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Review Article

Borderline Intellectual Functioning in Children: An Integrative Ayurvedic Perspective

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Abstract

Background: Borderline Intellectual Functioning (BIF) is characterized by below average intellectual performance that does not meet the criteria for intellectual disability. *Ayurveda* provides a holistic conceptual framework for cognition involving *Buddhi, Medha, Manas*, and related functional faculties. Aim: To explore BIF through an integrative Ayurvedic perspective by examining the conceptual relationship between Ayurvedic cognitive constructs and contemporary cognitive science. Methods: A narrative integrative review was conducted using relevant literature from PubMed and Google Scholar and classical Ayurvedic texts including *Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Ashtanga Samgraha, and Kashyapa Samhita*. Concepts including *Buddhi, Dhee, Dhriti, Smriti, Medha, Buddhi Vibhramsha,* and *Prajnaparadha* were comparatively examined in relation to executive function, memory, learning, and adaptive behaviour. Results: *Dhee* was conceptually related to discernment, reasoning, and judgment; *Dhriti* to regulatory and inhibitory control; and Smriti to memory and learning. Ayurvedic descriptions of developmental, nutritional, behavioural, and psychosocial influences also showed conceptual convergence with contemporary developmental and biopsychosocial perspectives. Preventive and supportive approaches such as *Medhya Rasayana* and *Sattvavajaya Chikitsa* may have complementary conceptual relevance, although their efficacy specifically for BIF remains insufficiently established. Conclusion: BIF may be conceptually interpreted as a spectrum of functional disturbance involving *Buddhi* and its associated faculties. This integrative perspective may support culturally sensitive understanding and future interdisciplinary research. Limitations: The narrative review did not employ systematic review methodology, quantitative synthesis, or formal risk of bias assessment, and the search was limited primarily to PubMed and Google Scholar; therefore, relevant literature may have been missed. The proposed conceptual correspondences also require empirical validation.

Keywords: *Buddhi*, Borderline intellectual functioning, Cognitive development, Executive dysfunction, *Medha*, Neurodevelopment.

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Introduction

Borderline Intellectual Functioning (BIF) represents a clinically and socially significant cognitive spectrum characterized by intellectual performance below the population average but not severe enough to meet diagnostic criteria for intellectual disability (1). Conventionally associated with intelligence quotient (IQ) scores between approximately 70 and 84, individuals with BIF often experience persistent difficulties in academic achievement, executive functioning, adaptive behavior, and psychosocial adjustment (2,3). Despite its relatively high prevalence in school-aged populations, BIF remains under recognized within clinical and public health frameworks, frequently occupying a diagnostic and therapeutic grey zone (4,5). In contemporary psychiatry, BIF is not classified as a distinct disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) but is instead coded as a condition that may be a focus of clinical attention (1). Similarly, the ICD-11 acknowledges borderline intellectual functioning without clear diagnostic boundaries (6). This nosological ambiguity has important implications: individuals with BIF often function independently in basic daily activities, yet demonstrate heightened vulnerability when faced with increasing cognitive, academic, or social demands. Longitudinal studies suggest that unaddressed BIF is associated with elevated risks of academic failure, emotional dysregulation, reduced occupational

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outcomes, and psychiatric comorbidities in adulthood (3). From a neuropsychological perspective, BIF is associated with diffuse cognitive inefficiencies, particularly in executive functions such as planning, inhibitory control, working memory, and cognitive flexibility (7-10). These difficulties may contribute to slow learning, impaired problem solving, and reduced adaptive functioning, with their functional impact influenced by environmental stressors, educational support, and repeated experiences of failure(11). Beyond cognitive limitations, children with BIF frequently encounter psychosocial challenges related to self-esteem, emotional regulation, and peer relationships. Recurrent academic difficulties and misinterpretation of cognitive slowness as lack of motivation may result in negative feedback from caregivers and educators, contributing to secondary emotional and behavioural problems (10,11). Such consequences are often more disabling than the primary cognitive vulnerability itself and tend to become entrenched when early identification and support are lacking. Contemporary management approaches largely emphasize psychometric assessment, educational accommodations, and behavioral interventions (12,13). While these strategies can improve functional outcomes, they are predominantly reactive and offer limited emphasis on early life prevention, holistic regulation of cognition, or culturally grounded explanatory models (14). In this context, integrative perspectives that conceptualize cognition as an emergent process shaped by biological, psychological, social, and cultural determinants are increasingly relevant (15).

Ayurveda, as a holistic medical system with a long tradition of addressing cognitive and psychological functioning, offers a complementary conceptual framework for understanding subthreshold cognitive states (16). Although classical *Ayurvedic* texts do not describe Borderline Intellectual Functioning as a discrete nosological entity, they provide detailed accounts of intellect (*Buddhi*), cognition (*Medha*), and mental regulation (*Manas*), acknowledging graded variations in cognitive capacity rather than rigid diagnostic categories (17,18). Central to *Ayurvedic* psychology is the concept of *Buddhi* and its functional faculties such as *Dhee* (discernment), *Dhriti* (regulatory control), and *Smriti* (memory), which collectively govern judgment, learning, self-regulation, and adaptive behavior (19). Despite potential conceptual parallels between these *Ayurvedic* constructs and contemporary cognitive domains, integrative analyses bridging the two knowledge systems remain limited.

Accordingly, this narrative review aims to synthesize Borderline Intellectual Functioning through an integrative Ayurvedic perspective by synthesizing classical Ayurvedic concepts of cognition with contemporary psychological and neuroscientific perspectives. The novelty of this review lies in its conceptual mapping of Buddhi and its functional faculties like *Dhee, Dhriti,* and *Smriti* with contemporary domains of executive function, memory, learning, and adaptive behaviour, while also considering developmental and psychosocial influences. Rather than proposing direct equivalence between the two knowledge systems, the review seeks to identify areas of conceptual convergence and differences that may provide a culturally sensitive framework for understanding BIF and guide future interdisciplinary research.

Methods

This review was conducted using a narrative integrative methodology, designed to synthesize classical *Ayurvedic* literature with contemporary scientific research relevant to Borderline Intellectual Functioning (BIF). The objective was not merely to compile existing knowledge, but to develop a conceptual framework by systematically comparing, interpreting, and integrating cognitive constructs from *Ayurveda* and modern psychology.

Data Sources

Two broad categories of sources were consulted:

Classical Ayurvedic literature:

Primary Ayurvedic texts including *Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Ashtanga Samgraha,* and *Kashyapa Samhita* were reviewed in their original Sanskrit versions along with authoritative English translations and commentaries. References pertaining to *Buddhi, Medha, Manas, Dhee, Dhriti, Smriti, Buddhi-vibhramsha, Prajnaparadha*, and developmental influences on cognition were identified.

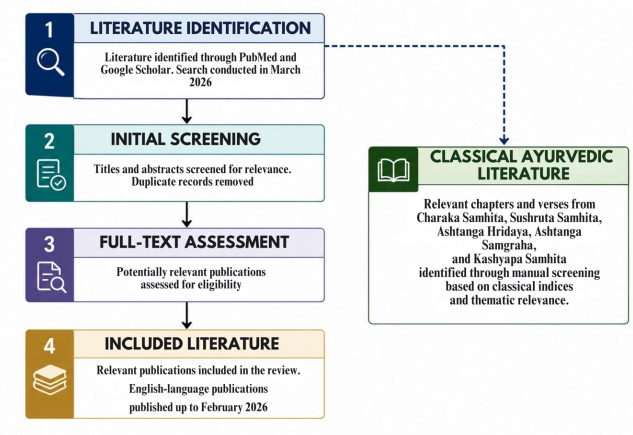
Contemporary scientific literature:

Modern literature related to Borderline Intellectual Functioning, cognitive development, executive function, memory, and adaptive behavior was retrieved from electronic databases including PubMed and Google Scholar. Diagnostic manuals, review articles, and key empirical studies in developmental psychology, psychiatry, and cognitive neuroscience were included to represent current biomedical perspectives.

Search Strategy

A targeted literature search was performed in PubMed and Google Scholar in March 2026 using combinations of the following keywords and phrases: "Borderline Intellectual Functioning," "borderline intelligence," "executive function," "cognitive development," "adaptive behavior," "*Ayurveda* and cognition," "*Buddhi*," "*Medha*," "*Dhee Dhriti Smriti*," "*Medhya Rasayana*," and related terms. Contemporary literature published up to February 2026 was considered, and only English-language publications were included. Titles and abstracts were initially screened to identify relevant studies and remove duplicate records, followed by full-text assessment of potentially relevant publications for inclusion. The literature identification and selection process is summarized in Figure 1.

Figure 1: Flow diagram of literature identification and selection for the narrative integrative review



For Ayurvedic texts, relevant chapters and verses were identified through manual screening based on classical indices and thematic relevance rather than electronic keyword matching,

acknowledging the contextual and interpretative nature of classical literature.

Inclusion and Exclusion Criteria

Inclusion criteria:

Sources addressing borderline or subthreshold intellectual functioning, cognitive impairment, or executive dysfunction. Ayurvedic descriptions related to intellect, cognition, memory, and mental regulation. Peer-reviewed articles, authoritative textbooks, and classical Ayurvedic treatises.

Exclusion criteria:

Non-scholarly sources, popular media articles, and anecdotal reports. Studies unrelated to cognitive functioning or intellectual development. Redundant publications without substantive conceptual contribution.

Analytical and Synthesis Framework

A comparative–conceptual analytical approach was employed. Core Ayurvedic cognitive faculties (*Dhee, Dhriti,* and *Smriti*) were systematically examined and conceptually mapped against contemporary neuropsychological domains such as executive function, working memory, learning ability, and adaptive behavior. Etiological factors described in *Ayurveda* including prenatal, perinatal, postnatal, and psychosocial influences were analyzed in relation to established neurodevelopmental and biopsychosocial models of cognition.

Rather than quantitative pooling of data, emphasis was placed on interpretative synthesis, identifying convergences, complementarities, and explanatory parallels between the two knowledge systems. Preventive and therapeutic principles from *Ayurveda* were evaluated in the context of their potential relevance to current clinical and educational approaches to BIF.

Contemporary Understanding of Borderline Intellectual Functioning

Borderline Intellectual Functioning (BIF) occupies an intermediate position on the cognitive continuum between average intelligence and intellectual disability (1,5). It is conventionally characterized by intelligence quotient (IQ) scores approximately between 70 and 84, representing performance about one to two standard deviations below the population mean (20,21). Although individuals with BIF do not meet diagnostic criteria for intellectual disability, they frequently experience significant functional challenges, particularly when confronted with increasing academic, social, or occupational demands. Epidemiological estimates of BIF vary according to the diagnostic criteria and assessment methods used. When an IQ range of approximately 71–84 is considered, the theoretical proportion of the population falling within this range is about 13.6%; however, the proportion meeting clinically relevant criteria is likely lower when adaptive functioning is also considered. Recent literature has reported prevalence estimates ranging from approximately 7% to 14% (22-24).

In current diagnostic frameworks, BIF is not classified as a discrete mental disorder. The DSM-5 recognizes it under conditions that may be a focus of clinical attention, reflecting persistent ambiguity regarding its nosological status (21). The ICD-11 also recognizes the category but without clear diagnostic boundaries. This classification has important clinical implications, as individuals with BIF often fall outside structured support systems designed either for typical development or for intellectual disability. As a result, BIF is frequently under identified, especially during early childhood, and is often recognized only when academic or adaptive demands exceed the individual's coping capacity.

From a neuropsychological perspective, BIF is associated with diffuse and non-specific cognitive inefficiencies rather than focal deficits. Core difficulties commonly involve executive functions, including planning, cognitive flexibility, inhibitory control, working memory, and sustained attention (25-28). These impairments contribute to poor academic performance, slow learning, difficulty generalizing knowledge, and reduced problem solving efficiency. Importantly, basic self-care skills and simple daily activities are usually preserved, distinguishing BIF from more severe intellectual impairments.

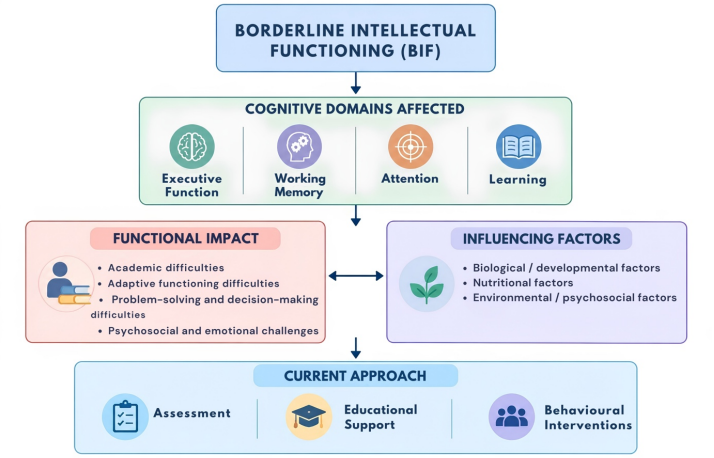
Developmental studies suggest that BIF arises from a complex interaction of biological vulnerability and environmental influences (29,30). Prenatal factors such as maternal malnutrition, substance exposure, infections, and psychosocial stress; perinatal factors including prematurity and low birth weight; and postnatal influences such as socioeconomic deprivation, limited cognitive stimulation, and adverse family environments have all been implicated. Rather than a single etiological agent, BIF is increasingly understood within a neurodevelopmental and biopsychosocial framework, emphasizing cumulative risk across the life course.

Adaptive functioning represents a critical dimension of BIF. Even when IQ scores fall within the borderline range, functional impairment becomes clinically relevant only when limitations in conceptual, social, or practical domains interfere with age-appropriate expectations (31). Children with BIF may struggle with academic organization, emotional regulation, peer relationships, and independent decision-making, often leading to secondary emotional and behavioral difficulties (32). These challenges tend to intensify during adolescence and adulthood, when environmental demands for autonomy and abstract reasoning increase.

Management strategies in contemporary practice are largely supportive and compensatory. These include individualized educational plans, cognitive and behavioral interventions, occupational therapy, and family-centered support (33,34). While such approaches can improve functional outcomes, they are primarily reactive and often initiated after difficulties have become established. Preventive models addressing early developmental influences and broader psychosocial determinants of cognition remain limited.

Overall, contemporary science conceptualizes Borderline Intellectual Functioning as a dimensional, developmentally mediated condition marked by executive and adaptive vulnerabilities rather than a fixed deficit state. This perspective provides an important foundation for integrative exploration. However, modern models largely focus on measurement and remediation, offering relatively little insight into early life prevention, holistic cognitive regulation, or culturally grounded explanatory frameworks. These gaps create a conceptual space in which traditional systems such as Ayurveda may offer complementary perspectives on the origins, modulation, and management of borderline cognitive functioning. The contemporary conceptual framework of Borderline Intellectual Functioning, encompassing its cognitive domains, functional impact, influencing factors, and current management approaches, is summarized in Figure 2.

Figure 2: Contemporary conceptual framework of Borderline Intellectual Functioning



Ayurvedic Conceptualization of Cognition and Intellect

Ayurveda conceptualizes cognition within an integrated psychophysiological framework involving *Buddhi* (intellect), *Manas* (mind), *Indriyas* (sensory faculties), and *Atma* (consciousness). Classical Ayurvedic descriptions emphasize the coordinated role of these factors in the processes of perception, cognition, and mental functioning (35,36). Rather than localizing cognitive functioning exclusively to a single component, Ayurvedic thought describes cognition as a dynamic process influenced by constitutional, developmental, environmental, and behavioural factors. This provides a conceptual framework for interpreting variations in cognitive functioning, including subthreshold states such as Borderline Intellectual Functioning.

Buddhi and *Medha*: Core Determinants of Cognitive Function

Buddhi represents the faculty involved in discrimination, determination, and intellectual appraisal. Classical Ayurvedic descriptions associate Buddhi with the acquisition and determination of knowledge and describe its functional faculties in relation to *Dhee, Dhriti,* and *Smriti* (37). ***Medha*** is described in relation to the capacity for comprehension and retention of knowledge and is considered an important aspect of intellectual functioning (38). Optimal cognitive functioning may therefore be understood, within the *Ayurvedic* framework, as involving the coordinated functioning of *Buddhi, Medha, Manas*, and sensory inputs.

Classical *Ayurvedic* literature also describes variations in intellectual functioning using terms such as ***Alpabuddhi, Mandabuddhi*, and *Jada* (39)**. These descriptions should not be regarded as direct equivalents of modern diagnostic categories such as Borderline Intellectual Functioning; rather, they provide historical descriptions of variations in intellectual capacity and cognitive performance.

Functional Faculties of *Buddhi*: *Dhee, Dhriti,* and *Smriti*

Ayurveda describes ***Dhee, Dhriti*, and *Smriti* as functional faculties associated with *Buddhi* (40).** *Dhee* is described as ***Yatharthanubhava***, referring to accurate apprehension or perception of a matter as it is (41). *Dhriti* denotes the governing or restraining capacity that helps regulate the activities of *Manas* (41,42). *Smriti* refers to the remembrance of things previously perceived, heard, or experienced and is described in relation to several factors involved in recollection (43).

From an integrative perspective, these Ayurvedic descriptions may be **conceptually related** to different aspects of contemporary cognitive functioning. Disturbance of *Dhee* may be considered in relation to difficulties in comprehension, reasoning, and judgment; impairment of *Dhriti* may be considered in relation to difficulties in behavioural and attentional regulation; and disturbance of *Smriti* may be considered in relation to difficulties in retention and recall. These correspondences are **interpretative and conceptual rather than claims of direct equivalence** between Ayurvedic constructs and contemporary neuropsychological domains.

Buddhi-Vibhramsha and *Prajnaparadha*: Functional Disturbance of Intellect

Classical *Ayurvedic* literature also describes disturbances of intellectual functioning and judgment. ***Buddhi Vibhramsha*** may be understood as a disturbance or impairment of appropriate intellectual functioning, while ***Prajnaparadha*** refers to an error or transgression of intellectual judgment and is described among important factors involved in disease causation (44,45).

Within an integrative interpretation, disturbances involving discernment, regulation, and remembrance may be considered relevant to maladaptive cognitive and behavioural patterns. Such a comparison may provide a conceptual framework for understanding some functional difficulties observed in BIF, including impaired judgment, difficulties in learning from experience, and behavioural dysregulation. However, ***Buddhi Vibhramsha* and *Prajnaparadha* should not be regarded as classical diagnostic equivalents of Borderline Intellectual Functioning**, as BIF is a contemporary construct that is not described as a discrete diagnostic entity in the classical Ayurvedic texts.

Developmental Influences on Cognitive Function

Ayurveda adopts a life-course perspective on cognitive development, attributing intellectual capacity to the interaction of congenital (*Sahaja*), intrauterine (*Garbhaja*), postnatal (*Janmottara*), and external (*Agantuka*) factors, a framework that closely parallels contemporary early childhood development models emphasizing cumulative developmental risk (46,47). Intellectual capacity is influenced by the quality of parental health, maternal nutrition and mental state during pregnancy, birth related events, early nourishment, and the child's psychosocial environment. This developmental orientation closely parallels contemporary neurodevelopmental and biopsychosocial models emphasizing cumulative risk and early life vulnerability.

Cognitive and behavioural attributes are also modulated by the relative predominance of the *Guṇas*. Excessive *Tamas* is associated with cognitive dullness, inertia, and impaired comprehension, while an imbalance of *Rajas* contributes to restlessness and poor regulation. *Sattva* supports clarity, stability, and adaptive reasoning. This framework complements modern perspectives, highlighting the role of emotional regulation, motivation, and environmental stability in shaping cognitive performance.

Relevance to Borderline Intellectual Functioning

Although *Ayurveda* does not describe Borderline Intellectual Functioning as a discrete nosological entity, its conceptual framework accommodates graded cognitive variability and functional impairment without rigid categorization. A cognitive state characterized by subtle yet persistent dysfunction of *Dhee, Dhriti,* and *Smriti*, influenced by developmental and psychosocial factors, corresponds closely to the contemporary understanding of

BIF as a dimensional and context-sensitive condition. This convergence provides a robust conceptual foundation for integrative analysis and for exploring preventive and supportive strategies beyond purely compensatory models.

Integrative Conceptual Mapping of Borderline Intellectual Functioning and *Ayurvedic* Cognitive Framework

Integrative understanding of Borderline Intellectual Functioning (BIF) requires a conceptual framework capable of accommodating graded cognitive inefficiencies, developmental variability, and contextual influences. Contemporary psychology conceptualizes BIF as a dimensional condition characterized by diffuse executive and adaptive vulnerabilities rather than discrete cognitive deficits. *Ayurveda*, through its functional model of *Buddhi* and its faculties *Dhee, Dhriti*, and *Smriti*, offers a parallel explanatory structure that similarly emphasizes gradation, regulation, and developmental modulation of cognition. Mapping these perspectives allows meaningful synthesis without reducing either system to the epistemological boundaries of the other.

Conceptual Correspondence Between Executive Functions and *Dhee-Dhriti-Smriti*

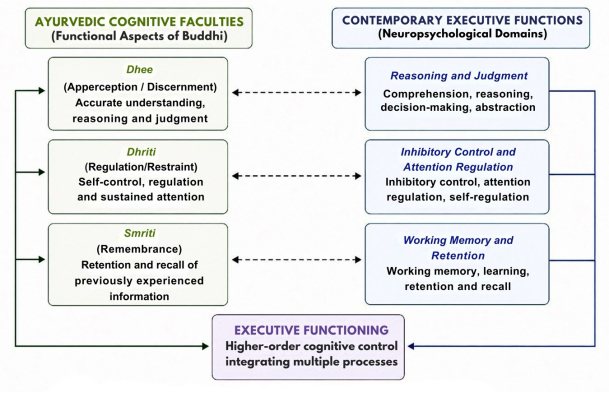
Modern neuropsychology describes executive functions as higher order regulatory processes governing planning, working memory, inhibitory control, attention, and cognitive flexibility (48-50). These functions enable adaptive, goal-directed behaviour and are consistently reported to be inefficient in individuals with BIF. Within the *Ayurvedic* framework, comparable regulatory roles are attributed to the functional faculties of *Buddhi* (Table 1).

Dhee, which governs accurate perception, reasoning, and judgment, corresponds conceptually to cognitive processes involved in comprehension, abstraction, and decision-making. Impairment of *Dhee* may manifest as slow understanding, faulty judgment, and difficulty integrating information, features commonly observed in borderline intellectual functioning. *Dhriti*, responsible for restraint and regulation, aligns closely with executive control mechanisms such as impulse inhibition, sustained attention, and emotional regulation. Disturbance of *Dhriti* provides a functional explanation for distractibility, poor task persistence, and behavioural dysregulation frequently described in BIF. Smriti, encompassing memory retention and recall, parallels working memory and learning consolidation processes that are often compromised in this population (Figure 3).

Several similarities can be identified between the two frameworks at the level of **functional description**. Both approaches view cognitive functioning as multidimensional and involving interacting processes rather than a single isolated capacity. *Dhee* shares conceptual features with higher-order cognitive processes involved in comprehension, reasoning, discrimination, and judgment. Similarly, *Dhriti* has functional parallels with regulatory processes underlying inhibitory control, sustained attention, and behavioural self-regulation, while *Smriti* shares similarities with memory-related processes involving retention and retrieval of previously acquired information (6,37). Both frameworks therefore recognize the importance of coordinated cognitive processes for adaptive and goal-directed functioning.

However, important differences must be acknowledged. In *Ayurveda*, *Dhee, Dhriti,* and *Smriti* are described within a broader psychophysiological framework involving *Buddhi, Manas,* sensory faculties, and consciousness, whereas contemporary executive functions are operationalized as specific

Figure 3: Conceptual mapping between Ayurvedic cognitive faculties (*Dhee, Dhriti, Smriti*) and contemporary executive function domains



neuropsychological processes that can be assessed using standardized behavioural and cognitive measures (9,35). The Ayurvedic constructs are also not organized according to the same componential structure as contemporary executive-function models. For example, cognitive flexibility, planning, and other executive processes cannot be assigned directly or exclusively to a single Ayurvedic faculty. Furthermore, the classical descriptions are primarily functional and conceptual, whereas contemporary models are supported by empirical investigation and neuropsychological measurement. Therefore, the observed similarities should be interpreted as **functional and conceptual correspondences rather than direct equivalence,** and the mapping should not be taken to indicate identical underlying mechanisms or neurobiological substrates.

These faculties operate interdependently rather than in isolation. Partial dysfunction across *Dhee, Dhriti*, and *Smriti* results in cumulative inefficiency, closely mirroring the diffuse executive vulnerability pattern emphasized in contemporary models of Borderline Intellectual Functioning. This correspondence supports the view that BIF may be conceptualized as a functional disturbance of cognitive regulation rather than a fixed intellectual deficit.

Etiological Integration: Developmental and Contextual Influences

Both *Ayurveda* and modern developmental science emphasize the role of cumulative etiological influences in shaping cognitive outcomes. Contemporary literature highlights prenatal adversity, perinatal complications, early nutritional deficiencies, psychosocial deprivation, and educational disadvantage as contributory factors in BIF. *Ayurveda* similarly attributes intellectual development to the interaction of congenital constitution, intrauterine environment, postnatal nourishment, emotional climate, and behavioural discipline.

The *Ayurvedic* concept of *Buddhi Vibhramsha* reflects functional distortion arising from such multifactorial influences rather than irreversible pathology. When compounded by *Prajnaparadha*, errors of judgment and regulation—these influences may perpetuate maladaptive cognitive and behavioural patterns over time. This developmental and contextual emphasis resonates with biopsychosocial models of cognition, reinforcing the relevance of integrative interpretation for borderline cognitive states.

Table 1: Conceptual correspondence between executive functions and Ayurvedic cognitive faculties

Contemporary Cognitive Domain	Description in Psychology	Corresponding Ayurvedic Concept	Functional Interpretation	Clinical Relevance
Reasoning and Judgment	Logical analysis, comprehension and decision-making	*Dhee* (40,41)	Discernment and appropriate understanding	May be relevant to difficulties in comprehension, judgment, and integration of information
Inhibitory Control and Attention Regulation	Response inhibition, sustained attention and behavioural regulation	*Dhriti* (40,42)	Restraint and regulation	May be relevant to distractibility, poor task persistence, and behavioural dysregulation
Working Memory and Memory-related Learning	Retention, recall and temporary maintenance of information	*Smriti* (40,43)	Retention and retrieval of previously acquired knowledge	May be relevant to difficulties in learning, retention, and recall
Intellectual Efficiency	Learning capacity and comprehension	*Medha* (39)	Cognitive sharpness and understanding	May be relevant to reduced learning efficiency and comprehension
Cognitive Disturbance	Impaired judgment and maladaptive behaviour	*Buddhi Vibhramsha / Prajnaparadha*(44,45)	Functional disturbance of intellect	May be relevant to maladaptive cognitive and behavioural patterns

Functional and Adaptive Dimensions

Adaptive functioning constitutes a critical determinant of clinical relevance in Borderline Intellectual Functioning. Contemporary frameworks emphasize that functional impairment becomes clinically significant when cognitive inefficiencies interfere with age-appropriate academic, social, or practical demands. *Ayurveda* similarly evaluates cognitive adequacy in relation to behavioural appropriateness, self-regulation, and social functioning rather than abstract intellectual capacity alone.

Subtle disturbances of *Dhee, Dhriti*, and *Smriti* may not impede basic self-care but can significantly compromise learning efficiency, emotional regulation, and decision-making in complex environments. This functional perspective helps explain why individuals with BIF often cope adequately in simple contexts yet struggle disproportionately when environmental demands escalate, particularly during adolescence and transitions to independent living.

Integrative Insights from Regulatory and Nutritional Perspectives

Ayurvedic approaches traditionally applied to childhood regulatory and attentional disorders further support the conceptualization of borderline cognitive states as modifiable rather than fixed. Contemporary integrative reviews of *Ayurvedic* interventions in attention-deficit and regulatory conditions highlight the centrality of cognitive regulation, emotional stability, and behavioural consistency rather than categorical diagnosis (51). These insights reinforce the relevance of regulation-oriented strategies for borderline intellectual functioning.

Nutrition represents another critical interface for integrative understanding. *Ayurveda* places strong emphasis on *Ahara* as a determinant of *Medha, Smriti*, and overall mental stability. Emerging integrative research suggests that nutrition-based modulation of cognition may influence attention, memory, and emotional regulation, particularly during developmental periods (52). When viewed alongside modern evidence on neurodevelopmental vulnerability, these principles support a holistic framework in which cognitive functioning is shaped by regulatory, nutritional, and psychosocial factors acting in concert.

Integrative Value of the Conceptual Mapping

The integrative mapping presented in this section does not imply equivalence between *Ayurvedic* and modern cognitive constructs but highlights areas of conceptual convergence that enhance understanding. *Ayurveda* contributes a functional, developmental, and preventive orientation that complements the measurement-driven focus of contemporary psychology. Conversely, modern neuropsychology provides operational clarity and empirical grounding that can inform systematic exploration of *Ayurvedic* cognitive constructs.

Together, these perspectives support a multidimensional understanding of Borderline Intellectual Functioning as a modifiable cognitive state shaped by regulation, environment, and development. This integrative framework provides the conceptual foundation for examining preventive strategies and adjunctive interventions, which are discussed in the subsequent section.

Preventive and Therapeutic Perspectives: An Integrative View

Ayurveda emphasizes prevention, early identification of functional difficulties, and regulation of factors that may influence health and well-being. This orientation provides a broader perspective for considering developmental and contextual influences on cognitive functioning in children with Borderline Intellectual Functioning (BIF). However, the preventive and therapeutic principles described in Ayurveda should be interpreted as conceptual and supportive perspectives rather than established treatments for BIF.

Preventive Orientation Across Developmental Stages

Preventive strategies in *Ayurveda* begin at the prenatal stage, where maternal nutrition, emotional well-being, and lifestyle are considered relevant to fetal development. Classical descriptions of *Garbhini Paricharya* provide a traditional framework emphasizing maternal care during pregnancy. These principles have conceptual similarities with contemporary developmental evidence concerning prenatal nutrition, maternal stress, and early environmental influences on later cognitive development. However, such parallels do not establish that *Garbhini Paricharya* specifically prevents BIF.

Postnatally, *Ayurveda* emphasizes appropriate nourishment, routine, sensory experiences, emotional stability, and supportive environmental influences. These principles can be conceptually compared with contemporary developmental approaches that emphasize responsive caregiving, enriched environments, and early educational support. Their relevance to BIF therefore warrants further investigation rather than being considered established preventive intervention.

Regulation of Cognition and Behaviour

A distinguishing feature of the *Ayurvedic* framework is its emphasis on regulation of cognitive and behavioural functioning. The concepts of *Dhee, Dhriti,* and *Smriti* provide a traditional framework for understanding discernment, regulation, and retention. This has conceptual parallels with contemporary approaches addressing executive functioning, self-regulation, attention, and adaptive behaviour in children with cognitive difficulties.

Behavioural and ethical regulation (*Sadvritta*) is also described within *Ayurveda* in relation to appropriate conduct and regulation of behaviour. From a contemporary perspective, some of these principles may be considered alongside structured routines, behavioural regulation, and supportive learning environments. However, these conceptual similarities should not be interpreted as evidence that *Sadvritta* or other Ayurvedic practices have established therapeutic effects on BIF.

Therapeutic Approaches and Adjunctive Role

Certain *Ayurvedic* interventions, including *Medhya Rasayana*, are traditionally described in relation to cognitive functions such as comprehension, memory, and mental functioning. However, evidence regarding their effectiveness specifically in children with BIF remains insufficient to support therapeutic recommendations. Findings from studies involving other cognitive, behavioural, or neurodevelopmental conditions cannot be directly extrapolated to BIF.

Accordingly, any potential role of *Ayurvedic* interventions should currently be considered **adjunctive and investigational rather than established or standalone treatment.** Contemporary support for children with BIF should continue to emphasize individualized educational interventions, behavioural and psychosocial support, and assessment of adaptive functioning. If Ayurvedic approaches are explored alongside such interventions, their use should be appropriately contextualized and accompanied by attention to safety, interactions, quality of preparations, and age-appropriate administration.

Translational and Ethical Considerations

Translation of *Ayurvedic* preventive and therapeutic principles into contemporary practice requires careful empirical evaluation. Integrative application should avoid deterministic, curative, or efficacy claims and should prioritize **safety, feasibility, functional outcomes, and child-centred care**. Importantly, conceptual similarities between Ayurvedic constructs and contemporary cognitive domains should not be interpreted as evidence of equivalent mechanisms or established clinical effectiveness.

The framework presented in this review therefore provides a basis for generating **research hypotheses** regarding the potential relevance of Ayurvedic preventive, regulatory, nutritional, and supportive principles to children with BIF. It does not support replacement of established educational, behavioural, or developmental interventions. Future controlled and adequately monitored studies are required to determine whether specific Ayurvedic interventions provide measurable benefits for cognitive or adaptive functioning in BIF.

Research Gaps, Future Directions, and Implications for Practice

Despite growing literature on Borderline Intellectual Functioning, significant conceptual, methodological, and translational gaps remain, particularly in integrative and culturally grounded models of cognition.

Implications for Clinical and Educational Practice

An integrative understanding of Borderline Intellectual Functioning has important implications for early identification and management. *Ayurvedic* concepts emphasize life-course–oriented prevention, beginning from preconception and antenatal care, aligning with modern developmental neuroscience that recognizes early environmental and maternal influences on cognition. Incorporating *Ayurvedic* counselling principles, dietary guidance, and mental health–oriented lifestyle interventions may support holistic cognitive development in at-risk children.

The conceptual alignment between *Dhee, Dhriti*, and *Smriti* with executive functions suggests potential utility in combining Ayurvedic psychotherapeutic approaches such as *Sattvavajaya Chikitsa* , with contemporary behavioral and educational interventions. Such integrative strategies may enhance adaptive functioning, emotional regulation, and learning capacity in children with borderline intelligence.

Implications for Future Research

Future research should focus on operationalizing *Ayurvedic* cognitive constructs using standardized neuropsychological and adaptive-function measures to enable empirical validation of the proposed conceptual correspondences. Prospective cohort studies could examine the longitudinal relationship between *Dhee, Dhriti,* and *Smriti*, executive functioning, and adaptive outcomes across childhood and adolescence. Case–control studies could compare children with BIF and typically developing children using standardized cognitive measures alongside structured assessment of relevant *Ayurvedic* constructs. Randomized controlled trials (RCTs) may be undertaken to evaluate specific *Ayurvedic* interventions as adjuncts to established educational and behavioural support, with clearly defined cognitive, adaptive, and safety outcomes. Neuroimaging studies could explore structural and functional neural correlates of executive and memory-related domains, while biomarker studies may investigate potential biological correlates of cognitive and developmental functioning. Interdisciplinary research integrating these approaches may help determine whether the proposed Ayurvedic contemporary correspondences have measurable empirical validity and clinical relevance.

Limitations of the Review

This review has certain limitations that warrant consideration. As a narrative integrative review, it does not employ quantitative synthesis or formal risk-of-bias assessment, which may limit the generalizability of specific interpretations. The review also did not follow a formal systematic-review methodology, including a prospectively registered protocol, predefined systematic eligibility criteria, or formal study-quality assessment. The conceptual mapping between *Ayurvedic* cognitive constructs and contemporary neuropsychological domains is interpretative in nature and intended to facilitate integrative understanding rather than assert direct equivalence.

Additionally, while classical *Ayurvedic* texts provide rich theoretical insights into cognition and development, empirical validation of these constructs using standardized cognitive measures remains limited. Variability in translations and commentarial interpretations may also influence conceptual interpretation. The literature identified may also be subject to publication bias, as studies with positive or significant findings may be more likely to be published than studies reporting null or inconclusive results. Furthermore, the use of selected electronic databases and the availability of published literature may have resulted in the omission of potentially relevant studies, particularly literature from regional or non-indexed sources. Finally, much of the emerging evidence supporting integrative interventions is preliminary, underscoring the need for well-designed clinical and longitudinal studies.

Conclusion

Borderline Intellectual Functioning (BIF) represents a clinically relevant spectrum of cognitive and adaptive difficulties that requires consideration beyond psychometric thresholds alone. This review highlights conceptual parallels between the *Ayurvedic* framework of *Buddhi* and its functional faculties *Dhee, Dhriti,* and *Smriti,* and contemporary domains of executive and cognitive functioning. These parallels provide a framework for integrative interpretation but should not be considered evidence of direct equivalence or shared mechanisms.

The principal contribution of this review is the proposed conceptual integration of *Ayurvedic* cognitive perspectives with contemporary cognitive science while acknowledging the distinct theoretical foundations of both systems. Future research should empirically test these proposed correspondences through longitudinal and controlled studies incorporating standardized neuropsychological, adaptive-function, neuroimaging, and biomarker measures, and should evaluate the safety and efficacy of specific Ayurvedic interventions in appropriately designed clinical trials. Such evidence is essential before this conceptual framework can inform evidence-based clinical practice.

Declaration of generative AI use

The authors declare that no generative AI or AI-assisted tools were used in the preparation, writing, editing, or revision of this manuscript.

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Conflict of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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