



Interoceptive Awareness and Digital Consumption: Teaching Children to Listen to Their Bodies

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Interoceptive Awareness as a Mechanism for Digital Emotional Literacy in K-5 Populations: A Theory-Development Study — Research Summary

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ABSTRACT

This paper provides a public-facing summary of a doctoral dissertation investigating the role of interoceptive awareness in children's digital emotional literacy. Employing a theory-development methodology, the study examines how elementary-age children (K–5) perceive and report internal bodily signals during technology use, and how these signals relate to digital behavioral patterns. The research addresses two primary questions: (1) How do K–5 children describe interoceptive experiences during digital engagement? and (2) What role do these interoceptive signals play in children's digital decision-making processes? The study's theoretical grounding spans three literatures — interoception and embodied cognition, attachment theory as extended to digital contexts, and bounded rationality — synthesizing them into an integrated framework proposing that interoceptive awareness functions as a pre-conscious decision-making heuristic in children's digital behavior. This summary presents the study's theoretical foundations, methodological approach, key constructs under investigation (including the exploratory Digital Wellness Assessment instrument), and the contribution to the emerging field of cyberpsychology. The summary is designed for accessibility while maintaining scholarly precision about what the research claims and what remains exploratory.

Keywords: interoceptive awareness, digital emotional literacy, theory-development, K-5, cyberpsychology, embodied cognition, Digital Wellness Assessment

1. INTRODUCTION: THE RESEARCH PROBLEM

Children's digital lives have become the subject of intense public and scholarly concern, yet the frameworks available for understanding those lives remain largely inadequate. Prevailing approaches to

children's digital wellness fall into two broad categories: restriction-based interventions that seek to limit exposure (screen-time rules, content filters, device-free zones) and cognitive-behavioral interventions that seek to modify digital behavior through knowledge and reasoning ("think before you click," digital citizenship curricula). Neither category addresses a fundamental question: what is actually happening inside the child during digital engagement?

This question is not rhetorical. When a child scrolls through a video feed, the experience is registered not only cognitively but somatically — through changes in heart rate, respiration, muscle tension, and gut sensation that precede and inform conscious thought. When a child reaches for a device, the reaching is motivated not only by a conscious desire but by a pre-conscious bodily assessment of need, comfort, and anticipation. When a child resists putting down a game, the resistance is not merely willful; it is embodied, felt in the body as urgency, tension, or the absence of a satisfying stopping signal.

These observations point toward a mechanism that existing digital literacy frameworks have not articulated: the role of interoceptive awareness — the capacity to perceive and interpret internal bodily signals — in shaping children's digital behavior. If digital experiences register first in the body, then the body's awareness of those signals represents a primary channel through which children might develop genuine digital agency — the capacity to notice, evaluate, and respond to their own digital experiences in real time.

This dissertation investigates that mechanism. It asks whether interoceptive awareness can function as a foundation for digital emotional literacy in K–5 populations, and it employs a theory-development methodology designed to generate the conceptual framework and preliminary constructs necessary for future empirical investigation.

2. THEORETICAL FOUNDATIONS

The study's theoretical architecture rests on three pillars, each drawn from an established body of scholarship and each contributing a distinct element to the integrated framework.

2.1 Interoception and Embodied Cognition

Interoception — the perception of internal bodily signals including heartbeat, respiration, gastrointestinal sensation, muscle tension, and thermal state — has been established in the neuroscience and clinical psychology literature as foundational to emotional awareness and self-regulation (Craig, 2015; Garfinkel et al., 2015). The interoceptive system provides the brain with a continuous stream of information about the body's internal state, and this information serves as the basis for subjective feeling states, emotional categorization, and behavioral motivation.

Three dimensions of interoception are relevant to this study. Interoceptive accuracy refers to the objective precision with which an individual can detect internal signals (e.g., the ability to count one's

own heartbeats without taking a pulse). Interoceptive sensibility refers to the individual's self-reported tendency to notice and attend to internal signals. Interoceptive awareness refers to the metacognitive capacity to evaluate one's own interoceptive accuracy — the ability to know how well one knows one's own body (Garfinkel et al., 2015). This study focuses primarily on interoceptive sensibility and awareness as the dimensions most amenable to educational intervention and most relevant to children's digital decision-making.

Embodied cognition frameworks provide the broader theoretical context. The embodied cognition perspective holds that cognitive processes are fundamentally shaped by the body's sensorimotor interactions with the environment (Gallagher, 2023; Varela et al., 1991). Thinking is not disembodied information processing; it is a bodily activity that draws on sensory experience, motor capacity, and interoceptive signals. Applied to children's digital experiences, this perspective suggests that digital literacy is not merely a cognitive skill but an embodied capacity — one that requires awareness of the body's responses to digital stimuli as a foundation for reflective engagement.

2.2 Attachment Theory Extended to Digital Contexts

The study draws on the Digital Bonding Patterns framework (Davis, 2026b), which extends Bowlby's (1969/1982) and Ainsworth's (1978) attachment theory to children's relationships with technology. This framework identifies five patterns of relational orientation — Secure Digital Attachment, Anxious Digital Attachment, Avoidant Digital Attachment, Disorganized Digital Attachment, and the Phantom Tether — that describe the range of children's relational experiences with digital devices and platforms.

The attachment-theory contribution to this study is the recognition that children do not merely use technology; they relate to it in ways that parallel (though do not replicate) their relational dynamics with human caregivers. These relational patterns are experienced somatically — each pattern has a characteristic bodily signature — and are therefore accessible to interoceptive awareness. A child who can notice the bodily sensation of Anxious Digital Attachment ("my stomach feels tight when I can't check my messages") has gained access to information about their digital relational pattern that cognitive reflection alone may not provide.

2.3 Bounded Rationality and Satisficing

Herbert Simon's (1956) concept of satisficing — the tendency to select the first option that meets a minimum threshold of acceptability rather than optimizing across all available alternatives — provides the decision-making framework for this study. Children's digital choices are rarely deliberative. When a child selects a video, taps an app, or decides whether to continue or stop a digital activity, the decision is typically rapid, pre-reflective, and driven by a bodily assessment of "good enough" rather than a cognitive evaluation of optimal choice.

The study proposes that interoceptive signals function as satisficing heuristics in children's digital behavior. The body provides a rapid, below-conscious assessment of the digital option — a felt sense of interest, comfort, excitement, or unease — that drives selection before reflective thought engages. This framing has two important implications. First, it explains why cognitive-behavioral approaches to digital literacy ("think before you click") have limited efficacy with young children: the body has

already "decided" before the thinking begins. Second, it suggests that interventions targeting the body's assessment process — through interoceptive awareness training — may be more developmentally appropriate than those targeting cognitive deliberation alone.

2.4 The Integrated Framework

The integration of these three theoretical pillars produces the study's central proposition: that interoceptive awareness functions as a pre-conscious decision-making mechanism in children's digital behavior, that this mechanism is shaped by digital bonding patterns, and that it can be cultivated through educational intervention to support digital emotional literacy.

Digital emotional literacy, as defined in this study, is the capacity to perceive, interpret, and respond to one's own emotional and somatic experiences during digital engagement. It is distinguished from digital literacy (the knowledge and skills required to use digital tools effectively) and from digital citizenship (the ethical and social norms governing digital behavior) by its focus on the child's internal experience rather than external competence or conduct.

3. METHODOLOGY: THE THEORY-DEVELOPMENT APPROACH

3.1 Rationale for Theory-Development

This study employs a theory-development methodology — a systematic approach to generating theoretical propositions and conceptual frameworks from existing literature, preliminary data, and structured analytical processes. The choice of this methodology requires justification, as it positions the study as theory-generating rather than theory-testing.

The rationale is straightforward: the intersection of interoception, digital behavior, and child development is insufficiently theorized to support hypothesis-testing research. No existing theory specifies how interoceptive signals function in children's digital decision-making, what form those signals take at different developmental stages, or how educational interventions might cultivate interoceptive digital awareness. Before these questions can be tested empirically, the theoretical framework that generates testable hypotheses must be developed.

The theory-development methodology is not a lesser form of empirical research; it is a necessary precursor to it. Physics does not test hypotheses before developing the theoretical models that generate them. Psychology, at its best, follows the same logic: theoretical development precedes and informs empirical investigation. This study develops the theoretical architecture; future studies will test its predictions.

3.2 Research Questions

The study addresses two primary research questions:

RQ1: How do K–5 children describe interoceptive experiences during digital engagement?

This question investigates the phenomenology of children's bodily awareness during technology use — what children notice, how they describe it, and what vocabulary they use to articulate their somatic experiences in digital contexts.

RQ2: What role do interoceptive signals play in children's digital decision-making processes?

This question examines the functional relationship between bodily signals and digital behavior — whether and how interoceptive awareness influences the choices children make during technology use.

3.3 Data Sources and Analytical Approach

The theory-development methodology draws on multiple data sources: systematic review of literature across interoception, embodied cognition, attachment theory, bounded rationality, and child development; analysis of existing frameworks for children's digital wellness; and preliminary observations from the MindfulBytes program's co-design sessions with elementary-age children in New Mexico schools.

The analytical approach follows the structured theory-building protocols described by Lynham (2002) and Swanson and Chermack (2013): (1) conceptualize the theoretical framework through literature synthesis, (2) operationalize the framework's key constructs, (3) confirm the framework's internal consistency through expert review and logical analysis, (4) apply the framework to preliminary observational data, and (5) refine the framework based on application outcomes.

4. KEY CONSTRUCTS

The study develops and operationalizes several key constructs that form the vocabulary of the proposed theoretical framework.

4.1 Interoceptive Digital Awareness

Interoceptive Digital Awareness (IDA) is defined as the capacity to perceive, identify, and interpret internal bodily signals that arise in the context of digital engagement. IDA is a domain-specific application of general interoceptive awareness — it focuses specifically on the body's responses to technology use, including but not limited to: somatic anticipation before device use (excitement, tension, urgency), real-time body-state changes during engagement (altered breathing, postural shifts, emotional arousal), and post-engagement residual states (agitation, calm, restlessness, satisfaction).

IDA is proposed as a developmental capacity that varies across individuals and ages, can be enhanced through targeted training, and mediates the relationship between digital environmental stimuli and digital behavioral responses.

4.2 The Interoceptive Gap

The Interoceptive Gap is the temporal interval between the body's registration of a digital impulse (e.g., the urge to check a device, the resistance to disengagement, the pull of a notification) and the behavioral response to that impulse. In unaware states, this gap is effectively zero — the impulse and the action are experienced as simultaneous. Interoceptive awareness training expands the gap by making the impulse visible as a somatic event before it is acted upon, creating space for reflection and choice.

The Interoceptive Gap is the functional definition of digital agency within this framework: the capacity to notice what the body wants before automatically acting on it. This construct operationalizes the widely invoked but rarely specified notion that mindfulness creates "space between stimulus and response."

4.3 Digital Emotional Literacy

Digital Emotional Literacy (DEL) is the integrated capacity to perceive, interpret, and respond to one's own emotional and somatic experiences during digital engagement. It is operationalized as the combination of three component capacities: (1) interoceptive digital awareness (perceiving body signals in digital contexts), (2) digital bonding pattern recognition (interpreting those signals in relational terms), and (3) reflective agency (responding to the perceived and interpreted signals through deliberate choice rather than automatic behavior).

DEL is the study's primary outcome construct — the capacity that the proposed theoretical framework aims to cultivate through educational intervention.

4.4 The Digital Wellness Assessment (DWA)

The Digital Wellness Assessment is an exploratory measurement instrument designed to capture three dimensions of children's internal digital experience: interoceptive signals during technology use, digital bonding patterns, and creative engagement indicators. The DWA employs developmentally appropriate methods including visual analog scales, body-mapping exercises (in which children indicate on a body outline where they feel sensations related to digital experiences), and structured verbal reflection prompts adapted for varying literacy levels across the K–5 range.

It is essential to state clearly that the DWA is an exploratory instrument in the early stages of development. Construct validity has not been established through large-scale testing. The DWA represents a direction of measurement — an attempt to capture dimensions of children's digital experience that existing instruments do not address — rather than a completed, validated tool. Current development efforts focus on item refinement based on children's natural language, pilot administration in school settings, and the establishment of preliminary construct validity through expert review and co-design feedback.

5. THE MINDFULEYTES PROGRAM: FROM THEORY TO PRACTICE

The MindfulBytes program serves as the applied context through which the theoretical framework is being operationalized and explored. Developed by the NM-CCCR and currently implemented in partnership with elementary schools in New Mexico through the Harvard Center for Digital Thriving fellowship, MindfulBytes translates the interoceptive awareness framework into a K–5 digital wellness curriculum.

The program's core philosophy — children do not need less technology; they need better awareness of how technology makes them feel — operationalizes the study's central proposition. MindfulBytes sessions are structured around three moments (before-screen, during-screen, after-screen), each designed to cultivate interoceptive awareness of the body's response to digital engagement.

The co-design methodology employed by MindfulBytes treats children as experts on their own experience. Session design privileges children's natural language over adult-imposed vocabulary, uses body-mapping exercises to ground abstract concepts in somatic experience, and employs Harkness-circle discussion formats that honor children's reports as primary data. When a child describes a sensation as "my tummy goes buzzy when I can't stop watching," that language is preserved as a phenomenological report — a window into the child's interoceptive experience of digital engagement that no external observation or standardized measure could provide with equivalent fidelity.

Preliminary observations from co-design sessions suggest several directions that inform the theoretical framework. Children as young as five can identify and describe bodily sensations associated with technology use when given structured support and appropriate vocabulary. Children's descriptions of digital experiences frequently reference somatic states before cognitive evaluations — supporting the proposition that the body registers digital experience before conscious thought engages. And children express genuine interest in understanding their own bodily responses to technology, suggesting that interoceptive awareness training meets a felt need rather than imposing an adult agenda.

These observations are preliminary. They do not constitute validated findings and should not be interpreted as evidence that the proposed framework has been empirically confirmed. They represent the early stages of an iterative process in which theory informs practice, practice generates observations, and observations refine theory.

6. IMPLICATIONS

6.1 Implications for Research

The theoretical framework developed in this study generates several testable propositions for future empirical investigation. Among them: that interoceptive awareness training increases children's accuracy in reporting bodily signals during technology use; that expanded interoceptive awareness is associated with more deliberate (less automatically satisfying) digital decision-making; that children with higher interoceptive digital awareness demonstrate more stable digital bonding patterns over time;

and that the Interoceptive Gap can be reliably measured and expanded through educational intervention.

These propositions require empirical testing through controlled studies employing validated interoceptive measures, behavioral observation protocols, and longitudinal tracking. The DWA, once further developed and validated, may serve as one instrument in this empirical program.

6.2 Implications for Practice

For educators and digital wellness practitioners, the framework suggests a paradigm shift in how digital literacy is taught. Rather than beginning with cognitive rules (what to do and not do online), body-first approaches begin with somatic awareness (what does your body feel during technology use?). This shift is not anti-cognitive; it proposes that cognitive digital literacy is more effectively built on a foundation of embodied awareness than in its absence.

The MindfulBytes program structure — before-screen, during-screen, after-screen — offers a practical model for integrating interoceptive awareness into existing classroom routines without requiring additional curricular time. Brief interoceptive check-ins (one to three minutes) at transition points around technology use can be woven into any instructional context that involves digital devices.

6.3 Implications for Policy

The framework contributes to policy discourse by identifying a specific mechanism — interoceptive awareness — through which digital wellness education can operate, moving beyond the vague invocation of "digital citizenship" or "responsible use" that characterizes many current policy positions. If interoceptive awareness is the mechanism, then educational policy can be evaluated on whether it supports the development of that specific capacity rather than on whether it achieves broadly defined and difficult-to-measure "digital wellness" outcomes.

7. LIMITATIONS AND FUTURE WORK

This study is a theory-development effort, not an empirical test. Its primary contribution is a conceptual framework and set of constructs that organize existing knowledge, generate testable propositions, and inform applied program design. The limitations of this contribution should be clearly stated.

The framework has not been empirically validated. The propositions it generates are theoretically grounded but not experimentally confirmed. The DWA is exploratory and has not undergone psychometric validation. The MindfulBytes observations are preliminary and were not collected through controlled research protocols. The developmental claims about interoceptive capacity across the K–5 range are based on existing literature rather than original developmental data.

Future work must address these limitations systematically. Priorities include: large-scale pilot administration of the DWA with analysis of construct validity and developmental sensitivity; controlled

studies comparing interoceptive awareness-based digital literacy interventions with conventional cognitive-behavioral approaches; longitudinal tracking of digital bonding patterns in children who receive interoceptive training; and cross-cultural investigation of the framework's applicability in diverse educational and cultural contexts.

The study also acknowledges its position at the intersection of multiple disciplinary traditions — developmental psychology, neuroscience, cyberpsychology, education, and embodied cognition — and the inherent challenges of interdisciplinary theoretical integration. The constructs developed here draw on established scholarship in each tradition but combine them in novel ways that may require refinement as each contributing field advances.

8. CONTRIBUTION TO CYBERPSYCHOLOGY

This study contributes to the emerging field of cyberpsychology by proposing a specific, mechanistic account of how children's bodies participate in their digital experiences. While cyberpsychology has productively examined the psychological dimensions of human-technology interaction, the field has given insufficient attention to the embodied dimension — the fact that digital experiences are not merely psychological events but somatic ones, registered in the body before they are processed by the mind.

The interoceptive awareness framework fills this gap by proposing the body as the primary site of digital experience and interoceptive awareness as the primary capacity through which that experience becomes available for reflection and regulation. This is not a minor theoretical adjustment. It reorients the study of children's digital behavior from a cognitive paradigm (what do children think about technology?) to an embodied paradigm (what do children's bodies feel during technology use?). The implications extend beyond children to the broader human-technology relationship, suggesting that embodied awareness may be a more effective foundation for digital agency than cognitive understanding alone.

The study also contributes the specific constructs of Interoceptive Digital Awareness, the Interoceptive Gap, and Digital Emotional Literacy to the cyberpsychological vocabulary — constructs that provide testable, operationalizable terms for investigating the embodied dimension of digital experience.

9. CONCLUSION

The body knows before the mind does. This is not a mystical claim; it is an empirically grounded observation about the temporal priority of interoceptive signals in human experience. When a child reaches for a device, the reaching begins in the body — in the anticipatory arousal, the subtle tension, the felt pull — before the conscious decision to reach is formed.

This study proposes that this temporal priority is not incidental but foundational. If the body registers digital experience before the mind evaluates it, then the body's awareness of its own signals is the first and most fundamental form of digital literacy. Teaching children to notice what they feel — in their hearts, their stomachs, their hands, their breathing — during technology use is not a supplement to digital education. It is the ground on which digital education can most effectively be built.

The framework developed here is a beginning, not a conclusion. It proposes mechanisms, defines constructs, and generates propositions that await empirical testing. What it offers, immediately, is a different way of asking the question. Not: How do we control children's technology use? But: How do we help children notice what technology use does to their bodies? The answer to the second question, we propose, is the foundation for the child's own answer to the first.

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