Attention, Awareness, and Cognitive Development in Childhood: A Yogic Perspective

Shodh Siddhi
A Multidisciplinary & Multilingual Double Blind Peer Reviewed International Research Journal
Volume: 02 | Issue: 03 [July to September : 2026], pp. 41-50



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Abstract

Childhood is one of the most important phases of human development, especially for the growth of attention, awareness, and higher cognitive abilities. Modern psychology has explained many aspects of how children learn to think, focus, and respond to the world around them. At the same time, the Indian yogic tradition offers a holistic understanding of mental development that is equally valuable. This article attempts to connect these two perspectives by exploring how yogic ideas such as dharana (concentration), pratyahara (withdrawal of the senses), and dhyana (meditation) relate to stages of cognitive development in children.

The discussion draws from contemporary research studies along with the relevant scholarly work of Maheshwari (2021) to examine the role of yoga-based practices in improving children's mental functioning. Practices such as asana, pranayama, and mindfulness techniques including Vipassana are discussed as practical tools that may strengthen attention, emotional stability, and executive functioning. Several controlled studies have shown that regular yoga practice can improve sustained attention, working memory, inhibitory control, and visual-motor coordination among school-going children.

The article also places these scientific findings within the broader framework of yogic psychology, particularly the concepts of chitta (mind-field), vritti (mental modifications), and prajna (higher wisdom). Rather than treating yoga as an alternative to neuroscience, the paper argues that both systems often point toward

similar understandings of how the mind develops and functions. Finally, the article considers how yoga may contribute to educational practices, therapeutic interventions, and future interdisciplinary research related to child development and cognition.

Keywords: Attention, yoga and attention, childhood and attention.

1. INTRODUCTION

Childhood is widely recognised as one of the most significant phases of human development. During this period, the brain develops rapidly, especially the prefrontal cortex and its connections with emotional and sensory centres of the brain. These developments form the basis for higher cognitive functions such as reasoning, self-control, decision-making, and learning. Among these abilities, attention occupies a central place because it allows children to focus on relevant information while filtering distractions. When attentional control is weak, learning, memory, problem-solving, and even social interactions can be negatively affected.

Modern developmental psychology has provided important explanations of how attention develops over time. The work of Jean Piaget, Lev Vygotsky, and later the attentional networks theory proposed by Michael Posner and Mary Petersen has shown how attention gradually evolves from simple and involuntary responses in infancy to more sustained, voluntary, and self-regulated forms during childhood and adolescence. These theories explain the developmental stages of attention with considerable clarity. However, they focus mainly on describing how attention develops rather than examining how deliberate mental training practices may strengthen or accelerate this process.

In this context, yoga offers an important complementary perspective. The ancient yogic tradition, systematised in the Yoga Sutras (circa 400 CE), is not limited to physical exercise alone. Instead, it presents a comprehensive framework for the refinement of the mind and consciousness. Within the eight-limbed (ashtanga) system of yoga, the cultivation of attention gradually progresses from basic concentration to deeper states of awareness and meditation. Practices such as dharana, pratyahara, and dhyana are specifically intended to stabilise the mind and improve attentional control.

This article argues that the yogic model of the mind, together with its practical methods, provides a theoretically meaningful and increasingly evidence-based framework for understanding and supporting cognitive development in children. The scholarly contribution of Dr. Vivek Maheshwari is particularly relevant in this regard. His work in yoga psychology and the clinical application of contemplative practices—including research on Vipassana meditation and Naad Yoga—highlights the therapeutic and developmental value of traditional yogic techniques within modern psychological contexts (Patwa & Maheshwari, 2024; Maheshwari & Tiwari, 2021).

2. BACKGROUND OF THE CONCEPT: THE YOGIC MODEL OF MIND (*MANA)*

2.1 Chitta, Vritti, and the Nature of Attention

Patanjali defines yoga as *"yogah chitta-vritti-nirodhah"*—the calming or regulation of the fluctuations of the mind (Yoga Sutra 1.2). Although expressed in a brief aphorism, this definition presents a remarkably deep understanding of human cognition. In yogic psychology, *chitta* refers to the mind-field as a whole, including thoughts, memories, emotions, perceptions, and patterns of awareness. In many ways, it resembles what modern psychology describes as consciousness and mental processing. *Vrittis*, on the other hand, are the constant mental fluctuations that occupy the mind, such as thoughts,

imagination, sensory impressions, and memories, which often disturb mental stability and divide attention.

From this perspective, attention is not understood as an isolated mental skill but as a quality or direction of *chitta* itself. When the mind is restless and filled with uncontrolled *vrittis*, attention becomes scattered, reactive, and easily distracted by external stimuli or emotional impulses. However, according to the yogic tradition, regular practices such as concentration, breath regulation, and meditation gradually reduce these fluctuations and help stabilise the mind. As the mind becomes calmer, attention develops greater steadiness, clarity, and voluntary control.

Interestingly, this understanding closely parallels modern psychological theories of attention. Contemporary cognitive science distinguishes between bottom-up attention, which is automatically drawn toward external stimuli, and top-down attention, which involves conscious and goal-directed focus. Yogic practices appear to strengthen this higher form of attentional regulation by training the individual to consciously direct and sustain awareness rather than remain controlled by distractions or impulsive reactions.

2.2 Progressive Attentional Training And the concept of Ashtanga Yoga

According to Patanjali, the eight limbs of yoga represent a gradual and systematic refinement of attention and awareness. Each stage prepares the practitioner for deeper mental stability and concentration. The first four limbs—*yama* (ethical restraints), *niyama* (personal disciplines), *asana* (posture), and *pranayama* (breath regulation)—establish the physical, emotional, and behavioural foundations necessary for sustained inward attention. These practices help regulate the body, breath, and behaviour, thereby creating the stability required for higher mental training.

The fifth limb, *pratyahara*, involves the withdrawal of the senses from external objects and distractions. In practical terms, it refers to reducing the mind's habitual tendency to react continuously to sensory input. Contemporary neuroscience offers an interesting parallel to this concept, as it may resemble the down-regulation of the default mode network and reduced activity in sensory-processing regions of the brain during meditative practices.

Dharana, the sixth limb, is described as fixing or binding the mind to a single point of focus. This closely resembles the concepts of selective and sustained attention discussed in modern cognitive psychology, where attention is intentionally directed toward one object while distractions are filtered out. As this concentration becomes more continuous and effortless, it develops into *dhyana* (meditation), the seventh limb. In this stage, attention flows steadily toward the object without interruption. This experience has often been compared to the "flow state" described by Mihaly Csikszentmihalyi, in which an individual becomes fully absorbed in an activity with heightened focus and reduced self-consciousness.

The eighth limb, *samadhi*, is regarded as a state that transcends the ordinary subject-object distinction present in normal attention. In this condition, awareness becomes deeply unified and absorbed. Modern neurophysiological studies on experienced meditators have associated such advanced meditative states with measurable brain activity patterns, including alpha-theta synchrony and elevated gamma-wave activity in EEG recordings. These findings suggest that higher stages of yogic meditation may correspond to distinctive modes of cognitive and neural integration observed in contemporary meditation research.

3. DEVELOPMENT OF COGNITION IN CHILDREN: IMPORTANT MILESTONES

3.1 Development of Attention: A perspective of the developmental psychology

Research in developmental cognitive neuroscience has identified three major attentional networks involved in human cognition: the alerting network, which helps an individual achieve and maintain a state of readiness; the orienting network, which directs attention toward relevant sensory information; and the executive attention network, which monitors conflicts and regulates responses. The development of these networks occurs gradually across childhood and adolescence. While alerting and orienting abilities tend to mature relatively early, executive attentional control—largely associated with the anterior cingulate cortex and prefrontal brain regions—continues to develop well into adolescence (Posner & Rothbart, 2007).

Among these networks, executive attention is especially important for academic and behavioural development. Children who possess stronger executive attentional abilities often perform better in mathematics, literacy, and problem-solving tasks. They also tend to demonstrate improved emotional regulation, reduced impulsive behaviour, and healthier social interactions (Diamond, 2013). In contrast, difficulties in executive attention are commonly associated with attention deficit hyperactivity disorder (ADHD), a condition estimated to affect approximately 5–7% of school-aged children worldwide.

Beyond the development of attention itself, cognitive growth also involves the emergence of meta-cognition—the ability to observe, understand, and regulate one's own thinking processes. John H. Flavell first described meta-cognition systematically and explained how it gradually develops during middle childhood as children become more aware of their own learning and mental processes (Flavell, 1979). This capacity is closely connected to academic self-regulation and effective learning strategies.

From a yogic perspective, this idea closely resembles *sakshi bhava*, often translated as "witness consciousness," in which an individual observes thoughts, emotions, and mental activity in a calm and non-reactive manner. Several researchers in contemplative science have pointed out the similarity between meta-cognitive awareness and this yogic concept, suggesting an important area for further interdisciplinary research.

The work of Dr. Vivek Maheshwari is particularly relevant to this discussion. His research on Vipassana meditation explores the relationship between mindfulness practices and cognitive development. Vipassana, an ancient meditation practice rooted in Buddhist and yogic traditions, has been associated with improvements in attention, perception, and self-awareness while also cultivating the quality of witnessing awareness described in yogic philosophy (Patwa & Maheshwari, 2024). In this practice, individuals are trained to observe sensations, thoughts, and emotions without immediate reaction or judgment. Over time, this process may strengthen meta-cognitive monitoring abilities and contribute to greater emotional and cognitive regulation.

4. Empirical evidence: yoga, attention, and cognitive enhancement in children

4.1 Asana-Based Interventions

A growing number of randomised controlled trials have examined how structured yoga programmes influence children's cognitive development and attentional abilities. One important study conducted by Jarraya et al. (2019) involved 45 kindergarten children aged five years who were assigned either to a 12-week Hatha yoga programme, a general physical education programme, or a no-

intervention group. The children who participated in yoga showed significant improvements in visual attention and visual-motor precision compared with the other groups. They also demonstrated noticeable reductions in inattentive and hyperactive behaviour. The researchers concluded that yoga functions as a form of "conscious exercise" that strengthens attention control and inhibitory skills, making it especially beneficial in early educational settings.

Similar findings were reported by Aleksić-Veljković et al. (2021), who studied the effects of a 12-week yoga intervention on preschool children. Their research showed improvements not only in motor abilities but also in impulse control, sustained attention, concentration, and classroom behaviour. These benefits may reflect improvements in motor planning, attentional endurance, and the maturation of prefrontal regulatory systems involved in self-control and executive functioning.

More recently, Huang et al. (2025) conducted a large randomised controlled trial involving 131 school-aged children in Western China. The study found that children in the yoga intervention group demonstrated significantly stronger concentration skills compared with those in physical education and control groups. The researchers interpreted yoga as a form of sensorimotor training that supports executive functioning and attentional regulation.

Pranayama and Breath Regulation

Pranayama, the yogic practice of breath regulation, occupies an important position within the ashtanga system because it connects physical practices with deeper mental disciplines. Modern neuroscience increasingly supports the idea that controlled breathing directly affects the autonomic nervous system, vagal activity, and prefrontal brain functioning. Shirley Telles et al. (2019) demonstrated that even a single session of high-frequency yogic breathing significantly improved attention scores among children aged 11–12 when compared with breath-awareness exercises and quiet sitting conditions. These findings suggest that pranayama may produce immediate effects on attentional functioning in developing minds.

From a neuroscientific perspective, these effects may occur through enhanced vagal tone and respiratory sinus arrhythmia, which influence the locus coeruleus–norepinephrine system involved in alertness and attentional regulation. In yogic philosophy, pranayama is understood as the regulation of *prana* or vital energy. By balancing the flow of prana—particularly through the *sushumna nadi* (central energy channel)—pranayama is believed to stabilise awareness and reduce the restless, scattered quality of *chitta* that interferes with focused attention.

Yoga and Neurodevelopmental Conditions

Researchers have also explored the potential benefits of yoga for children with neurodevelopmental conditions related to attention. Chou and Huang (2017) studied 49 children diagnosed with ADHD who participated either in an 8-week yoga programme or a control condition. Children in the yoga group showed statistically significant improvements in sustained attention and discrimination abilities based on computerised assessments. These findings are particularly important because ADHD represents one of the more severe challenges in attentional development, while conventional pharmacological treatments are often associated with side effects and inconsistent long-term outcomes.

Within the yogic framework, ADHD may be interpreted as a condition characterised by excessive *rajas*—the guna associated with restlessness, hyperactivity, and mental agitation—combined with

insufficient *sattva*, which represents clarity, balance, and mental steadiness. Yogic practices such as stable posture, controlled breathing, and sensory regulation are traditionally believed to cultivate *sattvic* qualities, thereby helping reduce the excessive restlessness associated with attentional instability.

Yogic Educational Systems and Sustained Attention

The role of yoga within educational systems has also attracted scholarly attention. Rangan, H. R. Nagendra, and Bhatt (2009) compared sustained attentional performance in children studying within a traditional yogic *Gurukula* education system and those in a conventional modern educational setting. The *Gurukula* students, who regularly practised asana, pranayama, and Vedic chanting, demonstrated significantly stronger sustained attention on the Six Letter Cancellation Task. These findings suggest that long-term immersion in a yogic educational environment may provide broader developmental benefits for attention and self-regulation than isolated yoga sessions conducted within conventional schools.

5. Awareness, consciousness, and the yogic developmental map

5.1 Pratyahara: Sensory Withdrawal and Inner Awareness

Among the eight limbs of yoga described by Patanjali, *pratyahara* is perhaps one of the least explored, especially in modern discussions on child development and cognition. Yet, from the perspective of developmental psychology, it is highly significant. *Pratyahara* refers to the process of gradually withdrawing attention from external distractions and turning awareness inward. In simple terms, it is the practice of learning not to be constantly controlled by external sensory stimulation.

This idea has interesting similarities with what modern psychology calls *interoceptive awareness*—the ability to notice and understand one's internal bodily sensations, emotions, and mental states. Research suggests that children who develop stronger interoceptive awareness often show better emotional regulation, empathy, social understanding, and psychological well-being. They are generally more capable of recognising their feelings and responding to situations calmly rather than impulsively.

Practices associated with *pratyahara*, such as yoga nidra, body scanning, and guided relaxation, encourage children to observe their internal experiences in a relaxed and non-reactive way. These practices may therefore help develop not only attention but also emotional balance and self-awareness. By learning to pause and observe their thoughts, emotions, and bodily sensations, children may gradually develop stronger self-regulation and emotional stability.

5.2 Vipassana and the Development of Witnessing Awareness

The scholarly work of Dr. Vivek Maheshwari offers valuable insight into the relationship between contemplative practices and cognitive development. In their review, Patwa and Maheshwari (2024) explain that Vipassana meditation involves carefully observing bodily sensations, thoughts, and emotions without reacting to them immediately. According to their findings, this practice can improve emotional balance, sharpen perception and cognition, and support overall psychological well-being. They suggest that the effectiveness of Vipassana lies in cultivating a calm and non-judgmental awareness of present-moment experience.

When adapted appropriately for children, the principles of Vipassana—such as mindful breathing, body awareness, and recognising emotions without reacting impulsively—may offer important developmental benefits. Emerging studies indicate that even short mindfulness-based programmes can help children become less reactive and more self-aware in their thinking and

behaviour. Instead of responding automatically to distractions or emotions, children gradually learn to observe and regulate their responses more consciously.

Neuroscientific research also supports this possibility. These practices are believed to strengthen connections between brain regions involved in attention and self-regulation, particularly the fronto-parietal networks and the anterior cingulate cortex, which play important roles in monitoring behaviour and resolving mental conflict.

5.3 Naad Yoga and Acoustic Consciousness

Another important but often overlooked dimension of yogic training is the use of sound. *Naad Yoga*, or the yoga of sound, uses chanting, mantra recitation, and vibrational practices to stabilise and refine awareness. Dr. Vivek Maheshwari and Tiwari (2021) studied the effects of Naad Yoga and found that sound-based yogic practices could produce meaningful psychological benefits, including reductions in depressive symptoms. Although their work focused mainly on clinical populations, the findings have wider implications for children and educational settings as well.

From a developmental perspective, structured sound practices during childhood—especially rhythmic and repetitive chanting—can positively influence brain development. Such practices stimulate auditory processing systems, support memory and language development, and improve concentration. Traditional Vedic chanting, which remains an important aspect of *Gurukula* education systems, may therefore function as much more than a spiritual or cultural activity. It can also act as a form of cognitive training that strengthens attention, phonological awareness, memory, and mental endurance in children.

6. NEUROSCIENTIFIC CORRELATES OF YOGIC PRACTICE IN DEVELOPING BRAINS

Research in neuroscience and meditation studies has increasingly shown that long-term yoga and meditation practices can produce measurable changes in the brain. Neuroimaging studies in adults have reported increased grey matter density in regions such as the prefrontal cortex, anterior cingulate cortex, and insula—areas associated with attention, emotional regulation, and self-awareness. Researchers have also observed stronger functional connectivity within networks related to executive control and self-regulation, along with reduced emotional reactivity in the amygdala. Although long-term neuroimaging studies involving children are still limited, existing cross-sectional and psychophysiological research suggests that similar processes may also occur in developing brains.

One of the most important aspects of yoga for childhood development is its effect on the autonomic nervous system. Regular yogic practice is known to strengthen parasympathetic activity by improving vagal tone, which helps the body shift into a calmer and more regulated state. In children, this may lead to lower stress reactivity, improved heart rate variability, and greater emotional stability. These physiological changes create internal conditions that support sustained attention, learning, and emotional balance.

This is especially important because chronic stress during childhood has been linked with structural and functional changes in brain regions such as the prefrontal cortex and hippocampus, both of which are essential for attention, learning, and memory. Children growing up in stressful or adverse environments often struggle with emotional regulation and attentional control. In this context, yoga's stress-reducing and balancing effects may provide meaningful developmental support.

Electroencephalography (EEG) studies on experienced yoga and meditation practitioners have also identified characteristic brain-wave patterns associated with different states of awareness. Increased

alpha-wave activity is commonly linked with relaxed alertness, while theta activity is associated with deeper meditative states. Advanced practitioners sometimes demonstrate heightened gamma synchrony, which has been connected with integrated cognitive processing and heightened awareness. Interestingly, the transitional alpha-theta state—often associated with *pratyahara* and the early stages of *dharana*—has been linked with creativity, memory consolidation, and deeper forms of learning. For children, age-appropriate yogic practices that gently cultivate such calm and attentive mental states may support both academic learning and experiential understanding.

7. Implications for Integrative Education and Child Development

7.1 Curriculum Integration

The growing body of research on yoga and cognitive development has important implications for educational systems and classroom practice. Evidence increasingly suggests that structured yoga programmes can support attention, emotional regulation, and learning in ways that complement traditional academic instruction. Several countries in Europe and Asia have already introduced yoga-based wellness and physical education initiatives with encouraging results. In India, the National Education Policy 2020 specifically encourages the inclusion of Indian knowledge traditions, including yoga, within mainstream education. Dr. Vivek Maheshwari has also emphasised the importance of this integration for supporting holistic child development.

For children, yoga programmes should focus less on difficult physical postures and more on practices that cultivate awareness and attentional stability. Mindful movement, breath regulation, guided relaxation, body-awareness exercises, and simple sensory withdrawal techniques are likely to be more developmentally appropriate and educationally meaningful. Existing research suggests that even programmes lasting 20–30 minutes, conducted two or three times per week over a period of 8–12 weeks, may produce measurable cognitive and emotional benefits.

7.2 Clinical Applications

Yoga-based interventions also hold promise for children experiencing attentional difficulties, anxiety, stress-related learning problems, or behavioural dysregulation. Research increasingly supports the use of yoga as a complementary, non-pharmacological intervention for conditions such as ADHD, learning disabilities, and anxiety disorders. One of yoga's strengths is that it addresses the child as a whole by integrating body, breath, emotions, and attention rather than focusing only on isolated symptoms. This holistic approach aligns closely with integrative models of child mental health and well-being.

7.3 Future Research Directions

Although the existing research findings are promising, several limitations remain within the current literature. Many studies involve relatively small sample sizes, short intervention periods, and varying yoga protocols, making it difficult to draw universally generalisable conclusions. Future studies would benefit from larger randomised controlled trials, standardised yoga curricula, neuroimaging-based assessments, and longer follow-up periods to better understand the long-term developmental effects of yoga on children.

Longitudinal research following children from early childhood through adolescence would be especially valuable in understanding how yogic practices influence attentional development, emotional regulation, and self-awareness over time. Interdisciplinary collaboration between yoga scholars and

developmental neuroscientists may also open new directions for research. In particular, the conceptual language of yogic psychology—terms such as *chitta*, *vritti*, *dharana*, *pratyahara*, and *sakshi*—may provide fresh theoretical frameworks for exploring attention and awareness in ways that extend beyond the conventional vocabulary of modern cognitive psychology.

The work of Dr. Vivek Maheshwari is especially relevant in this emerging interdisciplinary space, as it demonstrates how traditional yogic knowledge systems can meaningfully contribute to contemporary discussions on cognition, education, and mental health.

8. CONCLUSION

The yogic tradition, developed through centuries of careful observation and exploration of the human mind, offers a rich and meaningful perspective on cognitive development that is increasingly supported by modern scientific research. One of its central ideas is that attention is not fixed but can be consciously trained and refined over time. Yoga proposes that awareness can gradually move from a scattered and reactive state toward greater stability, clarity, and self-awareness. Interestingly, this understanding closely aligns with many findings in contemporary cognitive neuroscience regarding attention, emotional regulation, and brain development.

For children, these ideas have important practical value. Research suggests that yoga-based practices—including asana, pranayama, pratyahara, and age-appropriate meditation techniques—can improve selective attention, sustained concentration, executive functioning, emotional balance, and meta-cognitive awareness. These are not minor improvements; they directly influence the foundations of learning, behaviour, emotional intelligence, and healthy social interaction.

The scholarly work of Lakulish Yoga University has played an important role in connecting traditional yogic knowledge with contemporary research in psychology, education, and child development. Their contributions in areas such as yoga psychology, Vipassana meditation, Naad Yoga, and the clinical application of contemplative practices help create a meaningful bridge between ancient yogic wisdom and evidence-based scientific inquiry. As interest in holistic and mind-body approaches to education and child health continues to grow around the world, this interdisciplinary work deserves wider academic recognition and support.

Ultimately, the yogic perspective does more than simply add to existing developmental theories. It broadens them by emphasising that cognitive growth is not only a matter of biological maturation or neurological change, but also of conscious practice and the gradual cultivation of awareness. In teaching children how to focus—not only on the external world but also on their own thoughts, emotions, and inner experiences—yoga offers something that extends beyond academic success. It supports the development of a more balanced, aware, and emotionally resilient human being.

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