

Digital Addiction: An Integrative Review of Ayurveda, Psychology, and Behavioural Counselling

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ABSTRACT

Background: Digital addiction is an emerging behavioural health concern associated with impaired self-control, psychological distress, sleep disturbance, and functional impairment. Its classification remains heterogeneous.

Objective: To review the classification, neurobiology, manifestations, and management of digital addiction and explore its conceptual relationship with Ayurveda.

Methods: An integrative narrative review of contemporary psychiatric, psychological, behavioural, public health, and Ayurvedic literature was conducted, supplemented by classical Ayurvedic texts.

Results: Digital addiction involves reward dysregulation, impaired executive control, reinforcement, attentional disturbances, sleep disruption, and stress-related mechanisms. Ayurvedic concepts including **Prajnaparadha**, **Asatmya Indriyarth**, **Samyoga**, **Atiyoga of Indriyas**, **Rajas–Tamas**, **Manovaha Srotas Dushti**, and **Nidra** provide a complementary conceptual framework. Approaches such as **Sattvavajaya Chikitsa**, **Yoga**, **Pranayama**, **Dinacharya**, and **Medhya Rasayana** may have complementary potential.

Conclusion: Digital addiction requires a multidimensional approach. Ayurveda may complement behavioural interventions through emphasis on mental regulation, sensory discipline, lifestyle balance, and self-control. However, these relationships remain conceptual and require clinical validation.

Keywords: *Digital Addiction; Internet Gaming Disorder; Ayurveda; Behavioural Addiction; Prajnaparadha; Sattvavajaya Chikitsa; Integrative Medicine.*

1. INTRODUCTION

1.1 Background and Emerging Concern of Digital Addiction

Digital technology has transitioned from a peripheral convenience to an essential component of everyday life over the past two decades. The widespread adoption of smartphones, high-speed internet, and artificial intelligence-driven recommendation algorithms has transformed the way individuals communicate, work, learn, and entertain themselves. While these technological innovations have improved accessibility, connectivity, and productivity, they have simultaneously created digital environments designed to maximise user engagement through personalised content, continuous notifications, and reward-based feedback mechanisms. Consequently, excessive and uncontrolled use of digital technologies has emerged as an important behavioural health concern worldwide, particularly among adolescents and young adults (1–4).

The term *digital addiction* has evolved as an umbrella construct encompassing problematic internet use, smartphone addiction, social media addiction, online gaming disorder, binge-watching behaviour, and other maladaptive patterns of technology use. Although no universally accepted diagnostic entity encompasses all of these conditions, they share several behavioural characteristics, including impaired control over use, compulsive engagement, prioritisation of digital activities over daily responsibilities, and persistence despite adverse physical, psychological, academic, occupational, or social consequences (5–7). The increasing clinical recognition of problematic digital behaviours is reflected by the formal inclusion of Gaming Disorder in the International Classification of Diseases, 11th Revision (ICD-11) by the World Health Organization (WHO), while the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR) identifies Internet Gaming Disorder as a condition warranting further research (5,6).

Despite increasing recognition, the conceptualisation of digital addiction remains controversial. Several researchers have considered problematic digital behaviours within the framework of behavioural addictions by applying criteria analogous to substance-use disorders, including tolerance, withdrawal symptoms, craving, diminished self-control, and continued use despite negative consequences (8,9). Conversely, other researchers have cautioned that excessive technology use may sometimes represent an adaptive response to contemporary social and occupational demands rather than a distinct psychiatric disorder, thereby raising concerns regarding the medicalisation of normative digital behaviour (10). The emerging perspective therefore favours a dimensional model in which problematic digital engagement exists along a continuum and becomes clinically significant primarily when it is associated with functional impairment rather than merely high frequency of use (11).

1.2 Epidemiology and Multidimensional Health Consequences

Epidemiological studies have demonstrated considerable heterogeneity in the prevalence of problematic digital behaviours, reflecting differences in diagnostic instruments, age groups, cultural environments, and patterns of technology use. Meta-analyses indicate that problematic smartphone use affects approximately one-quarter of adolescents globally, whereas problematic internet use and gaming disorder demonstrate higher prevalence in several East Asian populations compared with many Western populations (12–14). Such geographical variation highlights the influence of sociocultural norms, educational pressures, family dynamics, and digital-platform architecture on the development of problematic digital behaviours. These observations suggest that biological vulnerability alone cannot adequately explain digital addiction and emphasise the importance of multidimensional explanatory models incorporating psychological, social, environmental, and cultural determinants.

The consequences of excessive digital engagement extend beyond psychological distress. Prolonged screen exposure has been associated with sleep disturbances, circadian rhythm disruption, anxiety, depression, attention deficits, reduced academic performance, impaired workplace productivity, musculoskeletal disorders, digital eye strain, obesity, physical inactivity, and increased cardiometabolic risk (15–18). Furthermore, compulsive gaming, online gambling, and impulsive digital purchasing may contribute to financial hardship and interpersonal conflict, thereby increasing the broader public health and socioeconomic burden associated with problematic digital behaviours (19,20).

These diverse consequences indicate that digital addiction should not be viewed solely as excessive screen exposure. Rather, it represents a complex behavioural phenomenon involving interactions among reward processing, executive control, emotional regulation, sleep, lifestyle, interpersonal relationships, and environmental factors. Accordingly, effective prevention and management require approaches that address the underlying determinants of maladaptive digital engagement in addition to reducing problematic technology use.

1.3 Need for a Multidimensional and Integrative Approach

Given the multifactorial nature of digital addiction, interventions focused exclusively on symptom suppression or screen-time restriction may produce limited long-term success. Contemporary management approaches primarily include psychoeducation, cognitive behavioural therapy, motivational interviewing, family-based interventions, and digital self-regulation strategies. However, relapse and persistent maladaptive use remain important challenges, partly because these approaches may not fully address disturbances in emotional regulation, stress resilience, sleep, autonomic balance, and lifestyle behaviours (21,22).

An integrative medicine framework that combines evidence-based psychological interventions with lifestyle medicine and traditional systems such as Ayurveda and Yoga may therefore provide a more comprehensive approach to prevention and rehabilitation. Ayurveda conceptualises excessive sensory engagement through principles such as *Atiyoga of Indriyas*, while mental instability, impaired judgement, and lifestyle imbalance may be understood through concepts including predominance of *Rajas* and *Tamas*, *Prajnaparadha*, and *Asatmya Indriyarthasamyoga* (23,24). These concepts provide a traditional framework for understanding behavioural dysregulation involving sensory overuse, impaired self-regulation, and disruption of mental equilibrium.

Ayurvedic approaches including *Sattvavajaya Chikitsa*, *Dinacharya*, regulation of *Nidra*, *Rasayana* therapy, *Medhya Rasayana*, Yoga, mindfulness practices, and dietary regulation may therefore have potential as complementary approaches to conventional behavioural interventions by addressing behavioural, psychological, and lifestyle determinants of digital addiction (23–26).

The convergence of contemporary neuroscience with selected Ayurvedic principles provides a potentially useful conceptual foundation for developing holistic and patient-centred approaches to digital addiction. Such an approach may shift the focus beyond simple reduction of screen time towards restoration of cognitive control, emotional resilience, healthy lifestyle behaviours, sensory regulation, and overall well-being.

However, the relationship between contemporary neurobiological mechanisms and Ayurvedic concepts should be interpreted cautiously. Similarities between the two frameworks represent conceptual parallels rather than established one-to-one biological equivalences. Therefore, these relationships should primarily serve as a basis for hypothesis generation and future empirical investigation.

1.4 Rationale for the Present Review

The increasing prevalence of problematic digital behaviours, together with their neurological, psychological, physical, and social consequences, highlights the need for a broader conceptual framework for understanding digital addiction. Contemporary neuroscience provides important insights into reward circuitry, executive dysfunction, neuroplasticity, emotional regulation, sleep disturbance, and maladaptive reinforcement. Ayurveda, in contrast, provides a holistic framework emphasising regulation of the senses, mental discipline, self-control, lifestyle balance, and restoration of psychological well-being.

Integrating these perspectives may provide a culturally sensitive and potentially useful framework for understanding digital addiction while identifying complementary therapeutic possibilities. At the same time, the limited availability of controlled clinical evidence for Ayurveda-based interventions makes empirical validation essential before such approaches can be recommended as established treatments.

Accordingly, the present review synthesises contemporary evidence on the classification, neurobiology, and behavioural consequences of digital addiction and examines their conceptual relationship with selected Ayurvedic principles and therapeutic approaches.

1.5 Aim and Objectives

Aim

To integrate contemporary evidence regarding the classification, neurobiology, psychological and behavioural consequences, and management of digital addiction with relevant Ayurvedic concepts and therapeutic principles.

Objectives

1. To describe the major forms and current conceptual challenges associated with digital addiction.
2. To synthesise available evidence regarding the neurobiological mechanisms underlying problematic digital engagement.
3. To examine digital addiction from selected Ayurvedic perspectives, including *Prajnaparadha*, *Asatmya Indriyarthasamyoga*, *Rajas–Tamas* predominance, *Manovaha Srotas Dushti*, and relevant *Dosha* involvement.
4. To identify conceptual relationships between contemporary neurobehavioral mechanisms and classical Ayurvedic principles.
5. To explore the potential role of Ayurveda-informed lifestyle and behavioural interventions as complementary approaches to contemporary management.
6. To identify evidence gaps and priorities for future interdisciplinary research.

2. METHODS

2.1 Review Design

The present study was conducted as an integrative narrative review to synthesise available evidence concerning digital addiction and to examine its conceptual relationship with selected principles of Ayurveda. The review integrated evidence from psychiatric, psychological, public health, behavioural, and Ayurvedic literature to develop a multidisciplinary understanding of digital addiction.

The synthesis focused on four principal domains: (i) classification and conceptualisation of digital addiction, (ii) contemporary understanding of its neurobiological and behavioural mechanisms, (iii) interpretation of relevant manifestations through selected Ayurvedic concepts, and (iv) potential integration of behavioural counselling with Ayurveda-informed lifestyle and behavioural approaches.

2.2 Literature Sources

The review considered peer-reviewed literature from psychiatric, psychological, public health, behavioural, and Ayurvedic sources. Priority was given to systematic reviews, meta-analyses, and relevant international clinical guidelines published between 2018 and 2026. Seminal earlier publications were additionally considered where they provided foundational evidence or theoretical frameworks relevant to digital addiction, behavioural addiction, neurobiology, or psychological models.

Classical Ayurvedic literature was also examined to identify relevant concepts concerning mental health, sensory regulation, behavioural control, lifestyle, and psychological well-being. The principal classical sources considered included the *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*.

2.3 Scope of Evidence Synthesis

The contemporary literature was examined with particular emphasis on the classification and conceptualisation of problematic digital behaviours, including problematic internet use, Gaming Disorder, Internet Gaming Disorder, problematic smartphone use, social media addiction, online gambling, streaming and short-video use, and problematic online sexual behaviours.

Evidence concerning the neurobiological basis of digital addiction was synthesised under major domains including reward processing, mesolimbic dopaminergic signalling, executive control, neuroplasticity, craving and withdrawal, attentional regulation, sleep and circadian rhythm, and stress-related mechanisms.

The Ayurvedic literature was examined for concepts that could provide a framework for understanding the behavioural and psychological manifestations of excessive digital engagement. Particular attention was given to *Prajnaparadha*, *Asatmya Indriyartha Samyoga*, *Atiyoga of Indriyas*, predominance of *Rajas* and *Tamas*, *Manovaha Srotas Dushti*, *Dosha* involvement, and disturbance of *Nidra*.

2.4 Integrative Analysis

Evidence from contemporary and Ayurvedic literature was synthesised thematically rather than quantitatively pooled. Contemporary neurobiological and behavioural findings were first examined within their respective domains, followed by consideration of relevant Ayurvedic concepts.

Potential conceptual relationships between the two frameworks were subsequently identified according to common clinical and behavioural manifestations, including reward seeking and craving, impaired executive control, excessive sensory stimulation, attentional dysregulation, withdrawal-related manifestations, sleep disturbance, emotional dysregulation, and sedentary behaviour.

These relationships were subsequently organised into an integrative framework comparing contemporary neurobiological findings with corresponding Ayurvedic concepts, clinical manifestations, interpretive relationships, and potential interventions.

2.5 Ayurvedic Textual Interpretation

The Ayurvedic concepts identified in the review were interpreted within their classical conceptual framework. The review considered principles related to the regulation of *Manas*, *Indriyas*, *Buddhi*, behaviour, lifestyle, and mental well-being.

Because digital addiction is not described as a distinct disease entity in the classical Ayurvedic texts, the application of these principles to digital addiction was undertaken as a conceptual interpretation rather than as a direct classical description of the condition.

Particular care was therefore taken to distinguish conceptual parallels from established biological mechanisms. The proposed relationships between Ayurvedic concepts and contemporary neurobiological findings were considered hypothesis-generating and were not interpreted as direct one-to-one biological equivalences.

2.6 Therapeutic Evidence Synthesis

Contemporary behavioural and psychological approaches were considered alongside Ayurveda-informed approaches relevant to behavioural regulation and lifestyle modification. Contemporary approaches included psychoeducation, cognitive behavioural therapy, motivational interventions, family-based interventions, and digital self-regulation strategies.

Ayurveda-informed approaches considered in the review included *Sattvavajaya Chikitsa*, *Dinacharya*, *Nidra* regulation, *Yoga*, *Pranayama*, meditation, and *Medhya Rasayana*.

The potential role of these approaches was interpreted in the context of the available evidence. Established behavioural approaches were distinguished from Ayurveda-informed interventions for which clinical evidence specific to digital addiction remains limited.

2.7 Methodological Considerations

As the present work represents an integrative narrative review rather than a systematic review or meta-analysis, the available evidence was synthesised qualitatively. No quantitative effect-size pooling or meta-analysis was undertaken.

The heterogeneity of terminology, diagnostic criteria, study populations, and outcome measures within digital addiction research was considered during interpretation. Similarly, the conceptual nature of the Ayurvedic interpretation and the limited availability of controlled clinical evidence specific to Ayurveda-based management of digital addiction were acknowledged.

The methodological approach was therefore intended to provide an integrated synthesis of contemporary scientific evidence and classical Ayurvedic perspectives while identifying potential areas for future empirical investigation.

3. RESULTS

3.1 Classification of Digital Addiction

Digital addiction does not represent a single, uniformly defined diagnostic entity. Rather, it encompasses a spectrum of maladaptive digital behaviours characterised by compulsive engagement, impaired self-regulation, and persistence despite adverse consequences. Because digital platforms facilitate diverse activities, contemporary literature describes several overlapping but clinically distinguishable patterns of problematic digital behaviour rather than a single unified disorder (27,28).

3.1.1 Internet Addiction / Problematic Internet Use

Internet addiction, also referred to as Problematic Internet Use (PIU), represents one of the broadest and earliest conceptualisations of digital addiction. Initially described by Young in the late 1990s, it refers to excessive or poorly controlled internet use associated with psychological, academic, occupational, or social impairment (29).

However, the construct has been criticised for its heterogeneity because the internet primarily functions as a medium through which multiple activities—including gaming, social networking, streaming, shopping, and gambling—are performed rather than constituting a single addictive activity (30). Consequently, behaviour-specific classifications have increasingly been advocated to improve conceptual and clinical clarity.

3.1.2 Gaming Disorder

Among digital behavioural disorders, Gaming Disorder is currently the principal digital-related condition to receive formal diagnostic recognition from the World Health Organization through ICD-11 (5). It is characterised by impaired control over gaming, increasing priority given to gaming over other activities, and continuation or escalation of gaming despite negative consequences.

For a diagnosis, the behavioural pattern must result in significant impairment in personal, family, social, educational, occupational, or other important areas of functioning and generally persist for at least 12 months before diagnosis (5,31).

3.1.3 Internet Gaming Disorder

Internet Gaming Disorder (IGD) differs in its diagnostic status from Gaming Disorder. The DSM-5-TR does not recognise IGD as a formal psychiatric diagnosis but identifies it as a condition requiring further research (6).

The proposed diagnostic features include preoccupation with gaming, withdrawal symptoms, tolerance, unsuccessful attempts to reduce gaming, loss of interest in previous hobbies, continued gaming despite psychosocial problems, deception regarding gaming duration, use of gaming to escape negative emotions, and jeopardising important relationships, educational opportunities, or career prospects. The presence of five or more criteria within a 12-month period suggests clinically significant impairment warranting further evaluation (6,32).

3.1.4 Smartphone Addiction

Smartphone addiction refers to compulsive and uncontrolled smartphone use that interferes with daily functioning. Although it frequently overlaps with internet and social media use, smartphone-related problematic behaviour has distinctive characteristics, including repetitive checking, excessive monitoring of notifications, nomophobia—the fear of being without a mobile phone—and phantom vibration syndrome, in which individuals perceive notifications or vibrations that are not actually present (33,34).

Problematic smartphone use has been associated with poor sleep quality, anxiety, reduced attention span, musculoskeletal complaints, and impaired academic performance (12,33).

3.1.5 Social Media Addiction

Social media addiction involves compulsive engagement with social networking platforms such as Facebook, Instagram, TikTok, X, and related applications. Contemporary platforms incorporate persuasive design characteristics, including intermittent variable-ratio reinforcement, social validation through likes, personalised recommendation algorithms, push notifications, and infinite scrolling. These features may increase engagement and reinforce habitual patterns of use (35,36).

Excessive social media use has been associated with depression, anxiety, loneliness, poor self-esteem, body-image dissatisfaction, and reduced psychological well-being, particularly among adolescents and young adults (16,35).

3.1.6 Online Gambling Addiction

Online gambling occupies a distinctive position within digital behavioural disorders because Gambling Disorder is already recognised as a behavioural addiction in both DSM-5-TR and ICD-11 (5,6). Digital platforms have substantially increased

the accessibility of gambling through smartphones, live betting, microtransactions, and in-game wagering systems.

These technological developments reduce barriers to participation, facilitate continuous access, and may increase impulsive gambling behaviour, thereby contributing to financial, psychological, and social harms (20,37).

3.1.7 Streaming and Short-Video Addiction

The rapid expansion of streaming services and short-video platforms has introduced another emerging pattern of problematic digital engagement. Platforms using autoplay, personalised content feeds, sophisticated recommendation algorithms, and endless scrolling are designed to maximise viewing time and may encourage prolonged passive consumption.

Excessive streaming has been associated with binge-watching behaviour, disrupted sleep, impaired concentration, reduced productivity, and attention fragmentation. However, standardised diagnostic criteria for this behaviour remain under development (38,39).

3.1.8 Cybersexual Addiction and Problematic Pornography Use

Problematic online pornography consumption and cybersexual behaviours represent another evolving area within digital addiction research. Although these behaviours occur predominantly through digital media, related clinical conditions are currently classified under Compulsive Sexual Behaviour Disorder (CSBD) in ICD-11 rather than as a separate digital-specific addiction (5).

Available evidence suggests that compulsive online sexual behaviours may share features with other behavioural addictions, including reward dysregulation, impaired inhibitory control, and compulsive habit formation. Nevertheless, diagnostic consensus and the precise relationship between these behaviours and digital addiction remain limited (40,41).

3.2 Current Challenges in Classification

Despite increasing recognition of problematic digital behaviours, no unified diagnostic architecture currently encompasses all forms of digital addiction. Considerable overlap exists among internet addiction, smartphone addiction, gaming disorder, and social media addiction, resulting in inconsistencies in epidemiological estimates, screening instruments, diagnostic thresholds, and treatment outcomes across studies (28,30).

The absence of standardised nosology also complicates cross-cultural comparisons and limits the development of universally applicable clinical guidelines. Furthermore, the distinction between intensive but non-pathological technology use and clinically significant behavioural dysregulation remains an important challenge.

Consequently, establishing a harmonised classification system remains a major priority in digital addiction research. A multidimensional framework incorporating biological, psychological, behavioural, social, and cultural determinants may provide a more appropriate basis for understanding the heterogeneous nature of problematic digital engagement (28,30).

The diversity of digital behaviours and their overlapping clinical manifestations also raises an important question concerning their underlying mechanisms. Although the specific digital activity may differ, several forms of problematic engagement appear to involve common processes related to reward, reinforcement, executive control, emotional regulation, and habit formation. Therefore, examination of the neurobiological basis of digital addiction provides an important next step in understanding this heterogeneous condition.

3.3 Neurobiology of Digital Addiction

The neurobiology of digital addiction has been examined primarily through theoretical frameworks initially developed for substance-use and behavioural addictions. These include the incentive-sensitisation theory, reward-deficiency hypothesis, and Interaction of Person–Affect–Cognition–Execution (I-PACE) model. Collectively, these models propose that repeated engagement with highly rewarding digital stimuli may progressively shift behaviour from voluntary and goal-directed activity towards more habitual and compulsive patterns through alterations in neural systems involved in reward, motivation, executive control, and emotional regulation (9,42–44).

Unlike substance addictions, digital addiction does not involve exposure to an exogenous psychoactive substance. Instead, repeated exposure to rewarding behavioural stimuli, including gaming achievements, social validation, notifications, personalised recommendations, and rapidly changing digital content, may activate overlapping neural mechanisms involved in reinforcement and habit formation.

3.3.1 Reward Circuitry and the Mesolimbic Dopamine System

The mesocorticolimbic dopamine pathway, involving the ventral tegmental area (VTA), nucleus accumbens (NAc), ventral striatum, amygdala, hippocampus, and medial prefrontal cortex, represents an important neural substrate involved in reward learning and reinforcement (45).

Digital rewards such as gaming achievements, social-media notifications, likes, personalised recommendations, and autoplay features can activate reward-related circuitry and generate anticipatory dopaminergic signalling even before the expected

reward is received. Repeated pairing of environmental cues with digital rewards may consequently strengthen conditioned associations and reinforce cue-dependent digital engagement (46,47).

Modern digital platforms may further incorporate variable-ratio reinforcement schedules, in which rewarding events occur unpredictably rather than consistently. Such intermittent reinforcement can produce persistent behavioural responses because users remain uncertain about when the next rewarding event will occur. This mechanism may contribute to repetitive checking, prolonged gaming sessions, and compulsive social-media engagement, showing conceptual similarities with reinforcement processes observed in gambling behaviour (39,46,47).

3.3.2 Prefrontal Cortex Dysfunction and Executive Control

The transition from recreational technology use to compulsive digital behaviour has been associated with alterations in prefrontal cortical regions involved in executive control, particularly the dorsolateral prefrontal cortex (DLPFC), orbitofrontal cortex (OFC), and anterior cingulate cortex (ACC) (43,48). These regions participate in inhibitory control, decision-making, attention allocation, planning, and behavioural flexibility.

Functional neuroimaging studies have reported reduced activation or altered connectivity involving these regions during response-inhibition and cognitive-control tasks among individuals with problematic internet use and gaming disorder (49,50). These findings support a possible top-down control deficit model in which heightened reward responsiveness is insufficiently regulated by executive-control networks, contributing to impulsive and compulsive digital engagement.

However, neuroimaging findings have not been entirely consistent. Some studies have reported minimal or no significant structural or functional differences between individuals meeting criteria for Internet Gaming Disorder and highly engaged recreational gamers (51). This inconsistency highlights an important methodological challenge in distinguishing pathological digital behaviour from intensive but non-pathological technology use.

At present, no neuroimaging biomarker has demonstrated sufficient sensitivity and specificity to support routine diagnostic application for digital addiction (44,51).

3.3.3 Neuroplasticity and Structural Brain Changes

Repeated exposure to rewarding digital stimuli may induce neuroplastic adaptations within neural circuits involved in reward processing, habit formation, and cognitive control. Structural magnetic resonance imaging studies have reported alterations in grey-matter volume, cortical thickness, and white-matter integrity involving the prefrontal cortex, anterior cingulate cortex, insula, and striatum among individuals with problematic internet use or gaming disorder (49,52).

Diffusion tensor imaging studies have additionally identified abnormalities in white-matter tracts connecting frontal and limbic regions, suggesting possible alterations in communication between executive-control and reward-processing networks (52).

Nevertheless, most available studies are cross-sectional, which limits causal interpretation. It remains uncertain whether these structural differences represent pre-existing vulnerability factors, consequences of prolonged digital engagement, or potentially reversible neuroplastic adaptations. Longitudinal studies are therefore required to clarify the temporal and causal relationships between digital behaviour and observed neurobiological changes (44,52).

3.3.4 Craving, Tolerance, and Withdrawal

Behavioural characteristics analogous to those observed in substance addictions, including craving, tolerance, and withdrawal-like symptoms, have been repeatedly described in digital addiction research (7,32). Individuals may experience intense urges to access digital platforms, progressively increase their duration of use to achieve comparable levels of satisfaction, and experience difficulty reducing use despite awareness of its negative consequences.

Withdrawal-like manifestations following digital abstinence commonly include irritability, anxiety, restlessness, boredom, impaired concentration, and low mood rather than the pronounced autonomic disturbances characteristic of withdrawal from substances such as alcohol, opioids, or sedative drugs (53,54).

Thus, although digital addiction may demonstrate phenomenological similarities with substance-related and other behavioural addictions, the absence of a comparable severe physiological withdrawal syndrome represents an important clinical distinction (8,53).

3.3.5 Default Mode Network and Attentional Dysregulation

Emerging neuroimaging evidence has implicated alterations in the Default Mode Network (DMN) in excessive digital engagement. The DMN includes regions such as the medial prefrontal cortex, posterior cingulate cortex, precuneus, and angular gyrus and plays an important role in internally directed cognition, self-referential processing, and mind wandering (55).

Prolonged exposure to rapidly changing digital stimuli, particularly short-form video and algorithmically curated content, may affect interactions between the DMN and executive-attention networks. Such alterations have been proposed to

contribute to reduced sustained attention, increased distractibility, and habitual task switching (55,56).

However, this area remains under investigation. Existing studies are limited by relatively small sample sizes and methodological heterogeneity. Therefore, the relationship between short-video consumption, DMN function, and attentional dysregulation should currently be regarded as an emerging rather than established neurobiological association.

3.3.6 Sleep, Circadian Rhythm, and Stress-Axis Dysregulation

Excessive nighttime digital-device use may adversely affect sleep through several biological and behavioural mechanisms. Exposure to short-wavelength light can suppress melatonin secretion, delay circadian phase, prolong sleep-onset latency, and reduce sleep quality (15,57). At the same time, emotionally stimulating digital content may increase physiological and cognitive arousal, thereby delaying bedtime and disrupting normal sleep patterns.

Sleep deprivation can subsequently impair emotional regulation, increase stress responsiveness, reduce executive functioning, and enhance reward sensitivity. These effects may increase vulnerability to further compulsive digital engagement (58).

A bidirectional relationship may therefore develop in which excessive digital use contributes to sleep disturbance, while impaired sleep further weakens self-control and increases emotional dysregulation, thereby reinforcing maladaptive digital behaviour (15,57,58).

3.3.7 Neurobiological Perspective and Current Limitations

Overall, current evidence indicates substantial overlap between digital addiction and established behavioural or substance addictions in relation to reward processing, executive-control networks, reinforcement learning, and habit formation. However, important uncertainties remain regarding the specificity, causality, reversibility, and diagnostic utility of these neurobiological alterations.

A substantial proportion of available neuroimaging evidence is derived from cross-sectional studies involving heterogeneous diagnostic criteria and relatively small study populations. Consequently, observed neurobiological differences cannot necessarily be interpreted as causal effects of digital addiction.

Digital addiction should therefore be regarded as involving shared but not identical neurobiological mechanisms with substance dependence. Future longitudinal and multimodal neuroimaging studies are required to clarify whether the observed neural alterations represent vulnerability factors, consequences of excessive digital engagement, or potentially reversible adaptations (44,51,52).

The neurobiological evidence provides an important foundation for understanding compulsive digital behaviour. However, a purely neurobiological explanation does not fully account for the psychological, behavioural, sensory, and lifestyle dimensions of digital addiction. These broader dimensions provide the basis for examining the condition through the conceptual framework of Ayurveda.

3.4 Ayurvedic Perspective on Digital Addiction

Digital addiction is not explicitly described as a distinct disease entity in the classical Ayurvedic texts. However, several of its characteristic manifestations, including compulsive attraction towards digital stimuli, impaired regulation of technology use, emotional dependence, disturbed sleep, reduced concentration, and impaired social functioning, can be conceptually examined through classical principles concerning *Manas* (mind), *Indriyas* (sense organs), *Buddhi* (intellect), and *Achara* (behaviour).

From this perspective, excessive digital engagement may be interpreted through concepts such as *Prajnaparadha*, *Asatmya Indriyarth Samyoga*, predominance of *Rajas* and *Tamas*, and disturbance of *Manovaha Srotas*. Rather than treating the behaviour as an isolated phenomenon, the Ayurvedic framework emphasises the relationship between the mind, senses, behaviour, lifestyle, and overall equilibrium (23,24,59).

3.4.1 Prajnaparadha: A Fundamental Etiological Concept

Among the *Trividha Hetu* (three primary causes of disease), *Prajnaparadha* occupies an important position in the understanding of behavioural disturbances. Classical Ayurveda describes *Prajnaparadha* in relation to impairment of *Dhi* (intellect), *Dhriti* (self-restraint), and *Smriti* (memory), resulting in actions that are recognised as harmful but are nevertheless repeatedly performed (23).

Digital addiction may be conceptually related to this principle because individuals may recognise the adverse consequences of prolonged digital engagement, including sleep deprivation, anxiety, reduced productivity, eye strain, and social isolation, yet continue excessive use because of diminished behavioural control and difficulty regulating impulses.

This conceptual relationship also shows a possible parallel with contemporary models of executive dysfunction, in which impaired prefrontal regulation may reduce the ability to inhibit reward-seeking behaviours (43,48). However, this comparison should be understood as a conceptual correspondence rather than evidence that *Prajnaparadha* is biologically

equivalent to prefrontal cortical dysfunction (23,43,59–61).

3.4.2 *Asatmya Indriyarth Samyoga and Excessive Sensory Engagement*

Ayurveda identifies *Asatmya Indriyarth Samyoga* as an important etiological concept referring to inappropriate interaction between the sensory organs and their respective objects (23).

Digital devices can simultaneously engage multiple sensory and cognitive domains. Prolonged visual exposure primarily involves *Chakshurindriya*, continuous auditory notifications and multimedia content involve *Shrotrendriya*, while persistent information processing and cognitive stimulation place sustained demands upon *Manas*.

Classical Ayurveda recognises three forms of inappropriate sensory interaction:

- *Atiyoga* — excessive use
- *Ayoga* — inadequate use
- *Mithyayoga* — improper or inappropriate use

Excessive screen exposure may therefore be conceptually considered an example of *Atiyoga* of *Chakshurindriya*, whereas exposure to emotionally provocative, violent, misleading, or otherwise harmful digital content may be interpreted in relation to *Mithyayoga*. Persistent sensory overstimulation may consequently contribute to disturbed mental equilibrium, impaired concentration, psychological stress, and dysfunction of *Manovaha Srotas* (23,24,60).

3.4.3 *Role of Manas, Guna, and Mental Doshas*

Ayurveda describes *Manas* as being influenced by the *Guna* of *Rajas* and *Tamas*, while *Sattva* represents psychological clarity and balance (23,24).

The behavioural characteristics of digital addiction may be conceptually interpreted as a progressive disturbance in the balance among these qualities. *Rajas* is associated with excessive desire, restlessness, impulsivity, excitement, competitiveness, and persistent novelty seeking. *Tamas*, in contrast, may manifest through attachment, lethargy, reduced motivation, emotional withdrawal, and impaired discrimination. *Sattva* is associated with mindfulness, self-regulation, emotional stability, clarity, and wisdom.

The reward-oriented architecture of many digital platforms continuously provides novelty, competition, social comparison, and immediate gratification, which may be conceptually related to *Rajasic* tendencies. With prolonged excessive engagement, manifestations such as apathy, social withdrawal, poor concentration, reduced motivation, and disturbed cognition may also emerge, which have been interpreted in the manuscript in relation to *Tamasic* manifestations.

Accordingly, digital addiction may be conceptually viewed as a state involving *Rajas* predominance followed by secondary *Tamas* manifestations and diminished *Sattva* (61,62). This interpretation remains conceptual and should not be considered a direct psychiatric or neurobiological classification.

3.4.4 *Manovaha Srotas Dushti*

Ayurveda attributes psychological disturbances to alterations involving *Manovaha Srotas*, whose principal sites are described in relation to the *Hridaya* and *Manas* (23).

Repeated digital stimulation, chronic psychological stress, sleep deprivation, and emotional dysregulation may be considered potential factors contributing to disturbance of normal mental functioning. From an Ayurvedic perspective, this may manifest through symptoms including:

- *Chittodvega* — anxiety or mental agitation
- *Nidranasha* — insomnia or disturbed sleep
- *Smriti Bhramsha* — impaired memory
- *Avasada* — depressive manifestations
- *Anavasthita Chitta* — mental instability
- *Asamyata Indriya* — inadequate regulation of the senses

These manifestations show conceptual overlap with symptoms reported among individuals with problematic smartphone use, internet addiction, and gaming disorder (16,21).

3.4.5 *Dosha Involvement*

Although digital addiction is primarily considered in the context of mental and behavioural disturbance, the manuscript also considers the possible involvement of *Tridosha* in its progression.

Prana Vata is associated with cognition, attention, sensory perception, and higher mental functions. Excessive cognitive stimulation, irregular sleep, and prolonged mental activity may therefore be conceptually associated with aggravation of

Prana Vata, with manifestations such as anxiety, insomnia, reduced attention, and mental fatigue (63).

Sadhaka Pitta is associated with intelligence, emotional processing, motivation, and decision-making. Persistent emotional stimulation, competitive gaming, and chronic psychological stress may be interpreted as factors potentially disturbing *Sadhaka Pitta*, contributing to irritability, frustration, emotional instability, and impulsive behaviour (24,63).

Tarpaka Kapha is associated with emotional stability, memory, and nourishment of the nervous system. Prolonged sedentary behaviour and compulsive digital engagement may be conceptually associated with *Kapha* imbalance, with manifestations such as lethargy, excessive attachment, reduced motivation, and behavioural dependence (63).

Thus, within the conceptual framework presented in this review, digital addiction may involve *Prana Vata*, *Sadhaka Pitta*, *Tarpaka Kapha*, and *Manovaha Srotas* (63).

3.4.6 Nidra and Circadian Health

Nidra is described as one of the *Trayopastambha*, or three fundamental supports of life, and plays an important role in maintaining physical and psychological well-being (23).

Night-time exposure to digital screens may delay sleep onset, suppress melatonin secretion, disrupt circadian rhythms, and contribute to sleep disturbance. Within the Ayurvedic framework used in this review, disturbed sleep may additionally be considered in relation to aggravation of *Vata* and *Pitta*. Persistent disturbance of *Nidra* may manifest through fatigue, impaired intellect, reduced memory, emotional instability, and diminished vitality (23,57).

The bidirectional relationship identified in contemporary research, whereby excessive digital engagement disrupts sleep and inadequate sleep subsequently increases vulnerability to further compulsive digital use, shows a conceptual parallel with the Ayurvedic emphasis on preservation of healthy *Nidra* for maintaining mental and physiological equilibrium (23,57).

3.5 Integrative Interpretation

The contemporary neurobiological mechanisms identified in digital addiction, including dopaminergic reward sensitisation, impaired executive control, emotional dysregulation, maladaptive habit formation, attentional disturbance, and sleep disruption, can be conceptually considered alongside Ayurvedic principles such as *Prajnaparadha*, *Rajas–Tamas* predominance, *Asatmya Indriyārtha Samyoga*, and *Manovaha Srotas Dushti*.

Contemporary neuroscience primarily describes the neural and behavioural mechanisms underlying compulsive digital engagement, whereas Ayurveda provides a broader framework emphasising regulation of the senses, mental discipline, self-control, lifestyle balance, and psychological resilience.

On this basis, an integrative therapeutic framework may combine evidence-based psychological interventions with Ayurveda-informed approaches such as *Sattvavajaya Chikitsa*, *Dinacharya*, Yoga, meditation, *Pranayama*, *Nidra* regulation, and *Medhya Rasayana* (21,23,24,59–63).

However, the similarities identified between the two frameworks should be interpreted as conceptual and hypothesis-generating. They should not be considered evidence of direct biological equivalence between specific Ayurvedic concepts and neurobiological mechanisms. Empirical studies are required to determine whether these conceptual relationships translate into measurable clinical or biological outcomes.

3.6 Integrative Evidence Synthesis

The evidence synthesised in the preceding sections demonstrates that digital addiction involves multiple interacting domains, including reward processing, executive control, reinforcement learning, attentional regulation, emotional stability, sleep, and lifestyle behaviour. Although these mechanisms have primarily been investigated within contemporary neuroscience and behavioural medicine, several associated clinical manifestations can be conceptually examined through selected Ayurvedic principles.

The comparative synthesis presented in **Table 1** identifies areas of conceptual convergence between contemporary neurobiological findings and classical Ayurvedic concepts. For example, mesolimbic reward activation and compulsive reward-seeking behaviour may be considered alongside *Rajas* predominance and *Prajnaparadha*, whereas excessive sensory stimulation and repetitive behavioural reinforcement may be conceptually related to *Asatmya Indriyārtha Samyoga* and *Atiyoga of Indriyas*.

Similarly, impaired executive control may be conceptually examined in relation to impairment of *Dhi*, *Dhriti*, and *Smriti*, while attentional dysregulation may be considered alongside *Rajas* predominance and instability of *Manas*. Withdrawal-related psychological manifestations may be considered in relation to *Prana Vata* and *Manovaha Srotas*, whereas sleep and circadian disturbances may be examined in relation to *Nidra* and the functional balance of *Dosha*.

The integrative mapping also identifies potential areas in which Ayurveda-informed interventions may complement established behavioural approaches. Strategies such as *Sattvavajaya Chikitsa*, Yoga, meditation, *Pranayama*, *Dinacharya*, *Nidra* regulation, and *Medhya Rasayana* may theoretically address domains such as self-regulation, stress management,

attentional control, sensory discipline, sleep hygiene, and lifestyle modification (21,23,24,59–63).

Importantly, these relationships represent conceptual correspondences rather than demonstrated mechanistic equivalences. The purpose of the comparative framework is therefore not to equate Ayurvedic concepts with specific brain structures, neurotransmitters, or psychiatric diagnoses, but to identify potentially testable relationships that may guide future interdisciplinary research.

Table 1. Correlation Between Modern Neurobiology and Ayurvedic Concepts in Digital Addiction

Modern neurobiological finding	Clinical manifestation	Corresponding Ayurvedic concept	Integrative interpretation	Potential interventions
Hyperactivation of mesolimbic dopamine pathway (VTA–Nucleus Accumbens) (45–47)	Reward seeking, compulsive checking, craving (7,43)	Rajas predominance, Prajñāparādha (23,61)	Excessive activation of reward pathways parallels Rajasic dominance and impairment of Dhi–Dhṛti–Smṛti leading to compulsive behaviour (23,43,61)	Sattvavajaya Chikitsa, Yoga, Meditation, Prāṇāyāma, Medhya Rasāyana (23,24,62)
Variable-ratio reinforcement incorporated into digital platforms (39,46)	Habit formation, repetitive smartphone checking, compulsive engagement (46,47)	Asātmya Indriyārtha Saṃyoga (Atiyoga of Indriyas) (23,60)	Continuous excessive sensory stimulation produces maladaptive behavioural conditioning comparable to excessive sensory indulgence described in Ayurveda (23,39,60)	Digital detox, Indriya Nigraha, Dinacharya, behavioural modification (23,24)
Prefrontal cortex dysfunction (DLPFC, OFC, ACC) (48–50)	Poor inhibitory control, impaired decision-making, impulsivity (43,49)	Prajñāparādha, Dhi–Dhṛti–Smṛti Vibhramsha (23,59)	Executive dysfunction resembles impairment of intellect, restraint and memory resulting in repeated unhealthy actions (23,43,59)	Sattvavajaya, Medhya Rasāyana, mindfulness, counselling (23,24,62)
Altered gray matter volume and white matter integrity (49,52)	Reduced behavioural flexibility and cognitive dysfunction (52)	Prāṇa Vāta Duṣṭi, Majjā Dhātu involvement (hypothetical) (63)	Structural neuroplastic changes may conceptually correspond to disturbed Prāṇa Vāta regulating higher neurological functions (52,63)	Rasāyana therapy, Vāta-pacifying lifestyle, Yoga (24,63)
Craving and reward anticipation (45–47)	Strong urge to use digital devices despite awareness of harm (7,53)	Rajas, Tr̥ṣṇā, Prajñāparādha (23,61)	Excessive desire (<i>Tr̥ṣṇā</i>) and Rajasic mental activity perpetuate compulsive use (23,61)	Meditation, Satvavajaya, CBT, Yoga (21,23)
Tolerance (53)	Increasing screen time required for similar satisfaction (7,53)	Atiyoga, Rajas aggravation (23,60)	Repeated sensory indulgence progressively increases dependence and behavioural reinforcement (23,53,60)	Lifestyle modification, Digital fasting, Yoga (23,24)
Withdrawal symptoms (53,54)	Irritability, anxiety, restlessness, low mood after abstinence (53)	Prāṇa Vāta Prakopa, Manovaha Srotas Duṣṭi (23,63)	Aggravated Vāta and disturbed Manovaha Srotas manifest as psychological instability during withdrawal (23,63)	Abhyanga, Prāṇāyāma, meditation, sleep regulation (23,24)
Default Mode Network dysregulation (55,56)	Poor sustained attention, distractibility, mind wandering (56)	Rajas predominance, Chanchala Manas (23,61)	Restless mind described in Ayurveda resembles impaired attentional regulation observed in excessive digital engagement (23,55,61)	Dhyāna, Trataka, Yoga, mindfulness (24,62)
Blue-light exposure and circadian disruption (15,57)	Delayed sleep, insomnia, fatigue, poor cognition (15,57)	Nidra Vaigunya, Prāṇa Vāta and Sādhaka Pitta Duṣṭi (23,63)	Disturbed sleep weakens psychological stability and cognitive performance, reinforcing compulsive digital behaviour (23,57,63)	Nidra hygiene, Dinacharya, evening digital restriction, Yoga Nidra (23,24)

Stress-axis (HPA axis) activation (58)	Anxiety, depression, emotional dysregulation (16,58)	Rajas–Tamas imbalance, Manovaha Srotas Duṣṭi (23,61)	Chronic stress aggravates mental Doṣas and perpetuates compulsive behavioural cycles (23,58,61)	Yoga, Meditation, Rasāyana, Satvavajaya (23,24,62)
Sedentary lifestyle associated with prolonged screen use (17,18)	Obesity, fatigue, musculoskeletal disorders (17,18)	Kapha aggravation, Manda Agni, Avasāda (23,63)	Reduced physical activity promotes Kapha accumulation and metabolic imbalance (23,63)	Vyāyāma, Pathya, Āhāra, Dinacharya (23,24)
Social comparison and intermittent social reinforcement (35,36)	Low self-esteem, anxiety, depression (16,35)	Rajas, Moha, Asātmya Indriyārtha Saṁyoga (23,61)	Dependence on external validation and attachment resemble Rajasic and Tamasic disturbances of Manas (23,35,61)	Sadvṛtta, Satvavajaya, mindfulness, Yoga (23,24,62)

Abbreviations: VTA = Ventral Tegmental Area; DLPFC = Dorsolateral Prefrontal Cortex; OFC = Orbitofrontal Cortex; ACC = Anterior Cingulate Cortex; HPA = Hypothalamic–Pituitary–Adrenal axis; CBT = Cognitive Behavioural Therapy.

Note: The correlations between neurobiological mechanisms and Ayurvedic concepts are **conceptual and hypothesis-generating** and should not be interpreted as direct biological equivalence. They are intended to facilitate an integrative understanding of digital addiction based on current evidence and classical Ayurvedic principles (23,24,43,44).

3.7 Interpretation of the Comparative Framework

The comparison indicates that contemporary neuroscience and Ayurveda describe behavioural and cognitive disturbances through fundamentally different theoretical frameworks but may identify overlapping clinical phenomena. Contemporary neuroscience emphasises neural circuitry, reward processing, executive function, reinforcement, and stress-related mechanisms, whereas Ayurveda emphasises the regulation of *Manas*, *Indriyas*, *Buddhi*, behaviour, lifestyle, and overall mental balance.

For example, hyperactivation of reward-related pathways and repetitive checking behaviour may be conceptually interpreted within the Ayurvedic framework through *Rajas* predominance and *Prajnaparadha*. Similarly, continuous sensory stimulation associated with digital platforms may be considered in relation to *Asatmya Indriyārtha Saṁyoga*, particularly *Atiyoga* of the sensory organs.

The observed relationship between prefrontal executive dysfunction and impaired inhibitory control may be conceptually compared with impairment of *Dhi*, *Dhriti*, and *Smriti*. Likewise, disturbances in attention, emotional regulation, and sleep may be considered alongside *Rajas–Tamas* imbalance, *Manovaha Srotas Dushti*, *Prana Vata*, *Sadhaka Pitta*, and *Nidra* disturbance.

These comparisons provide a structured basis for interdisciplinary interpretation; however, they do not establish that Ayurvedic concepts represent neuroanatomical or neurochemical mechanisms. Rather, they identify areas where the two knowledge systems may provide complementary perspectives on similar behavioural manifestations.

The integrative framework therefore supports the possibility of combining evidence-based behavioural counselling with lifestyle-oriented approaches derived from Ayurveda. Nevertheless, such an approach should be developed through standardised protocols and evaluated using appropriate clinical and behavioural outcomes.

4. DISCUSSION

4.1 Principal Findings

The present integrative review indicates that digital addiction represents a heterogeneous and multifactorial behavioural health concern involving reward processing, executive control, reinforcement learning, neuroplasticity, attentional regulation, sleep, emotional regulation, and psychosocial functioning. Contemporary evidence suggests that problematic digital behaviours share several neurobiological and behavioural characteristics with established behavioural addictions, although important differences remain because digital addiction does not involve exposure to an exogenous psychoactive substance (9,43,45,48).

The findings also demonstrate that digital addiction cannot be adequately explained by a single behavioural or neurobiological mechanism. Different forms of problematic digital engagement, including gaming, smartphone use, social media use, internet use, streaming, and online gambling, may involve overlapping mechanisms but differ in their specific reinforcing stimuli and clinical manifestations. The absence of a universally accepted classification system therefore remains an important challenge for research and clinical practice (28,44).

From an Ayurvedic perspective, the manifestations of digital addiction can be conceptually examined through disturbances

involving *Manas*, *Indriyas*, *Buddhi*, and behavioural regulation. Concepts such as *Prajnaparadha*, *Asatmya Indriyarth Samyoga*, *Rajas–Tamas* predominance, *Manovaha Srotas Dushti*, and disturbance of *Nidra* provide a framework for interpreting impaired self-regulation, excessive sensory engagement, emotional dysregulation, attentional difficulties, and disturbed lifestyle patterns (23,24,59–63).

Thus, contemporary neuroscience and Ayurveda approach digital addiction from different theoretical perspectives but may converge at the level of several observable behavioural and psychological manifestations.

4.2 Neurobehavioral Interpretation

The neurobiological findings suggest that repeated exposure to highly rewarding digital stimuli may strengthen reward-seeking and cue-driven behaviours. Activation of mesocorticolimbic reward circuitry by gaming rewards, notifications, social validation, personalised recommendations, and other digital stimuli may contribute to repetitive engagement and conditioned behavioural responses (45–47).

At the same time, alterations involving prefrontal regions associated with inhibitory control and decision-making may contribute to difficulty regulating digital behaviour. The combination of heightened reward responsiveness and inadequate executive control provides a possible framework for understanding why individuals may continue engaging in digital activities despite recognising their negative consequences (43,48–50).

However, the available evidence should be interpreted cautiously. Neuroimaging findings are not completely consistent, and many studies are cross-sectional. Consequently, it remains uncertain whether observed neural differences are causes, consequences, or correlates of problematic digital engagement. No currently identified neurobiological marker is sufficiently specific for use as a diagnostic biomarker of digital addiction (44,51,52).

The interaction between digital engagement and sleep provides another important dimension. Night-time digital use may disrupt sleep and circadian regulation, while inadequate sleep may subsequently impair executive control and emotional regulation, potentially increasing vulnerability to further compulsive digital engagement (15,57,58). This reciprocal relationship suggests that effective management should consider sleep and lifestyle behaviours rather than focusing exclusively on screen-time reduction.

4.3 Ayurvedic Interpretation

The Ayurvedic interpretation presented in this review provides a complementary framework for understanding the behavioural dimensions of digital addiction. *Prajnaparadha* may be considered particularly relevant to the phenomenon in which an individual recognises the harmful consequences of excessive digital use but nevertheless continues the behaviour.

Similarly, excessive and inappropriate sensory exposure may be conceptually examined through *Asatmya Indriyarth Samyoga*. Modern digital platforms continuously provide visual, auditory, emotional, and cognitive stimulation, making sensory regulation an important consideration in understanding problematic engagement.

The role of *Rajas* and *Tamas* provides another interpretive dimension. Novelty seeking, impulsivity, restlessness, competitiveness, and immediate gratification may be considered in relation to *Rajasic* characteristics, whereas reduced motivation, attachment, lethargy, social withdrawal, and impaired discrimination may be considered in relation to *Tamasic* manifestations. The present framework therefore considers digital addiction as potentially involving disturbance of mental equilibrium rather than simply excessive exposure to technology (23,24,61,62).

The concept of *Manovaha Srotas* further allows psychological manifestations such as anxiety, disturbed sleep, impaired memory, mental instability, and inadequate sensory regulation to be considered within a broader Ayurvedic framework. Similarly, the proposed involvement of *Prana Vata*, *Sadhaka Pitta*, and *Tarpaka Kapha* provides an additional conceptual perspective on cognition, emotional regulation, motivation, memory, and behavioural attachment (23,63).

These interpretations should, however, remain within their appropriate conceptual boundaries. They do not establish that individual Ayurvedic concepts correspond directly to specific brain regions, neurotransmitters, or psychiatric diagnoses.

4.4 Implications for Integrative Management

The findings support consideration of an integrative management model in which evidence-based behavioural interventions remain central, while Ayurveda-informed lifestyle and behavioural strategies may be explored as complementary approaches.

Contemporary approaches such as cognitive behavioural therapy, psychoeducation, motivational interventions, family-based interventions, and behavioural self-regulation strategies provide important tools for addressing maladaptive digital behaviour (21,22). Ayurveda may potentially complement these approaches through interventions directed towards mental regulation, sensory discipline, lifestyle organisation, sleep regulation, and psychological resilience.

Sattvavajaya Chikitsa may be particularly relevant conceptually because of its emphasis on regulation of mental processes and behavioural control. Similarly, *Dinacharya*, appropriate *Nidra*, Yoga, meditation, and *Pranayama* may contribute to

structured lifestyle regulation and psychological well-being, while *Medhya Rasayana* represents an area for future investigation.

The potential value of these approaches should not, however, be interpreted as evidence that Ayurveda has already been established as an effective treatment for digital addiction. The present literature provides a conceptual basis for integration, whereas clinical efficacy and mechanisms require systematic empirical evaluation.

4.5 Significance of the Integrative Framework

One of the potential strengths of an integrative approach is that it addresses digital addiction across multiple levels. Contemporary neuroscience contributes an understanding of reward circuitry, executive control, reinforcement, neuroplasticity, attention, and sleep, whereas Ayurveda contributes a framework emphasising sensory regulation, mental discipline, behavioural restraint, lifestyle balance, and holistic well-being.

This broader perspective may be particularly relevant because problematic digital engagement is influenced not only by the characteristics of the technology but also by individual psychological factors, social context, lifestyle, sleep, and behavioural patterns.

The proposed framework may therefore serve as a basis for developing interdisciplinary interventions that combine established psychological approaches with structured lifestyle and behavioural strategies derived from Ayurveda. Nevertheless, such an approach should be developed through standardised protocols and evaluated using objective and clinically meaningful outcomes.

4.6 Strengths and Limitations

A major strength of the present review is its integration of contemporary neurobiological and behavioural evidence with classical Ayurvedic concepts. The comparative framework provides a structured method for identifying areas of conceptual convergence while explicitly distinguishing conceptual parallels from established biological mechanisms.

However, several limitations should be acknowledged. First, the present work is an integrative narrative review rather than a systematic review or meta-analysis, and therefore the evidence was synthesised qualitatively. Second, the literature on digital addiction remains heterogeneous with respect to terminology, diagnostic criteria, study populations, and outcome measures. Third, a substantial proportion of neurobiological evidence is derived from cross-sectional studies, limiting conclusions regarding causality and reversibility.

Furthermore, the Ayurvedic interpretation presented in this review is primarily conceptual. Digital addiction is not described as a distinct diagnostic entity in the classical Ayurvedic texts, and therefore the relationships proposed in this article represent interpretive applications of classical principles rather than direct classical descriptions of digital addiction.

Finally, controlled clinical evidence evaluating Ayurveda-based interventions specifically for digital addiction remains limited. Consequently, the proposed integrative model should be regarded as hypothesis-generating rather than as an established therapeutic framework.

4.7 Future Research Directions

The findings identify several priorities for future research. Greater consistency in terminology and diagnostic criteria is required to improve comparison between studies and facilitate reliable estimation of disease burden. Longitudinal research may help determine whether observed neurobiological alterations precede problematic digital engagement or develop as a consequence of prolonged exposure.

Future studies should also evaluate standardised integrative interventions combining evidence-based behavioural counselling with clearly defined Ayurveda-informed strategies. Such studies could examine outcomes related to digital-use behaviour, psychological well-being, sleep, attention, self-regulation, quality of life, and functional impairment.

Randomised controlled trials would be particularly valuable for determining whether Ayurveda-informed interventions provide additional benefit when used alongside established behavioural therapies. Mechanistic studies may further investigate whether such interventions produce measurable changes in behavioural, physiological, or neurobiological outcomes.

Importantly, future research should avoid assuming equivalence between Ayurvedic concepts and modern neurobiological mechanisms. Instead, specific conceptual relationships should be translated into testable hypotheses and evaluated using appropriate clinical, behavioural, and biological methods.

Taken together, these priorities provide a pathway for progressing from conceptual integration towards empirical validation of culturally sensitive and evidence-based approaches to digital addiction.

5. CONCLUSION

Digital addiction represents a complex and multifactorial behavioural health concern involving interacting neurobiological, psychological, behavioural, and lifestyle determinants. Contemporary evidence indicates that problematic digital engagement

is associated with alterations in reward processing, executive control, reinforcement learning, neuroplasticity, attentional regulation, sleep, and emotional functioning.

From an Ayurvedic perspective, the behavioural and psychological manifestations associated with digital addiction may be conceptually examined through principles including *Prajnaparadha*, *Asatmya Indriyarthasamyoga*, *Atiyoga of Indriyas*, predominance of *Rajas* and *Tamas*, *Manovaha Srotas Dushti*, *Dosha* involvement, and disturbance of *Nidra*. These concepts provide a complementary framework emphasising regulation of the mind and senses, behavioural restraint, lifestyle balance, and psychological well-being (23,24,59–63).

An integrative approach combining evidence-based behavioural counselling with appropriately evaluated Ayurveda-informed interventions may therefore provide a potentially holistic framework for the prevention and management of problematic digital behaviour. Approaches such as *Sattvavajaya Chikitsa*, *Dinacharya*, Yoga, *Pranayama*, meditation, *Nidra* regulation, and *Medhya Rasayana* may have potential as complementary strategies, particularly when directed towards self-regulation, lifestyle modification, sleep, and emotional resilience (21,23,24,59–63).

However, the proposed relationships between Ayurvedic concepts and contemporary neurobiological mechanisms remain primarily conceptual and should not be interpreted as direct biological equivalences. The current evidence base, particularly regarding Ayurveda-specific interventions for digital addiction, remains insufficient to establish definitive clinical efficacy.

Future interdisciplinary research should therefore focus on standardised definitions, longitudinal investigations, well-designed mechanistic studies, and randomised controlled trials evaluating clearly defined integrative interventions. Such research may help determine whether combining contemporary behavioural therapies with evidence-based Ayurveda-informed approaches can provide clinically meaningful benefits for individuals affected by problematic digital engagement.

Ultimately, an evidence-based integrative model should aim not merely to reduce screen exposure but to promote sustained self-regulation, healthy sensory engagement, psychological resilience, restorative sleep, balanced lifestyle practices, and overall well-being.

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