961). Additionally, the social information-processing

model suggests that children prone to aggression often interpret ambiguous social cues as hostile, increasing reactive responses (Dodge, Coie, & Lynam, 2006). These theoretical perspectives indicate that aggression reflects the interaction between cognitive processing patterns and environmental learning experiences.

The relationship between hemispheric dominance and behavioral regulation introduces an additional layer of complexity. Research on hemispheric asymmetry suggests that imbalances in neural activation may be associated with differences in emotional regulation and behavioral inhibition (Davidson, 2004). Studies have shown that when cognitive-verbal processing develops more prominently than regulatory integration, children may exhibit rigid, reactive, or impulsive responses under social stress (Holz et al., 2022). Furthermore, early temperamental differences linked to neural activation patterns have been associated with variations in frustration tolerance and emotional reactivity (Fox, Henderson, Marshall, Nichols, & Ghera, 2005). Despite growing interest in brain lateralization, limited research has specifically examined how left-hemisphere dominance in early childhood relates to manifestations of aggressive behavior within real-life contexts.

Based on the theoretical and empirical considerations above, a gap remains in understanding how left-brain dominance interacts with emotional regulation and environmental factors in shaping aggressive behavior during early childhood. While previous studies have explored aggression from social learning and ecological perspectives, fewer investigations have focused on hemispheric dominance as a contributing variable within naturalistic settings. Therefore, this study aims to examine how aggressive behavior is manifested in early childhood children identified with left-brain dominance, using a qualitative case study approach.

This research contributes to the existing literature by integrating perspectives from developmental neuroscience, hemispheric lateralization, and social-emotional development into a contextualized analysis of aggressive behavior. By providing an in-depth exploration of a specific case, this study offers a nuanced understanding of how cognitive dominance patterns intersect with emotional regulation and environmental experiences. The findings are expected to inform early childhood education practices and caregiving strategies aimed at promoting balanced neurodevelopment and adaptive behavioral outcomes.

METHOD

Research Design

This study employed a qualitative approach using an instrumental case study design. The qualitative design was selected to enable an in-depth exploration of aggressive behavior within the natural context of early childhood education. An instrumental case study allows a single case to be examined intensively in order to provide insight into a broader conceptual issue, in this case the relationship between left-brain dominance and aggressive behavior.

The design focused on capturing behavioral patterns, contextual influences, and regulatory processes as they occurred in real-life settings without experimental

manipulation. Through this approach, the study sought to generate a comprehensive and contextualized understanding of how neurological dominance characteristics may be reflected in observable social behavior.

Subjects / Population and Sample

The subject of this study was a five-year-and-eleven-month-old boy enrolled in Kindergarten A at TK TG Early Childhood Education Center. The participant was selected using purposive sampling based on specific inclusion criteria.

The selection criteria included:

1. Psychological assessment results indicating left-hemisphere dominance.
2. Teacher reports documenting frequent aggressive behaviors.
3. Observed low cognitive flexibility in classroom activities.
4. Consistent behavioral concerns across structured and unstructured settings.

The subject was identified as a relevant case representing the phenomenon under investigation. Supporting informants included the classroom teacher, parents, and a licensed child psychologist who conducted the initial psychological assessment. These informants were included to provide comprehensive contextual and developmental information.

Data Collection Procedure

Data collection was conducted using methodological triangulation to ensure comprehensive documentation of the phenomenon. The following techniques were employed:

1. Participatory Observation Observations were carried out during classroom learning sessions and peer play activities. Data were recorded using running records, behavioral checklists, and anecdotal notes. The observation focused on:
 - a) Frequency of aggressive behaviors
 - b) Intensity of behavioral responses
 - c) Situational triggers
 - d) Peer interaction patterns
 - e) Teacher responses to aggression
2. Semi-Structured Interviews In-depth interviews were conducted with the child's parents and the assessing psychologist. The interviews explored developmental history, emotional regulation patterns, parenting approaches, environmental stimulation, and behavioral concerns at home. An interview guide was used to ensure consistency while allowing flexibility for elaboration.
3. Document Analysis Psychological assessment reports and developmental records were reviewed to obtain supporting data related to hemispheric dominance, cognitive profiles, and executive function characteristics. These documents were used to corroborate observational and interview findings.

Data Analysis

Data were analyzed using thematic analysis. The analysis process involved systematic stages of data familiarization, open coding, categorization, theme development, and pattern identification. Codes were derived inductively from the data and then organized into broader themes related to aggressive behavior, left-brain dominance characteristics, and emotional regulation patterns.

The analytical framework was informed by Social Learning Theory, Emotional Regulation Theory, and executive function concepts to structure the interpretation of behavioral patterns.

To ensure trustworthiness, several strategies were implemented:

- Source triangulation involving parents, teachers, and the psychologist
- Method triangulation across observation, interviews, and documentation
- Member checking with parents and teachers to verify descriptive accuracy
- Thick description to enhance contextual validity

Ethical considerations included obtaining informed consent from the parents, maintaining participant anonymity through the use of pseudonyms, and ensuring confidentiality of all collected data.

FINDING AND DISCUSSION

FINDINGS

Results

The findings are presented in accordance with the research objective to describe aggressive behavior in early childhood children with left-brain dominance. The results are organized into psychological-cognitive, psychomotor, language, and social-emotional domains. The presentation focuses strictly on observed and documented data without interpretation.

1. Psychological and Cognitive Profile

Psychological assessment reports indicate that Child A demonstrates strong left-hemisphere dominance. Documented characteristics include:

- a) Rigid thinking patterns
- b) Difficulty adapting to change
- c) High need for superiority
- d) Discomfort when corrected
- e) Sensitivity to comparison with peers

Teacher observations and parental reports consistently confirm these characteristics across school and home settings.

During structured learning tasks involving clear rules and sequences, Child A:

- a) Completes activities quickly
- b) Understands instructions accurately
- c) Demonstrates strong logical reasoning

During activities requiring flexibility or collaboration, Child A:

- a) Insists on personal opinions

- b) Rejects peers' suggestions
- c) Displays impatience when outcomes differ from expectations
- d) Shows visible signs of frustration such as frowning, raising voice, and abruptly stopping tasks

Table 1. Psychological and Cognitive Findings

Aspect	Observed Characteristics
Brain dominance	Left-hemisphere dominance (assessment report)
Logical reasoning	Strong
Cognitive flexibility	Low
Response to correction	Discomfort, resistance
Reaction to comparison	Visible frustration
Adaptation to change	Difficulty adjusting

2. Psychomotor Findings

Observation data show that Child A demonstrates age-appropriate gross and fine motor skills. The child is able to:

- a) Participate in physical education activities
- b) Manipulate classroom materials effectively
- c) Complete motor-based learning tasks

However, during unstructured peer play, impulsive physical behaviors are frequently recorded. Documented behaviors include:

- a) Pushing peers
- b) Pinching peers
- c) Grabbing objects abruptly
- d) Physically interfering during peer activities

These behaviors typically occur:

- a) During competitive games
- b) When waiting for turns
- c) When personal desires are not immediately fulfilled
- d) No observable self-calming strategies were recorded prior to these actions.

Table 2. Psychomotor Findings

Domain	Observation
Gross motor	Age-appropriate
Fine motor	Age-appropriate
Impulse control in play	Frequently impulsive
Type of physical behavior	Pushing, pinching, grabbing

3. Language Findings

Observational and interview data indicate that Child A has well-developed verbal abilities. The child:

- a) Uses a rich vocabulary
- b) Expresses opinions clearly
- c) Understands verbal instructions quickly
- d) Communicates needs directly

During peer interaction, language use is often recorded as:

- a) Argumentative
- b) Confrontational
- c) High-toned during disagreement
- d) Pressuring peers during frustration

Several instances were documented in which Child A debated teacher instructions and challenged peer decisions verbally.

Table 3. Language Characteristics

Aspect	Observation
Vocabulary range	Well-developed
Clarity of expression	Clear and direct
Communication style in conflict	Argumentative, high tone
Verbal pressure toward peers	Frequently observed

4. Social-Emotional and Behavioral Findings

Classroom observations, anecdotal records, and interviews indicate significant difficulty in emotional regulation. Emotional reactivity is recorded in situations involving:

- a) Rejection by peers
- b) Failure to achieve desired outcomes
- c) Competition
- d) Perceived unfairness

Aggressive behaviors observed include:

- a) Hitting
- b) Pinching
- c) Kicking
- d) Forcibly grabbing toys
- e) Immediate retaliation

These behaviors occur across different classroom contexts and peer interactions. Aggression is repeatedly documented as the primary observable response during emotionally charged situations.

Table 4. Aggressive Behavior Patterns

Trigger Situation	Observed Response
Rejection	Hitting, verbal outburst
Waiting turn	Pushing, grabbing
Losing competition	Kicking, shouting
Peer disagreement	Retaliation, arguing
Unmet desire	Physical and verbal aggression

Overall, the documented findings show consistent patterns of left-hemisphere dominance characteristics, strong logical-verbal abilities, low cognitive flexibility, and recurrent physical and verbal aggressive behaviors across structured and unstructured settings.

Summary of Observed Findings by Developmental Domain

Developmental Domain	Observed Findings
Cognitive	Strong logical reasoning; difficulty with flexible thinking and collaboration
Psychomotor	Age-appropriate coordination; impulsive physical actions during peer interaction
Language	Advanced verbal expression; harsh and demanding communication style
Social-Emotional	Poor emotional regulation; frequent verbal and physical aggression

DISCUSSION

Interpretation of Findings

The findings indicate that Child A's aggressive behaviors are closely linked to characteristics associated with left-hemisphere dominance. The child demonstrates strong logical reasoning, rule-based thinking, and advanced verbal abilities. However, these cognitive strengths coexist with rigid thinking patterns and limited cognitive flexibility. When classroom situations deviate from the child's internal expectations or logical structure, observable difficulty in adaptation occurs.

In emotionally challenging contexts such as correction, competition, or unmet expectations, Child A exhibits immediate verbal and physical aggression. The data show that emotional escalation occurs rapidly, with minimal observable delay or self-regulatory attempt prior to aggressive responses. Although language skills are well developed, they are frequently used in argumentative or confrontational ways during conflict situations.

These findings suggest a discrepancy between cognitive-verbal competence and emotional regulation capacity. The child's ability to analyze, reason, and articulate does not consistently translate into adaptive emotional management. Aggression appears repeatedly as a primary behavioral response in situations involving frustration or perceived

unfairness. The importance of these findings lies in highlighting that advanced analytical abilities in early childhood do not automatically ensure emotional adaptability or social flexibility.

Relationship to Literature

The results are consistent with literature on hemispheric specialization indicating that left-hemisphere dominance is associated with strengths in language processing, analytical reasoning, and sequential organization (Gazzaniga, 2018). At the same time, research on hemispheric asymmetry suggests that imbalance in neural activation patterns may relate to differences in emotional regulation and behavioral inhibition (Davidson, 2004).

The rigid thinking patterns observed in this study correspond with findings that reduced cognitive flexibility is associated with increased frustration and reactive aggression in young children (Diamond, 2013). Furthermore, the immediate and repeated use of aggression as a conflict response aligns with Social Learning Theory, which proposes that behaviors may be reinforced when they effectively achieve desired outcomes (Bandura, 1986). When aggression results in object acquisition or peer withdrawal, it may become functionally reinforced.

The findings also correspond with emotional regulation frameworks emphasizing the role of executive control in managing emotional impulses. Early childhood is a period in which executive functions are still developing, and limited inhibitory control is associated with higher levels of reactive aggression (Blair & Raver, 2015). The behaviors observed in Child A reflect patterns described in prior research linking regulatory immaturity with impulsive and emotionally driven responses.

Limitations of the Study

Several limitations must be acknowledged. First, the use of a single-case design limits the generalizability of the findings. The behavioral patterns identified in Child A cannot be assumed to represent all children with left-hemisphere dominance.

Second, data were primarily derived from observations, interviews, and psychological assessment reports. These sources may be influenced by contextual bias, subjective interpretation, or situational variability.

Third, the study was conducted within a limited time frame and did not include longitudinal follow-up. As a result, developmental progression or changes in aggressive behavior over time were not examined.

Finally, although left-brain dominance was identified through psychological assessment, the study did not include neurophysiological measurements. Therefore, conclusions are limited to behavioral and assessment-based indicators rather than direct neural imaging data.

Implications for Practice and Future Research

The findings suggest several practical implications. Early childhood educators may benefit from implementing structured emotional regulation activities, flexibility training exercises, and guided social problem-solving strategies for children demonstrating rigid cognitive patterns. Cooperative learning experiences and structured turn-taking activities may support adaptive interaction skills.

Caregivers may also consider incorporating consistent emotional coaching practices at home, including modeling calm responses, labeling emotions, and practicing alternative conflict-resolution strategies.

For future research, studies with larger and more diverse samples are recommended to explore variability among children with different patterns of hemispheric dominance. Comparative research designs may clarify whether similar aggressive patterns appear in children without identified dominance characteristics.

Longitudinal studies would provide further insight into how early aggressive tendencies associated with cognitive rigidity evolve over time and how early intervention influences long-term emotional and social development trajectories.

CONCLUSION

This case study concludes that aggressive behavior in early childhood may be closely associated with left-hemisphere brain dominance when cognitive strengths are not balanced by adequate emotional regulation abilities. Child A demonstrates strong logical reasoning, advanced verbal expression, and effective comprehension of structured tasks. However, rigid thinking patterns and limited cognitive flexibility are consistently accompanied by difficulty managing frustration, accepting correction, and adjusting to social demands. In emotionally challenging situations, aggressive behavior emerges as the primary observable form of expression and conflict response.

The findings indicate that the aggression observed in this case is not related to cognitive delay or language deficits. Instead, it is associated with challenges in emotional regulation, impulse control, and adaptive social functioning. The predominance of analytical and rule-based processing, without sufficient regulatory balance, appears to increase vulnerability to reactive emotional outbursts when expectations are unmet or when compromise is required.

This study underscores the importance of early identification of neurocognitive characteristics, including patterns of brain dominance, in understanding behavioral manifestations in young children. Educational and caregiving interventions should integrate emotional regulation training, cognitive flexibility development, and structured social interaction guidance alongside cognitive stimulation.

Future research involving larger samples and longitudinal designs is recommended to further examine the relationship between hemispheric dominance and behavioral regulation. Additionally, empirical evaluation of targeted intervention programs may provide deeper insight into effective strategies for reducing aggressive behavior in early childhood educational settings.

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