**Applying the M.O.T.I.V.E Framework to Support Conative Development in Educational Therapy for Children with Neurodevelopmental Disorders**

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ABSTRACT

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| Children with neurodevelopmental disorders (NDDs) often face marked difficulties in initiating and sustaining purposeful, goal-directed behaviour. These difficulties are usually attributed to conative deficits—a critical domain of human development that governs motivation, volition, and persistence. Despite its importance, research exploring conative development in children with NDDs remains limited, reflecting a significant gap in the existing body of literature. This paper examines the application of the M.O.T.I.V.E. framework, comprising elements - *Meaningful Goals, Ownership, Task Structuring, Incremental Success, Value Rewards, and Effort Praise* - as a structured and neurodevelopmentally informed approach to support conative development within educational therapy (EdTx). The framework is positioned within the Cognition-Conation-Affect-Sensory (CCAS) model, a human behavioural potential model that emphasises the interaction between cognitive processing, motivational drives, emotional regulation, and sensory integration. By aligning with the CCAS model, the M.O.T.I.V.E. framework enables educational therapists (ETs) to  design targeted, evidence-based interventions that promote engagement, independence, and self-regulation in children with neurodevelopmental disorders (NDDs). It will also open new directions for research focused on tailored, strengths-based support for children with NDDs. |

*Keywords:* Cognition-Conation-Affect-Sensory (CCAS) model, Conation, Educational therapy, Executive function, Motivation, Neurodevelopmental disorders (NDD)

1. INTRODUCTION

Neurodevelopmental disorders (NDDs) are a heterogeneous group of complex conditions that emerge early in life, affecting neurological functioning and brain development, resulting in diverse difficulties in attention, communication, learning, and social interaction (Thapar, Cooper, & Rutter, 2017). The noticeable behavioural and cognitive issues usually happen before the age of 18 years old.  NDDs include Autism Spectrum Disorder (ASD), Attention-Deficit/Hyperactivity Disorder (ADHD), Conduct Disorder, Intellectual Developmental Disorder (IDD), Specific Learning Disorders (SpLDs), Motor Disorders and Communication Disorders (Cainelli & Bisiacchi, 2023; Lord et al., 2020). Although the presentation of NDDs differs widely among individuals, their co-occurrence with other conditions makes the condition more complex, as they commonly disrupt a child’s educational progress, behavioural self-regulation, and social relationships. For some children, symptoms improve or shift with age, while the difficulties remain lifelong for others.

The aetiology of NDDs is multifaceted, involving a dynamic interaction between multiple factors, such as genetic predispositions and environmental influences, rather than a single cause(Herrmann, King, & Weitzman, 2008; [Lebeña](https://www.nature.com/articles/s41598-024-65067-4#auth-Andrea-Lebe_a-Aff1) et al., 2024)

Genetic susceptibility often interacts with prenatal exposures—like maternal smoking, stress, or toxins such as lead and phthalates—amplifying the risk of developing the condition ([Lebeña](https://www.nature.com/articles/s41598-024-65067-4" \l "auth-Andrea-Lebe_a-Aff1),et al., 2024; Rosi et al., 2023). This gene–environment interplay underscores the multifactorial aetiology of NDD conditions like ADHD and ASD, incorporating both inherited vulnerabilities, such as decreased in-utero brain growth (Herrmann, King, & Weitzman, 2008) and early exposure risks ([Lebeña](https://www.nature.com/articles/s41598-024-65067-4" \l "auth-Andrea-Lebe_a-Aff1) et al., 2024; Rosi et al., 2023).

While considerable progress has been made in identifying risk factors, NDDs are rarely examined collectively across diagnostic categories (Gidziela et al., 2023). Recent prevalence data indicate that approximately 8.5% of children are diagnosed with attention-deficit/hyperactivity disorder (ADHD), 2.9% with autism spectrum disorder (ASD), 1.4% with intellectual and developmental disabilities (IDD), and 6.4% with specific learning disorders (SpLDs),  with higher rates typically found in boys (Yang et al., 2022). However, these rates vary across regions.

According to the Global Burden of Disease Collaborative Network (2017), the study revealed uneven identification and reporting of NDDs worldwide. Adding to this is a major gap in genetic research: while people of European ancestry make up only 16% of the global population, they represent nearly 80% of participants in DNA studies (Gidziela et al., 2023) This lack of representation limits understanding of the genetic underpinnings and co-occurrence patterns of NDDs in non-European populations.

Increasingly, research has moved beyond categorical definitions to emphasise the dimensional nature of these conditions, recognising that a single diagnosis can involve strengths and challenges across cognitive and behavioural domains (Morris-Rosendahl & Crocq, 2020). Comparative studies across different NDD profiles suggest that specific neurodevelopmental phenotypes may shape impairment patterns in executive function (EF) and social function (Martinez, Stoyanov, & Carcache, 2024; Sadozai et al., 2024). For example, research comparing children diagnosed with autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) has found distinct EF profiles, with the latter exhibiting more significant impairments in cognitive flexibility and planning (Martinez, Stoyanov, & Carcache, 2024; Sadozai et al., 2024) Children with ADHD are more likely to show difficulties with response inhibition and working memory in their executive functioning profile (Sadozai et al., 2024)

These distinctions are clinically meaningful, as they help clarify the underlying mechanisms contributing to each condition's behavioural manifestations. Recognising differences in executive function (EF) sub-domains across various diagnostic groups enhances the accuracy of identifying co-occurring conditions. This enables more accurate identification of co-occurring conditions, informs the development of targeted interventions, and facilitates the evaluation of the severity of functional impairments. Furthermore, comparative data allows educational therapists refine their diagnostic practices and choose interventions that address specific areas of need, rather than relying solely on broad or general approaches.

Despite significant advances in neuroscience and educational therapy (EdTx), most interventions tend to emphasise more on cognitive and behavioural components while neglecting conation, which is the domain responsible for volitional action. Conation refers to the mental processes that guide purposeful action in children, encompassing elements such as volition, motivation, and drive. It is the bridge between cognition, emotion, and behaviour, enabling children to initiate, maintain, and complete goal-directed tasks (Militello, Gentner, Swindler, & Beisner, 2006). A child may understand a task cognitively and have the emotional stability to perform it, but with a lack of conation, the child may not act. This underrepresented yet critical domain is vital to ensuring functional independence, particularly for children with NDDs.

**2. Conation within the Cognition-Conation-Affect-Sensory (CCAS) Model**

The Cognition-Conation-Affect-Sensation (CCAS) model, proposed by Chia (2011), offers a comprehensive framework for understanding the interconnected functions of the human mind and its behavioural potential through four core domains: *Cognition, Conation, Affect,* and *Sensation*. Cognition encompasses the mental activities involved in acquiring and applying knowledge, such as linguistic and mathematical reasoning, motor coordination, and self-awareness of bodily and environmental interactions. Affect encompasses the emotional aspects of experience, such as attachments, feelings, and personal evaluations. It is closely linked to self-awareness and self-regulation—key processes that influence how individuals respond emotionally and develop a sense of self-worth. Conation, often less emphasised in psychological models, involves the motivational drive behind behaviour, characterised by volition, self-awareness, and the capacity for self-regulation. All these mental functions operate within a closed-loop nervous system, where sensory input, internal processing, and motor output are continuously connected (Chia, Kee & Shaifudin, 2010).This loop constantly updates as new information is received, allowing the brain to adjust and respond in real-time. The CCAS model situates cognitive, emotional, and conative processes within a neurophysiological framework, emphasising their interdependence (Chia, 2011). This model is beneficial for understanding how developmental delays or NDDs affect children and how therapists can design more effective, brain-based interventions.

Conation differs from cognition and affect in that it involves the mental processes that drive goal-directed behaviour rather than knowledge acquisition or emotional responses. Such behaviours include motivation, willpower, and perseverance. It is a foundational yet often overlooked component of the tripartite model of the human mind, comprising cognitive, affective, and conative domains (Gerdes & Stromwall, 2008). This is especially relevant for children with neurodevelopmental disorders, who may struggle to start tasks, stay focused, or cope with difficulties—not because they lack ability, but because the systems that support motivation and sustained effort are affected. Reitan and Wolfson (2000) emphasised that conation represents a neglected aspect of neuropsychological functioning and may be the crucial link between a child’s cognitive potential and actual performance in real-life situations (Shiozu et al., 2024). Educational therapists (ETs) can bridge the gap between knowledge and action more effectively by integrating conative assessment and support, enabling more adaptive and persistent learning behaviours.

Conative difficulties are common in children with NDDs but are often misinterpreted as behavioural defiance or inattention. These challenges may manifest as low motivation, difficulty initiating tasks, or reliance on constant external prompting (Shiozu et al., 2024) Addressing conative development is especially important for learners who have cognitive understanding to perform a task but struggle to engage in or follow through on it, due to disrupted volitional processes.

Several interconnected brain systems support conation. The *anterior cingulate cortex* contributes to conflict monitoring and effort allocation, the *Pre-Frontal Cortex (PFC),* particularly the medial and lateral regions integrate motivation and cognitive control during decision-making (Weinstein, 2023) the b*asal ganglia* aid in habit formation and behavioural regulation, and *dopaminergic systems,* particularly the hypothalamus and the brainstem underpin reward processing and motivational salience (Schott et al., 2008). The *dorsolateral prefrontal cortex (dlPFC)* is also involved in integrating and transmitting signals of reward to the mesolimbic and mesocortical dopamine circuits, and initiates motivated behaviour (Weinstein, 2023). Disruptions in these neural circuits can impede a child’s transition from intention to action, particularly under stress or unfamiliar conditions (Grossman & Avital, 2023).

**2.1 Stimulating Key Brain Regions Involved in Conation in Children with Neurodevelopmental Disorders (NDDs)**

Educational Therapy is a “*treatment approach in which there is a delivery of*

*adequate measures which are modelled to alleviate a psycho-educational and/or psycho-behavioral condition*” for individuals (Chia & Camulli, 2018). A central goal of educational therapy (EdTx) is to support a child’s ability to act with intention. This involves strengthening the brain systems that underlie conative behaviour—those that drive motivation, goal-setting, task initiation, and sustained effort. For children with NDDs, challenges in these areas are often linked to under-activation or dysregulation in specific brain regions. By applying targeted strategies, educational therapists (ETs) can scaffold conative growth and promote greater independence, self-direction, and engagement in learning  (Shiozu et al., 2024).

*2.1.1 Aterior cingulate cortex (ACC)*

The anterior cingulate cortex (ACC) is a key neural region that regulates motivation, monitors cognitive conflict, allocates mental effort, and sustains goal-directed behaviour. Emerging research suggests that children with NDDs who have  ADHD and/or Autism Spectrum Disorder (ASD) often exhibit reduced efficiency or underactivity in this region. In particular, altered levels of glutamate and GABA in the ACC and striatum have been associated with difficulties in attention regulation and task initiation (Mamiya et al., 2022). When the balance of these neurochemicals is disrupted, it can make it harder for a child to stay focused, keep putting in effort over time, or start activities on their own without extra help. Educational therapists (ETs) can promote development in this brain region by using practical tools like “I can” statement charts or visual posters to set clear goals, build a sense of purpose and also serve as a positive reminder. Supportive phrases such as “Try another way” or “You’re almost there” can also help children stay motivated and persist through difficulties.  By asking children to reflect on helpful strategies, therapists also support the development of metacognitive awareness. Simple activities that involve waiting or working toward a reward, such as token systems, help strengthen impulse control. When coupled with consistent praise and feedback, these interventions reinforce effort-driven behaviours and foster autonomy in children with NDDs.

*2.1.2 Basal ganglia*

The basal ganglia, particularly the nucleus accumbens (NAcc) within the ventral striatum and the substantia nigra, are key parts of the brain's reward system (Schott et al., 2008; Botvinick, Huffstetler, & McGuire, 2009). They support learning through reinforcement, shape habits, and are involved in how we experience pleasure. Apart from that, they also play an important role in starting actions and responding to rewards, making them essential to both motivation and everyday functioning (Botvinick, Huffstetler, & McGuire, 2009). These functions are often disrupted in children with NDDs such as autism spectrum disorder (ASD), developmental coordination disorder, or presentations involving catatonia-like motor inhibition. Such children with NDDs may appear unmotivated or resistant when, in reality, they struggle with the neurological ability to start tasks. Educational therapists (ETs) can support this brain region through strategies that reduce the cognitive load of initiating behaviour. Token economies that offer immediate, small rewards for task completion help reinforce action through positive feedback. Creating consistent routines, such as using a daily checklist, can help make tasks feel more automatic and effortless to begin. Using transition cues such as visual signals, music, or countdowns, can also provide external prompts to activate behaviour. These strategies are particularly beneficial for children with NDDs who often find it hard to get started on tasks. By offering a consistent and structured prompt, these cues help bridge the gap between intention and action, making it easier for the child to engage meaningfully.

*2.1.3. Prefrontal cortex*

Reward-driven behaviours are shaped by complex brain networks, with the prefrontal cortex (PFC) playing a key role in linking motivation to decision-making and self-control.  Both medial and lateral regions of the PFC contribute to aligning motivational states with cognitive control during goal-directed tasks.  The dorsolateral prefrontal cortex (dlPFC), in particular, plays a key role in interpreting reward-related cues and communicating with the mesolimbic and mesocortical dopamine pathways (Weinstein, 2023). This connectivity allows the dlPFC to facilitate the initiation and maintenance of purposeful, motivated behaviour. This functional connection enables the dlPFC to support the initiation and persistence of purposeful, motivated actions. Furthermore, the PFC is also responsible for higher-order cognitive abilities such as behavioural planning, organisation, and impulse regulation. These executive capacities are frequently underdeveloped in children with NDDs, resulting in observable difficulties in managing complex tasks and sustaining goal-directed behaviours (Sadozai et al., 2024).

To support and stimulate this brain region, educational therapists (ETs) can implement structured tools, such as visual task planners, which break down goals into two to four simple steps. Evidence indicates that the use of structured visual schedules can significantly improve independent task completion, increase time-on-task, and enhance academic engagement, particularly for children with NDDs, especially those on the autism spectrum (Liang, Lee, Zuo, & Liang, 2024).

Encouraging children with NDDs to make choices within activities increases their sense of ownership and intrinsic motivation. Role-playing scenarios that pose future-oriented questions, such as “What would you do if…?” help build problem-solving skills and cognitive flexibility. Executive function games that require inhibition of automatic responses—for example, prompting children to touch their nose when the cue is “head”—further strengthen impulse control. These strategies are especially helpful for children with executive function difficulties, as they link internal motivation to the ability to plan and act on their own.

*2.1.4 Orbitofrontal and ventromedial Cortex*

The orbitofrontal (OFC) and ventromedial prefrontal (vmPFC) regions are central to evaluating reward value, supporting decision-making, motivation and enabling behavioural flexibility (Rolls, 2023). These processes are often disrupted in children with NDDs who have ASD or Oppositional Defiant Disorder (ODD). Neuroimaging studies of children with NDDs, particularly those on the autism spectrum, also show heightened activity in these areas when anticipating social or tangible reward,  indicating differences in how rewards are valued and less flexibility in adapting to changing situations (Chiappini et al., 2024). Moreover, functional connectivity studies have shown weaker links between the OFC/vmPFC and subcortical reward networks, which are often associated with the decision-making difficulties seen in children with this condition (Yang et al., 2024). To engage these neural systems, educational therapists (ETs) may employ “motivation maps” that help children identify personally meaningful rewards,  use point systems or choice boards in exchange for rewards, and integrate social-emotional learning aids, such as comic strips or social stories, to enhance their learning experience. These strategies help recalibrate  the brain’s reward pathways in children with NDDs, supporting better decision-making and encouraging active participation in both therapy and learning environments.

*2.1.5 Dopaminergic Systems: Hypothalamus and brainstem*

The hypothalamus and brainstem  play a central role in the brain’s dopaminergic system, which influences arousal, motivation, and hormone activity. The tuberoinfundibular pathway, which begins in the hypothalamus and is mainly involved in regulating hormone levels. In contrast, dopaminergic neurons in the brainstem, especially within the ventral tegmental area (VTA) and substantia nigra, initiate key pathways involved in reward anticipation, processing, and attentional control. Schott et al. (2008) identified a correlation between neural activity in the substantia nigra and ventral tegmental area (SN/VTA), the brain’s primary sources of dopaminergic transmission, and the neural responses observed during reward anticipation and reward-related experiences (Grossman & Avital, 2023). For children with NDDs with sensory modulation challenges, disruptions in these dopaminergic systems can exacerbate stress responses and contribute to shutdowns that impair motivation and volitional behaviour. Supporting these children requires first stabilising foundational physiological needs—ensuring they are well-rested, nourished, and emotionally regulated. Sensory modulation activities such as vestibular or proprioceptive input through swinging or deep pressure and hippotherapy can help recalibrate arousal levels by influencing subcortical dopaminergic activity and improve volition (Stathopoulou & Siskou, 2023).  Incorporating mind-body regulation techniques, such as deep breathing or grounding exercises, can enhance the brainstem’s role in supporting self-regulation. Such approaches promote immediate physiological and emotional balance, laying the essential groundwork for engagement, learning, and conative development.

The M.O.T.I.V.E framework offers six interconnected elements—*(M) Meaningful Goals, Ownership, (T)Task Structuring, (I) Incremental Success, (V) Value Rewards, and (E) Effort Praise*—each designed to strengthen conative behaviour and internal motivation in children with neurodevelopmental disorders (NDDs). It offers educational therapists (ETs) with a structured, practice-informed approach to supporting conative development in children with neurodevelopmental disorders (NDDs).These components function as an integrated system to support executive functioning, persistence, and self-direction in both therapy and classroom settings.  When implemented purposefully, this framework promotes conative growth and nurtures internal motivation, often underdeveloped in children with executive functioning difficulties or motivational impairments (Reitan & Wolfson, 2000; Gerdes & Stromwall, 2008). While the framework itself is conceptual, it reflects an original synthesis of current research and practical application drawn from direct work in educational therapy settings.

*Meaningful Goals* are informed by goal-setting theory (Locke & Latham, 2002) and neuroscience research on the prefrontal cortex, which is involved in planning, decision-making, and evaluating outcomes (Fuster, 2008). These goals anchor attention and provide a clear sense of purpose, especially important for children with executive function challenges. It also focuses on linking learning activities to what the child finds personally relevant. Children with NDDs will show greater motivation and emotional involvement when working on tasks that align with their interests. Educational therapists (ETs) may consider incorporating children’s hobbies or preferences into everyday classroom activities.  Based on observations, if an educational therapist notices that a child’s interest is in animals, the therapist might introduce math problems involving animals or reading factual passages about endangered species. By aligning tasks with a child’s interests, the activity becomes more engaging and meaningful as it has personal relevance to the child with NDD. This will help to improve motivation and sustained focus. This approach also reinforces academic self-efficacy and emotional regulation (Stathopoulou & Siskou, 2023) while enhancing motivation and supporting the development of long-term goal-setting abilities.

*Ownership* is rooted in self-determination theory (Deci & Ryan, 2000), which highlights the role of autonomy in driving motivation. Studies have shown that having the ability to make choices strengthens engagement and intrinsic motivation, with neural activation often observed in the medial prefrontal cortex and anterior cingular cortex (ACC) during self-referential tasks (Quirin et al., 2022). This fosters a sense of autonomy in children when they are given opportunities to make choices within structured learning activities. This can be as simple as choosing the order of tasks or deciding between drawing and writing to express an idea, and promoting limited options helps. Allowing a child to choose between two or three task options can enhance their sense of control, intrinsic motivation and agency in the learning process (Evans & Boucher, 2015). For example, a therapist might ask, “Would you prefer to draw your response or explain it with blocks?” Such small decisions help the child experience a sense of authorship over their work, leading to higher levels of motivation, engagement and task persistence (Evans & Boucher, 2015).This practice also aligns with self-determination theory, reinforcing intrinsic motivation by providing choice (Evans & Boucher, 2015).

*Task Structuring* aligns with executive function (Diamond, 2013). and cognitive load (Sweller, 1994) theories offering step-by-step scaffolding that supports working memory and sequencing. These areas are commonly affected in children with NDDs . It involves the process of breaking down activities into simple, clear, and predictable steps. It often uses tools like visual guides, schedules, and timers to help children understand what to do, how much to do and in what order. This approach is effective for children with NDDs who have attention and executive functioning difficulties as helps them with task management and reduces confusion. For example, using a simple “First – Then – Next” visual guide can help reduce confusion and make tasks feel more manageable. Incremental success builds on this by breaking tasks into smaller steps, allowing children to accumulate “tiny wins”, reinforcing their sense of capability. A writing assignment might begin with brainstorming key ideas, then organising them into a graphic organiser, and concluding with a short paragraph. Each completed phase is met with positive reinforcement to sustain momentum. This gradual build-up is essential for children with ADHD or learning difficulties who struggle with executive organisation (Weyandt et al., 2020).

*Incremental Success* draws on mastery learning principles and reinforcement theory, engaging the brain’s reward pathways, particularly in the basal ganglia and dopaminergic systems, which support learning and behavioural change through small, achievable steps (Schultz, 2007; Dweck, 2006). It is also informed by Hull’s Drive Reduction Theory (Hull, 1943), which proposes that behaviour is motivated by the need to reduce internal drives through reinforcement. In educational therapy settings, small and achievable goals that are met with immediate reinforcement (e.g., praise, access to a preferred item) can help reduce cognitive or emotional discomfort associated with challenging tasks. This form of reinforcement not only encourages task completion but also shapes persistence and learning habits over time.

*Value Rewards* and *Effort Praise* are essential in consolidating learning and reinforcing conative behaviour. Value Rewards are informed by behavioural psychology and neuro-anatomy of reward processing. The nucleus accumbens, part of the brain’s reward system, plays a central role in evaluating effort and predicting reward outcomes, influencing motivation and persistence (Kringelbach & Berridge, 2009). It taps into each child’s personal motivation profile using incentives that resonate with their interests. Rewards can serve as catalysts for the development of extrinsic motivation, which transitions to intrinsic motivation in children (Sigalingging, Nababan, Putra, & Nababan, 2023). Rather than offering general praise or unrelated prizes, therapists can use meaningful rewards like allowing a child to do a favourite activity or use a preferred item. Meaningful rewards are to be given after the child with NDD complete a challenging task. Rewards should also be personally motivating for the child with NDD. For example, allowing extra time with a preferred toy after completing a challenging activity. It is more effective when rewards are paired with genuine praise that recognises how hard the child has worked.

*Effort Praise* is based on research in growth mindset, showing that praise focused on effort rather than outcome encourages resilience and adaptive learning behaviours (Dweck, 2006). This aligns with findings that emotional regulation and self-belief can influence task engagement and long-term motivation. Focusing on effort, rather than the result, helps to foster a mindset where learning and persistence are valued. An educational therapist (ET) might say, “I saw how hard you worked to keep trying even when the puzzle was difficult,” to acknowledge the child’s effort rather than just the result. This shift from outcome-focused to process-oriented reinforcement is essential in helping children understand and internalise the value of effort, resilience, and self-monitoring skills necessary for long-term independence (Weyandt et al., 2020).

The six M.O.T.I.V.E elements provide an actionable structure for educational therapists (ETs) to enhance conative capacity in children with NDDs. When integrated with neurodevelopmentally informed approaches, such as the CCAS framework, they create opportunities for children to build confidence, regulate behaviour, and participate meaningfully in their learning. In the context of educational therapy (EdTx), these elements strengthen both the neurological and behavioural aspects of conation, enabling children with neurodevelopmental disorders (NDDs) to develop greater independence, improve self-regulation, and be purposefully engaged. The framework’s adaptability further enhances its relevance across a wide range of learner profiles and therapeutic settings.

3. discussion

The M.O.T.I.V.E. framework gives educational therapists (ETs) a clear structure to support children with NDDs facing motivation-related challenges. Each of the six elements—*Meaningful Goals, Ownership, Task Structuring, Incremental Success, Value Rewards, and Effort Praise*—corresponds to observable learning behaviours and underlying neural functions, making the framework actionable and grounded in current evidence.

The M.O.T.I.V.E. framework and the Cognitive-Conative-Affective-Sensory (CCAS) model work well together in supporting children’s development. By focusing on motivation alongside thinking, feeling, will, and sensory processing, this combined approach offers a more complete picture of a child’s needs. It allows therapists to create strategies that are responsive to each child’s unique developmental profile.

Within this approach, *(M) Meaningful Goals* and *(O) Ownership* play a key role in emotional development. They help children stay engaged, build confidence, and to be more in control of their learning.  This builds confidence and supports lasting progress. This enhances motivation and creates the foundation for volitional behaviour. For children with NDD who often withdraw from structured academic activities, these affective supports can also help reduce avoidance and improve on-task behaviour.

*(T)Task Structuring* and *(I)Incremental Success* support the cognitive domain by offering essential scaffolding for children who experience executive functioning difficulties or become easily overwhelmed. By breaking tasks into smaller, manageable steps, educational therapists can reduce cognitive load and make academic demands more accessible. Tools such as visual aids and schedules paired with routines create a sense of order and predictability. This will minimise anxiety and support task initiation. These approaches help improve attention and memory while providing regular chances for children to experience success. As children begin to complete tasks independently, their confidence grows.  Over time, this process strengthens volitional development and encourages long-term, self-directed learning.

*(V)Value Rewards* and *(E)Effort Praise* involve both the conative and sensory domains, which are critical in shaping motivation, behaviour, and emotional regulation. When a child’s effort is recognised and supported with meaningful, personalised rewards, it engages key brain systems involved in evaluating the value of rewards. This includes the nucleus accumbens, a structure within the basal ganglia (Botvinick, Huffstetler, & McGuire, 2009), and the orbitofrontal cortex (Rolls, 2023). Both regions play a vital role in how the brain weighs effort against outcomes and are central to habit formation and sustaining long-term motivation (Botvinick et al., 2009; Rolls, 2023). Praise and rewards work best in a calm, sensory-sensitive environment, where children can process feedback and manage emotions more effectively.  For children with NDDs, who may be sensitive to sensory input or more reactive to stress, a low-stimulation space reduces cognitive strain and improves their ability to engage.  When positive reinforcement is consistent and tailored to the child’s needs,  it strengthens the child’s cognitive understanding of the value of the reward, encouraging the development of adaptive behaviours over time.

The M.O.T.I.V.E. framework draws on neuroscience and evidence based interventions with each element tied to brain systems that support executive function, emotional regulation, and volitional control. Applying M.O.T.I.V.E. elements into educational therapy (EdTx) practice helps support a child’s overall growth developmental progress. Rather than treating motivation as a fixed trait, the M.O.T.I.V.E. framework recognises it as a dynamic capacity that can be cultivated through targeted, experience-dependent and neuroscience-informed practices. This finding supports research in neuroplasticity, which suggests that when interventions are tailored to a child’s unique experiences and needs, they can lead to positive brain development and growth (Weyandt et al., 2020).

The successful implementation of the M.O.T.I.V.E framework requires Educational Therapists (ET) to collaborate with professionals from other disciplines, as well as the child’s support network. Effective interventions require coordinated efforts that leverage diverse expertise. This can be achieved through multidisciplinary, interdisciplinary, or transdisciplinary team approaches. In a multidisciplinary team, professionals contribute their disciplinary knowledge independently. In contrast, interdisciplinary teams synthesise methods across domains, while transdisciplinary teams move beyond traditional boundaries to create a unified framework for understanding and addressing learner needs (Chia & Camulli, 2018).

This poly-disciplinary approach allows for a holistic understanding of a child’s needs by integrating insights from multiple fields. Chia (2010) emphasises that educational therapists should adhere to the *“Principle of Targeted Treatment”* to guide effective intervention planning . This principle requires a thorough understanding of the child’s disorder, including both its stable (non-variant) and changing (variant) traits, to design interventions that are both precise and responsive to the child’s unique profile.

Educational therapists, teachers, and allied health professionals provide critical input into identifying patterns of low motivation or behavioural disruptions. By working together through sharing insights and aligning strategies across settings, they can ensure that interventions are targeted, consistent and grounded in neurological and contextual realities. When reinforced at home, school, and therapy settings, this collaborative approach allows children to generalise volitional skills and sustain long-term progress in autonomy and self-regulation (Chia, 2010; Chia & Camulli, 2018).

4. Conclusion

The M.O.T.I.V.E. framework promotes conative development in children with neurodevelopmental disorders (NDDs) by strengthening their motivation, persistence, and ability to pursue goals. This framework emerged from ongoing clinical practice in neuroscience, pedagogy, therapy and is shaped by recurring themes observed in children presenting with motivational and volitional challenges. While it does not present empirical findings, it offers a conceptual structure informed by both neuropsychologically informed research and practical insight to educational therapists (ETs).

When used in conjunction with the CCAS model, M.O.T.I.V.E. reinforces the importance of integrating thinking, feeling, sensing, and doing as essential components of the learning process. Its six elements—*Meaningful Goals, Ownership, Task Structuring, Incremental Success, Value Rewards, and Effort Praise*—align closely with CCAS domains, allowing educational therapists (ETs) to design personalised and targeted interventions that promote agency and sustained engagement. Because of its flexible structure, the framework can be used with a wide range of learner needs. However, further studies are needed to evaluate its outcomes across diverse NDD learning profiles and settings formally.

Collaboration also remains a key strength in ensuring the effectiveness of interventions to support the conative growth of children with NDDs. When educational therapists (ETs) collaborate with allied health professionals and teachers , they establish more consistent and responsive support systems across home, school, and clinical settings. By placing conation at the heart of educational therapy, learning is viewed not just as acquiring knowledge, but also as taking purposeful action. Nurturing volitional capacity is critical to building confidence, autonomy, and long-term progress for children with NDDs.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, manuscript.

References

Botvinick, M. M., Huffstetler, S., & McGuire, J. T. (2009). Effort discounting in human nucleus accumbens. Cognitive, Affective, & Behavioral Neuroscience, 9(1), 16–27. <https://doi.org/10.3758/CABN.9.1.16>

Cainelli, E., & Bisiacchi, P. S. (2023). Neurodevelopmental disorders: Past, present, and future. Children, 10(1), 31. <https://doi.org/10.3390/children10010031>

Chiappini, E., Massaccesi, C., Korb, S., Steyrl, D., Willeit, M., & Silani, G. (2024). Neural hyperresponsivity during the anticipation of tangible social and nonsocial rewards in autism spectrum disorder: A concurrent neuroimaging and facial electromyography study. Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, 9(9), 948–957. <https://doi.org/10.1016/j.bpsc.2024.04.006>

Chia, K. H. (2010). Reading disabilities and disorders. Singapore: Cobee Publishing House.

Chia, K. H., & Camulli, J. E. (2018). Strategic intervention: “Being strategic” in educational therapy. European Journal of Alternative Education Studies, 3(1), 31–49. <https://doi.org/10.5281/zenodo.1183653>

Chia, N. K. H. (2011). What we need to know and understand about courage (Part 1): Conceptualization of courage within the triangulation of cognition, affect & conation. Unlimited Human!, (Fall), 8–10, 13.

Chia, N. K. H., Kee, N. K. N., & Shaifudin, M. M. Y. (2010). Identifying and profiling autistic learning and behavioural difficulties in children. In Practical tips for teaching children with mild/moderate autism in mainstream schools (Paper No. 1). Singapore: Cobee Publishing House.

Hull, C. L. (1943). Principles of behavior: An introduction to behavior theory. Appleton-Century-Crofts.

Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11(4), 227–268. <https://doi.org/10.1207/S15327965PLI1104_01>

Diamond, A. (2013). Executive functions. Annual Review of Psychology, 64, 135–168. <https://doi.org/10.1146/annurev-psych-113011-143750>

Dweck, C. S. (2006). Mindset: The new psychology of success. Random House.

Evans, M., & Boucher, A. (2015). Optimizing the power of choice: Supporting student autonomy to foster motivation and engagement in learning. Mind, Brain, and Education, 9(2), 87–91. <https://doi.org/10.1111/mbe.12073>

Fuster, J. M. (2008). The prefrontal cortex (4th ed.). Academic Press.

Gerdes, K., & Stromwall, L. K. (2008). Conation: A missing link in the strengths perspective. Social Work, 53(3), 233–242. <https://doi.org/10.1093/sw/53.3.233>

Gidziela, A., Ahmadzadeh, Y. I., Michelini, G., Rees, E., Ruzzo, E. K., Hawkes, D., et al. (2023). A meta-analysis of genetic effects associated with neurodevelopmental disorders and co-occurring conditions. Nature Human Behaviour, 7, 642–656. <https://doi.org/10.1038/s41562-023-01530-y>

Global Burden of Disease Collaborative Network. (2017). Global Burden of Disease Study 2016 (GBD 2016) Results. Institute for Health Metrics and Evaluation.

Grossman, A., & Avital, A. (2023). Emotional and sensory dysregulation as a possible missing link in attention deficit hyperactivity disorder: A review. Frontiers in Behavioral Neuroscience, 17, 1118937. <https://doi.org/10.3389/fnbeh.2023.1118937>

Herrmann, M., King, K., & Weitzman, M. (2008). Prenatal tobacco smoke and postnatal secondhand smoke exposure and child neurodevelopment. Current Opinion in Pediatrics, 20(2), 184–190. <https://doi.org/10.1097/MOP.0b013e3282f56165>

Kringelbach, M. L., & Berridge, K. C. (2009). Towards a functional neuroanatomy of pleasure and happiness. Trends in Cognitive Sciences, 13(11), 479–487. <https://doi.org/10.1016/j.tics.2009.08.006>

[Lebeña](https://www.nature.com/articles/s41598-024-65067-4#auth-Andrea-Lebe_a-Aff1), A., Faresjö, Å., Jones, M. P., Bengtsson, F., & Faresjö, T. (2024). Early environmental predictors for ADHD, ASD and their co-occurrence: The prospective ABIS Study. Scientific Reports, 14, 14759. <https://doi.org/10.1038/s41598-024-65067-4>

Liang, Z., Lee, D., Zuo, J., & Liang, S. (2024). The use of visual schedules to increase academic-related on-task behaviours of individuals with autism: A literature review. International Journal of Developmental Disabilities, 1–14. <https://doi.org/10.1080/20473869.2024.2402124>

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. American Psychologist, 57(9), 705–717. <https://doi.org/10.1037/0003-066X.57.9.705>

Lord, C., Elsabbagh, M., Baird, G., & Veenstra-VanderWeele, J. (2020). Autism spectrum disorder. The Lancet, 392(10242), 508–520. <https://doi.org/10.1016/S0140-6736(19)31189-1>

Mamiya, P. C., Richards, T. L., Edden, R. A. E., Lee, A. K. C., Stein, M. A., & Kuhl, P. K. (2022). Reduced Glx and GABA inductions in the anterior cingulate cortex and caudate nucleus are related to impaired control of attention in attention-deficit/hyperactivity disorder. International Journal of Molecular Sciences, 23(9), 4677. <https://doi.org/10.3390/ijms23094677>

Martinez, S., Stoyanov, K., & Carcache, L. (2024). Unraveling the spectrum: Overlap, distinctions, and nuances of ADHD and ASD in children. Frontiers in Psychiatry, 15, 1387179. <https://doi.org/10.3389/fpsyt.2024.1387179>

Militello, L. G., Gentner, F. C., Swindler, S. D., & Beisner, G. I. (2006). Conation: Its historical roots and implications for future research. In Proceedings of the International Symposium on Collaborative Technologies and Systems (CTS 2006) (pp. 120–125). IEEE. <https://doi.org/10.1109/CTS.2006.31>

Morris-Rosendahl, D. J., & Crocq, M. A. (2020). Neurodevelopmental disorders—the history and future of a diagnostic concept. Dialogues in Clinical Neuroscience, 22(1), 65–72. <https://doi.org/10.31887/DCNS.2020.22.1/drosendahl>

Reitan, R. M., & Wolfson, D. (2000). Conation: A neglected aspect of neuropsychological functioning. Archives of Clinical Neuropsychology, 15(5), 443–453. <https://doi.org/10.1016/S0887-6177(99)00043-8>

Quirin, M., Kerber, A., Küstermann, E., Radtke, E. L., Kazén, M., Konrad, C., Baumann, N., Ryan, R. M., Ennis, M., & Kuhl, J. (2022). Not the master of your volitional mind? The roles of the right medial prefrontal cortex and personality traits in unconscious introjections versus self-chosen goals. Frontiers in Psychology, 13, 740925. <https://doi.org/10.3389/fpsyg.2022.740925>

Rolls, E. T. (2023). Emotion, motivation, decision-making, the orbitofrontal cortex, anterior cingulate cortex, and the amygdala. Brain Structure and Function, 228(6), 1201–1257. <https://doi.org/10.1007/s00429-023-02644-9>

Rosi, E., Crippa, A., Pozzi, M., De Francesco, S., Fioravanti, M., Mauri, M., et al. (2023). Exposure to environmental pollutants and ADHD: An overview of systematic reviews and meta-analyses. Environmental Science and Pollution Research, 30, 111676–111692. <https://doi.org/10.1007/s11356-023-30173-9>

Sadozai, A. K., Sun, C., Demetriou, E. A., Lampit, A., Munro, M., Perry, N., et al. (2024). Executive function in children with neurodevelopmental conditions: A systematic review and meta-analysis. Nature Human Behaviour, 8, 2357–2366. <https://doi.org/10.1038/s41562-024-02046-9>

Schott, B. H., Minuzzi, L., Krebs, R. M., Elmenhorst, D., Lang, M., Winz, O. H., et al. (2008). Mesolimbic functional magnetic resonance imaging activations during reard anticipation correlate with reward-related ventral striatal dopamine release. Journal of Neuroscience, 28(52), 14311–14319. <https://doi.org/10.1523/JNEUROSCI.2058-08.2008>

Schultz, W. (2007). Behavioral dopamine signals. Trends in Neurosciences, 30(5), 203–210. <https://doi.org/10.1016/j.tins.2007.03.007>

Shiozu, H., Kimura, D., Iwanaga, R., & Kurasawa, S. (2024). Participation strategies of parents of children with neurodevelopmental disorders: An exploratory study. Children, 11(2), 192. <https://doi.org/10.3390/children11020192>

Sigalingging, R., Nababan, H., Putra, A., & Nababan, M. (2023). Enhancing learning motivation in elementary schools: The impact and role of rewards. Jurnal Ilmu Pendidikan dan Humaniora, 12(1), 1–13. <https://doi.org/10.35335/jiph.v12i1.27>

Stathopoulou, A., & Siskou, K. (2023). Enhancing mental health promotion of students with learning disabilities: The role of motivation and digital technologies. GSC Advanced Research and Reviews, 16(1). <https://doi.org/10.30574/gscarr.2023.16.1.0307>

Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. Learning and Instruction, 4(4), 295–312. <https://doi.org/10.1016/0959-4752(94)90003-5>

Taylor, R. R., Kielhofner, G., Smith, C., Butler, S., Cahill, S. M., Ciukaj, M. D., & Gehman, M. (2009). Volitional change in children with autism: A single‐case design study of the impact of hippotherapy on motivation. Occupational Therapy in Mental Health, 25(2), 192–200. <https://doi.org/10.1080/01642120902859287>

Thapar, A., Cooper, M., & Rutter, M. (2017). Neurodevelopmental disorders. The Lancet Psychiatry, 4(4), 339–346. <https://doi.org/10.1016/S2215-0366(16)30376-5>

Weinstein, A. M. (2023). Reward, motivation and brain imaging in human healthy participants: A narrative review. Frontiers in Behavioral Neuroscience, 17, 1123733. <https://doi.org/10.3389/fnbeh.2023.1123733>

Weyandt, L. L., Clarkin, C. M., Holding, E. Z., May, S. E., Marraccini, M. E., Gudmundsdottir, B. G., ... & Thompson, L. (2020). Neuroplasticity in children and adolescents in response to treatment intervention: A systematic review of the literature. Clinical and Translational Neuroscience, 4(2), 2514183X20974231. <https://doi.org/10.1177/2514183X20974231>

Yang, C., Wang, X.-K., Ma, S.-Z., Lee, N. Y., Zhang, Q.-R., Dong, W.-Q., et al. (2024). Abnormal functional connectivity of the reward network is associated with social communication impairments in autism spectrum disorder: A large-scale multi-site resting-state fMRI study. Journal of Affective Disorders, 347, 608–618. <https://doi.org/10.1016/j.jad.2023.12.013>

Yang, Y., Zhao, S., Zhang, M., Xiang, M., Zhao, J., Chen, S., et al. (2022). Prevalence of neurodevelopmental disorders among US children and adolescents in 2019 and 2020. Frontiers in Psychology, 13, 997648. <https://doi.org/10.3389/fpsyg.2022.997648>