

RESEARCH ARTICLE OPEN ACCESS

Cognitive Self-Regulation and Motivation Among Preschool-Aged Children

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Received: 07 July 2026 Accepted: 03 August 2026 Published: 01 September 2026

ABSTRACT

Cognitive self-regulation and motivation are central developmental processes that shape how preschool-aged children engage with learning, manage behavior, respond to challenges, and prepare for formal schooling. This article examines the conceptual relationship between executive-function-related self-regulation and motivational processes during the preschool period through a structured synthesis of the provided literature. The review focuses on self-regulation, executive functioning, cognitive flexibility, approaches to learning, school readiness, and motivational tendencies. The methodology adopts a qualitative integrative review approach in which the ten provided references are thematically compared according to their treatment of executive functioning, self-regulation, motivation, learning behavior, and developmental outcomes. The synthesized findings indicate that cognitive self-regulation should not be treated as an isolated cognitive capacity; rather, it operates as a functional mechanism through which children sustain attention, regulate responses, adapt strategies, and participate purposefully in learning. Evidence concerning preschool children also suggests meaningful connections between executive functioning, approaches to learning, school readiness, and later academic performance. The literature further indicates that motivational tendencies may interact with executive-function capacities, although the direction and strength of these relationships may vary according to developmental, contextual, and individual factors. The review consequently proposes an integrated conceptual model in which executive control and motivational engagement mutually support children's learning-related behavior. Implications for early-childhood education include the design of learning environments that simultaneously strengthen cognitive control, autonomy, persistence, and adaptive engagement.

Keywords: Cognitive self-regulation, executive function, motivation, preschool children, cognitive flexibility, school readiness, learning behavior, early childhood education.

1. INTRODUCTION

The preschool period represents a formative stage in which children develop increasingly sophisticated capacities for controlling attention, inhibiting impulsive responses, shifting between tasks, solving problems, and sustaining purposeful activity. These capacities are commonly discussed under the broader construct of executive functioning and are closely related to children's ability to regulate their behavior within learning environments. At the same time, successful participation in educational

activities depends not only on what children can cognitively control but also on whether they are willing to initiate, sustain, and adapt their engagement. Consequently, cognitive self-regulation and motivation should be examined as interconnected dimensions of early learning rather than as independent developmental characteristics.

Self-regulation in preschool settings has practical significance because children are expected to follow

routines, cooperate with peers, respond to teacher instructions, tolerate delays, and maintain attention during increasingly structured activities. Evidence from the Finnish day-care environment demonstrates the relevance of children's self-regulation skills within everyday educational contexts, emphasizing that regulatory capacities become visible through children's actual participation in social and learning situations (Veijalainen, Reunamo, & Alijoki, 2017). This contextual perspective is important because executive abilities are expressed through behavior and may therefore be influenced by the structure and demands of the learning environment.

Motivation provides a complementary dimension to this process. A child may possess the cognitive capacity to complete an activity but may not consistently invest effort in it. Conversely, strong motivational engagement may encourage a child to persist, yet limited cognitive control can interfere with maintaining attention or organizing behavior. The relationship is therefore potentially reciprocal: cognitive self-regulation can facilitate sustained motivational engagement, while motivation can provide the direction and persistence necessary for children to employ their regulatory capacities.

The provided literature collectively addresses these relationships from several perspectives. Veraksa, Gavrilova, and Lepola (2022) directly examine learning motivation tendencies among preschoolers in relation to executive functions and gender differences, while Vitiello et al. (2011) connect cognitive flexibility and approaches to learning with academic school readiness. Viterbori et al. (2015) extend the developmental perspective by examining how preschool executive functioning predicts subsequent mathematics-related outcomes. Together, these studies indicate that executive functioning has significance beyond immediate behavioral control.

The objective of this article is therefore to synthesize the provided evidence concerning cognitive self-regulation and motivation among preschool-aged children and to develop an integrated interpretation of how these constructs may operate within early learning. The review specifically examines the theoretical relationship between executive functioning and motivational engagement, the developmental implications of self-regulation, and the educational significance of these processes. Its scope is restricted exclusively to the ten references supplied for the article.

2. LITERATURE REVIEW

2.1 Cognitive Self-Regulation as an Executive Developmental Capacity

Cognitive self-regulation can be conceptualized as the capacity to control and coordinate cognitive and behavioral responses in accordance with situational goals. Within preschool education, this capacity is reflected in behaviors such as waiting for one's turn, shifting from one activity to another, remembering instructions, resisting distractions, and correcting unsuccessful responses. These behaviors require children to coordinate several regulatory processes rather than simply demonstrate a single cognitive skill.

Veijalainen, Reunamo, and Alijoki (2017) provide an important foundation by examining children's self-regulation skills in a Finnish day-care environment. Their work supports the interpretation of self-regulation as an environmentally expressed developmental capacity. Rather than viewing regulation exclusively as an internal cognitive trait, the day-care context demonstrates how regulatory abilities become functionally relevant when children interact with peers, teachers, routines, and learning demands. This distinction has theoretical importance because the same child may demonstrate different levels of effective regulation depending on the complexity and organization of the environment.

The educational implications of this perspective are substantial. If self-regulation is partly expressed through interaction with environmental demands, then early-childhood settings should not merely evaluate regulatory deficits but should also examine whether classroom structures provide appropriate opportunities for children to practice control, decision-making, and adaptive responses. This interpretation is consistent with the broader educational implications of executive function described by Zelazo, Blair, and Willoughby (2016), in which executive functioning is positioned as relevant to educational development.

2.2 Executive Function and Motivation

The relationship between executive functioning and motivation is particularly important because learning behavior requires both control and directed engagement. Veraksa, Gavrilova, and Lepola (2022) explicitly examine learning motivation tendencies among preschoolers while considering executive functions and gender differences.

Their study provides direct evidence for positioning executive functioning within a motivational framework rather than treating it solely as a predictor of academic performance.

Conceptually, executive functioning may support motivation by enabling children to maintain an intended goal despite competing stimuli. A motivated child who wishes to complete a puzzle, for example, must maintain task-related information, inhibit irrelevant responses, shift strategies when an approach fails, and persist until the task is completed. Motivation establishes the behavioral direction, whereas executive control helps maintain and organize behavior toward that direction.

The relationship may also operate in the opposite direction. Children who are interested in an activity may be more likely to mobilize attention and regulatory resources. Thus, motivation may increase the likelihood that executive capacities are actively deployed. The relationship is consequently better represented as an interaction than as a simple one-way causal chain.

Research beyond preschool settings within the supplied literature also supports the importance of this interaction. Vergara-Lopez, Lopez-Vergara, and Colder (2013) demonstrate that executive functioning can moderate relationships involving motivation and psychological outcomes in adolescents. Although this population differs from preschool children, the study provides conceptual support for treating executive functioning as a regulatory condition that can alter the expression or consequences of motivational processes.

2.3 Cognitive Flexibility, Learning Approaches, and School Readiness

Cognitive flexibility represents an especially relevant component of self-regulation because effective learning requires children to adjust behavior when task conditions change. Vitiello et al. (2011) examine cognitive flexibility alongside approaches to learning and academic school readiness in Head Start preschool children. The inclusion of approaches to learning is significant because it connects cognitive control with observable patterns of engagement, such as how children approach tasks and respond to educational demands.

A theoretically important distinction emerges here. Executive functioning describes capacities that enable

controlled behavior, whereas approaches to learning reflect how these capacities may become expressed in educational participation. A child who can shift attention efficiently may be better equipped to respond constructively when a teacher changes instructions or introduces a new activity. However, cognitive flexibility alone does not guarantee productive engagement; motivational orientation remains relevant.

This interaction helps explain why school readiness should not be conceptualized exclusively through academic knowledge. Zamzow and Ernst (2020), for example, examine executive-function growth in nature preschools, illustrating the relevance of educational environments that create opportunities for children to exercise regulatory abilities. Such environments may support self-regulation through practical demands involving exploration, adaptation, decision-making, and sustained engagement.

2.4 Executive Function as a Foundation for Later Learning

The developmental significance of preschool executive functioning becomes more apparent when considering longitudinal evidence. Viterbori et al. (2015) investigate how preschool executive functioning predicts several aspects of mathematics achievement in Grades 1 and 3. This longitudinal perspective indicates that regulatory capacities developed before formal schooling may have consequences extending beyond the preschool period.

Weiland, Barata, and Yoshikawa (2014) similarly examine the co-occurring development of executive-function skills and receptive vocabulary in preschool-aged children. Their work suggests that executive functioning develops alongside other important learning-related competencies rather than independently from them. This supports an integrated developmental interpretation in which cognitive regulation participates in broader systems of language, learning, and educational readiness.

Veijalainen, Reunamo, and Alijoki (2017) are particularly relevant to this synthesis because self-regulation provides the behavioral mechanism through which executive capacities can be expressed in everyday educational contexts. In this sense, preschool self-regulation can be interpreted as both a developmental outcome and a functional resource for learning participation.

2.5 Broader Social and Educational Context

Self-regulation does not operate in isolation from children's social development. Yılmaz and Tepeli (2013) examine social problem-solving skills among 60–72-month-old children in relation to emotion understanding. Their findings are relevant to the present framework because effective problem solving requires children to coordinate emotional information, behavioral responses, and goal-directed strategies. Thus, cognitive self-regulation has a broader developmental function extending beyond narrowly academic tasks.

Yapıcı and Ulu (2010), through their examination of first-grade teachers' expectations from preschool teachers, provide an additional educational-context perspective. Expectations surrounding preschool education can influence which competencies are emphasized before children enter formal schooling. If school readiness is defined primarily through academic outcomes, opportunities to cultivate motivational and regulatory competencies may receive insufficient attention.

Collectively, the literature supports a multidimensional understanding of preschool development. Executive functioning, self-regulation, motivation, social problem solving, language, and school readiness appear conceptually interconnected. The principal gap within the provided literature is not the absence of evidence concerning these individual constructs, but the need for a more integrated explanation of how cognitive self-regulation and motivation function together during preschool learning.

3. METHODOLOGY

3.1 Research Design

This article employs a qualitative integrative literature-review methodology. The objective is not to generate new experimental data but to systematically synthesize the conceptual and empirical contributions of the ten references supplied by the user. The approach is appropriate for identifying relationships among cognitive self-regulation, executive functioning, motivation, learning behavior, and educational outcomes.

The analytical unit is the relationship among constructs rather than the individual study alone. Each reference was therefore considered according to its relevance to five interconnected dimensions: executive functioning, self-regulation, motivation or learning engagement,

developmental outcomes, and educational context.

3.2 Analytical Framework

The synthesis adopts an integrated conceptual framework consisting of three functional levels. The first level is cognitive control, including executive-function-related processes such as flexibility, behavioral regulation, and goal maintenance. The second is motivational engagement, referring to children's willingness to initiate and sustain participation in learning. The third is developmental and educational outcomes, including approaches to learning, school readiness, social problem solving, vocabulary development, and later academic achievement.

The proposed relationship can be represented conceptually as:

Executive control → self-regulated engagement → learning-related outcomes

with motivation functioning as both an initiating force and a sustaining mechanism within the pathway.

This framework does not imply that executive functioning mechanically determines motivation or educational achievement. Instead, it proposes that children's developmental outcomes emerge through interactions among cognitive resources, motivational orientation, and contextual demands.

3.3 Thematic Synthesis Procedure

The supplied studies were compared thematically rather than statistically because the references differ in research focus, developmental outcomes, and methodological orientation. Studies directly addressing preschool executive functioning and motivation were given primary interpretive weight, while studies addressing related constructs were used to establish broader theoretical connections.

Veijalainen, Reunamo, and Alijoki (2017) serve as a central reference for the environmental expression of self-regulation. Veraksa, Gavrilova, and Lepola (2022) provide the strongest direct connection between executive functions and motivation. Vitiello et al. (2011), Viterbori et al. (2015), and Weiland et al. (2014) contribute evidence concerning learning approaches, academic development, and related cognitive competencies. The remaining

references broaden the framework to social problem solving, educational expectations, nature-based preschool environments, and educational implications of executive functioning.

3.4 Interpretive Model

The model generated from the synthesis assumes that effective preschool learning depends on alignment between children's internal capacities and external educational demands. When a task is appropriately structured, motivation can activate engagement, while executive control allows children to maintain the task goal and adjust behavior. When demands exceed regulatory capacity, motivation alone may be insufficient. Conversely, strong executive control without meaningful engagement may not produce sustained learning participation.

A hypothetical classroom example illustrates this model. A preschool teacher introduces a multi-step sorting activity. A child must understand the objective, remember the sorting rule, resist distractions, shift strategies when an error occurs, and continue working after difficulty. Interest in the activity encourages participation, whereas executive control enables the child to sustain and organize that participation. The resulting performance therefore reflects an interaction between motivational and regulatory processes rather than either construct alone.

4. RESULTS

The synthesis of the ten provided references identifies four principal patterns concerning cognitive self-regulation and motivation among preschool-aged children.

First, self-regulation functions as an essential behavioral expression of executive capacity within educational environments. The evidence concerning Finnish day-care settings indicates that children's regulatory skills are embedded in everyday interactions rather than expressed only during formal cognitive assessments (Veijalainen, Reunamo, & Alijoki, 2017). This suggests that the educational environment is not simply a setting in which self-regulation is measured; it is also a context in which regulatory competencies are exercised and potentially strengthened.

Second, executive functioning and motivation appear to be functionally interconnected. The preschool-focused study

by Veraksa, Gavrilova, and Lepola (2022) directly positions executive functions alongside learning motivation tendencies. The synthesis indicates that executive control may facilitate sustained engagement by allowing children to maintain goals and manage distractions. At the same time, motivational engagement may determine whether children actively deploy available regulatory resources. This reciprocal interpretation is more consistent with the literature than a purely linear model.

Third, cognitive flexibility and regulatory capacity are associated with broader learning readiness. Vitiello et al. (2011) connect cognitive flexibility and approaches to learning with academic school readiness, while Viterbori et al. (2015) provide a longitudinal perspective linking preschool executive functioning with later mathematics achievement. These findings collectively suggest that cognitive self-regulation has consequences extending beyond immediate classroom behavior. It may function as a developmental foundation through which children adapt to increasingly complex academic demands.

Fourth, self-regulation is embedded within a wider developmental system. Weiland, Barata, and Yoshikawa (2014) connect executive-function development with receptive vocabulary, while Yılmaz and Tepeli (2013) examine social problem solving in relation to emotion understanding. These relationships indicate that cognitive regulation interacts with language, social cognition, and emotional understanding rather than developing as an isolated domain.

A further pattern concerns contextual variation. Evidence concerning nature preschools and educational expectations suggests that environments can shape the opportunities children have to exercise executive and motivational competencies (Zamzow & Ernst, 2020; Yapıcı & Ulu, 2010). Thus, differences in observed self-regulation may reflect not only individual developmental characteristics but also differences in task structure, teacher expectations, autonomy, and environmental complexity.

Overall, the findings support an integrated interpretation: preschool motivation and cognitive self-regulation are mutually relevant components of learning readiness, with executive functioning providing mechanisms for controlling engagement and motivation providing direction and persistence. However, the supplied literature does not justify claiming a universal causal pathway. Differences in developmental stage, context, measurement,

and outcome variables must be considered when interpreting these relationships.

5. DISCUSSION

The central implication of the synthesis is that cognitive self-regulation should be conceptualized as a functional bridge between children's internal cognitive resources and their observable learning behavior. Preschool children do not simply possess executive-function abilities independently of motivation; rather, these abilities become educationally consequential when children apply them to meaningful goals. This interpretation is consistent with the emphasis on self-regulation within authentic day-care environments identified by Veijalainen, Reunamo, and Alijoki (2017).

The relationship with motivation introduces an important theoretical trade-off. Strong motivation may promote persistence, but persistence without adequate cognitive regulation can become inefficient or poorly directed. Conversely, strong executive control may permit children to comply with task requirements without necessarily producing deep or sustained engagement. The most productive learning environment is therefore likely to be one in which motivational engagement and regulatory demands are appropriately aligned.

This perspective also helps explain why cognitive flexibility is particularly important during preschool development. Classroom activities frequently require children to shift rules, change strategies, transition between activities, and respond to unexpected feedback. Vitiello et al. (2011) connect cognitive flexibility with approaches to learning and school readiness, supporting the interpretation that flexible control has both cognitive and behavioral significance.

The longitudinal implications are equally important. Viterbori et al. (2015) indicate that preschool executive functioning can be associated with later mathematics achievement, suggesting that early regulatory capacities may have developmental consequences beyond the immediate preschool setting. However, this should not be interpreted as evidence that executive functioning alone determines later achievement. Academic outcomes are multidimensional and depend on children's accumulated learning experiences and broader developmental resources.

The literature also supports caution concerning context.

Veijalainen, Reunamo, and Alijoki (2017) demonstrate the relevance of the day-care environment, while Zamzow and Ernst (2020) highlight executive-function growth within nature-preschool contexts. These findings suggest that opportunities for self-directed exploration, problem solving, and adaptive decision-making may influence the ways regulatory competencies are expressed. Consequently, educational interventions should avoid treating low self-regulation exclusively as an individual child deficit.

From a practical perspective, preschool teachers can integrate self-regulation and motivation within ordinary classroom activities. Tasks can incorporate manageable challenges, opportunities for choice, delayed gratification, rule switching, collaborative problem solving, and reflection after mistakes. Such practices can create situations in which children must simultaneously mobilize motivation and executive control. The objective should not be to maximize cognitive demands but to create developmentally appropriate opportunities for controlled, purposeful engagement.

The primary limitation of the present synthesis is the heterogeneity of the supplied literature. The references address different constructs, populations, educational contexts, and outcomes. Some studies directly concern preschool executive functioning and motivation, whereas others provide indirect theoretical or developmental evidence. In addition, the synthesis is restricted to the ten references supplied and therefore does not claim comprehensive coverage of the broader international literature. The conceptual model should consequently be regarded as a theoretically grounded synthesis requiring further empirical validation rather than as a definitive causal model.

6. CONCLUSION

Cognitive self-regulation and motivation represent closely interconnected foundations of preschool learning. The provided literature indicates that executive functioning contributes to children's capacity to sustain attention, regulate behavior, shift strategies, solve problems, and participate effectively in educational activities. Motivation, meanwhile, provides direction and persistence for engagement. Their relationship is therefore best understood as dynamic and reciprocal rather than strictly linear.

The synthesis further demonstrates that self-regulation is environmentally expressed and connected to broader developmental outcomes, including approaches to learning, school readiness, vocabulary development, social problem solving, and later academic achievement. Veijalainen, Reunamo, and Alijoki (2017) are particularly important to this interpretation because their work places children's self-regulation within the practical conditions of day-care education.

The principal contribution of this review is an integrated framework in which executive control and motivation jointly support purposeful learning engagement. This framework has implications for preschool curriculum design, teacher practice, and early identification of learning needs. Future research should investigate these relationships longitudinally, examine how classroom contexts modify them, and test intervention models that simultaneously promote executive control, autonomy, persistence, and constructive learning motivation.

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