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EMBODIED COGNITION AND POSTURAL REGULATION: BODY CONFIGURATION AS AN ACTIVE MODULATOR OF COGNITIVE AND EMOTIONAL PROCESSES

Summary. *The goal of this paper was to look at how your postural positioning works as an active regulatory method from the standpoint of embodied cognition. In essence, we are saying that while you use your body's position to move around physically, it also has the ability to provide input into all of our other cognitive, emotional, and autonomic processes. We have examined much of what has been written about embodied cognition; interoceptive neuroscience; postural studies and somatic regulation. Our argument is that changing one's intentional posture can be used as an intervention to modulate decisions; how we appraise emotions; how we allocate attention and create strategies for behavior. As such, we are arguing that posture influences how the brain predicts its own internal state using both proprioceptive and interoceptive pathways; therefore influencing perception and behavior in ways far beyond movement. This view directly relates to the development of the Somatic Reset Method™ (SRM). Developed over 15 years of self-somatic practice and study and delivered formally for the past 4 years individually, in groups, and organizationally with participants; we see postural engagement as part* *of a six phase activation-recovery cycle. Since we treat regulation as a trainable/measureable skill, we operationalize postural awareness/recalibration as a structured way to produce predictable, reproducible shifts in attentional stability/emotional regulation/cognitive clarity. This paper provides the conceptual base for our applied position.*

Key words: *embodied cognition, postural regulation, proprioception, interoception, somatic feedback, cognitive modulation, Somatic Reset Method, body–mind regulation.*

Introduction. The traditional view of the way the brain uses abstract representations to carry out mental activities has, in recent years, been revised. A new theory called Embodied Cognition has made it clear that our minds do not exist independently of our bodies. Our cognitive abilities are developed and enhanced through interaction with the world around us, using our senses and muscles. As such, the way we perceive the world is directly related to how we move and use our bodies. In addition to being influenced by our surroundings and environment, the way we move also influences our perception of the world.

One area where cognition is significantly impacted by movement is through the use of posture. Posture does not just refer to the spatial relationship of body parts; it also continuously provides the nervous system with information regarding its orientation and tension level, including whether or not it is ready to act. All of these pieces of information are constantly flowing into our brains and are not always treated individually. Rather they interact with other forms of internal and external stimuli and influence each other. Therefore, when we intentionally adjust our posture, we create changes in both our physical and psychological state. We affect what aspects of our environment will capture our attention, the way we emotionally respond to situations and the types of behaviors we engage in.

Although research clearly demonstrates that posture affects psychological function, most models used today still focus on the idea that posture follows from an individual's psychological state. For instance, studies have shown that individuals who suffer from clinical depression typically exhibit slumped postures. However, these findings demonstrate only a unidirectional effect and fail to consider the fact that posture both influences and reflects cognitive and emotional processes.

This study seeks to address this void by exploring the ways in which posture affects and is affected by cognitive and emotional processes. Furthermore, this study positions the intentional regulation of posture as a major entry-point within established body-mind regulatory frameworks. Specifically, this study describes the Somatic Reset Method (SRM) as a methodological approach that utilizes the components of postural awareness and recalibration within a full recovery-activation cycle. While many approaches to correcting problematic postures treat them as isolated interventions, the SRM views posture as a part of a larger sequence of events within a fully functional regulatory process. The purposes of this study are to: (1) summarize existing literature on posture-cognition-emotion interactions; (2) develop a conceptual model of posture as an active regulator; and (3) describe the practical applications of methods that define regulation as a trainability-based competency.

Literature Review

1. Embodied Cognition: From Theory to Regulatory Mechanism

The embodied cognition paradigm asserts that mental processes are an extension of the body's physiological state and interaction with its external environment [14; 26].

The 4 E model (cognition as embodied, embedded, enacted, and extended) presents a complete conceptualization of how the body is involved in producing perception, emotions, and behaviors [14]. In this way, the body does not simply serve as a medium or platform on which to operate cognitively, but rather the body continuously co-constructs cognitive content.

In reviewing empirical and theoretical support for embodied cognition across multiple domains, Shapiro and Spaulding (2024) demonstrate that sensorimotor experiences do not simply correlate with cognitive processes, but instead constitute those same cognitive processes [22]. Castro-Alonso et al. (2024) identify applied outcomes related to learning and instructional practices by documenting that bodily engagement impacts both the process and retention of information [5]. Pearce and Miller (2025) expand upon this work and show that the bodily experiences individuals have in early life shape the brain architectures associated with attentional control and cognitive regulation [15].

Valentini and Guarnacci (2021) conducted a systematic review of studies examining the relationship between physical activity/embodied experiences and cognitive performance in various populations [25]. They found that there was a significant amount of evidence indicating that engaging in physical activity/embodied experiences improves cognitive performance.

However, Khatin-Zadeh et al. (2021) did note that the stronger forms of embodied cognition presented some theoretical challenges however they also noted that regardless of these challenges the data clearly shows that the configuration of the body and actions taken by the body significantly affect cognitive/emotional processes [12]. Moreover, Khatin-Zadeh et al. (2021) further stated that these effects occur via mechanisms that cannot be reduced to abstract symbolic representations [12].

Gordon and Ramani (2021) developed a model combining elements of embodied cognition with those of information processing. Their model demonstrated how gestures and movements made with the body can directly impact the mathematical reasoning of children. Gordon and Ramani (2021) showed that their findings generalize to the larger principle that the body is a cognitive variable, and not just an output mechanism for motion.

2. Posture as a Bidirectional Regulatory Variable

Hall et al. (2023), in their analysis of both emotional and postural control, have demonstrated an interchangeably related relationship between emotional condition and postural stability [10]. They found that emotional condition influences postural swaying, muscle tone and body orientation; and at the same time demonstrate how the input from the position of the body influences activity within both the autonomic and somatic nervous systems. Therefore, Hall et al. (2023), established the bi-directional nature of the mechanism for using posture as a regulatory tool: if emotional condition affects posture and posture effects emotional condition, then, deliberately changing posture provides a controllable means of influencing the internal regulatory environment [10].

The findings reported in Caron et al. (2023), provided empirical support for the effect that posture has upon the process of focusing or directing attention [4]. Specifically, they found that changes in body position and configuration affect the ability to focus or attend to stimuli along several different dimensions. Thus, there are practical implications of these findings as well: Because attentional capacity is influenced by postural conditions, the act of changing posture may also serve to modify cognitive conditions. Therefore, the first phase of the SRM will include training that requires participants to become aware of their body's configuration (posture) during each exercise, so as to establish a base line level of body awareness prior to entering into subsequent breathing based and attentionally focused exercises.

The work conducted by Weininger & Shilaty (2024) demonstrates that developing the skills necessary to develop accurate representations of one's own postural positions (interoceptive-posture-awareness) is both trainable and associated with specific functional regulatory outcomes. Additionally, they found that providing participants with structured photographs of themselves in various postures was sufficient to improve their ability to develop such representations, thus supporting another key premise of the SRM: That, bodily regulatory capacities are not innate, but rather can be developed through systematic practice.

In addition to providing evidence regarding the development of interoceptive-posture-awareness, Sanna (2025) also provided additional conceptual foundations for understanding the role of postural configurations in regulating behavior and cognition [20]. Specifically, he demonstrated that signals derived from proprioception (the perception of movement and spatial location) resulting from a particular postural configuration contribute to the formation of "readiness-to-act" states that directly influence an individual's behavioral and cognitive orientation.

3. Interoceptive Integration and Predictive Processing of Postural Signals

The impact of how we position our bodies extends into the realm of how the body regulates its own internal state, or interoceptive predictive processing. According to Seth (2013), interoception is the process of drawing inferences about the body's internal state using predictive models of the body's internal state built from incoming sensory data [21]. Proprioception, or the sense of where your body parts are positioned, is one source of this ongoing flow of sensory data; it provides feedback regarding the positioning of body parts, muscle tone throughout the body, and how close you feel to being in contact with your surroundings. All of these pieces of information constitute part of what the brain uses to build a predictive model of the body's overall internal state.

According to Barrett (2017) and Barrett et al. (2025), this same process can be used to explain how we emotionally respond to experiences [1; 2]. Emotional responses occur when the brain takes in information from various sources -- including interoceptive signals, prior knowledge and past expectations -- and integrates them together to create an active representation of an emotion. In other words, the way we physically position ourselves in space influences both the type of interoceptive signals that we receive, and therefore, the types of emotional states that we may infer. For example, there will likely be a difference in the interoceptive signals received by someone who collapses their posture versus someone who maintains an upright posture. These differences in interoceptive signals then influence the predictions made by the brain, and therefore have differing implications for both cognition and emotional response.

Khalsa et al. (2018) describe the interoceptive system as consisting of several layers that interact with each other to provide real-time feedback about both proprioceptive and visceral sensations [11]. Fermin et al. (2022) further describe that the hierarchically organized networks of neurons found in the insula region of the brain are responsible for integrating sensory information from proprioceptors and viscera with higher order cognitive functions such as attentional control [8]. This is important because it shows that posture and cognition do not exist independently of one another; they are instead interconnected through a common neural pathway.

Price and Hooven (2018) demonstrated that training individuals to explicitly recognize their interoceptive signals results in adaptive changes at the behavioral level [17]. Farb et al. (2015) also showed that developing greater awareness of internal bodily sensation was associated with improved emotional regulation and increased subjective feelings of well-being [7].

4. Somatic Feedback, Emotional Regulation, and Behavioral Strategy

Beginning with Bu and Wang (2020) and their development of the concept of "embodied emotion," they provide evidence that emotional experiences exist as a result of being influenced by physical (bodily) conditions rather than simply occurring with them. The research conducted by Bu and Wang (2020) establishes that the way individuals physically position themselves or move will have a direct effect on how they perceive emotions and subsequently react to those perceptions;

this further supports the theoretical basis of using posture to regulate both emotional and cognitive functions. In addition, clinical evidence exists supporting the use of body positioning and movement to reduce symptoms of dissociation and dysregulation. As reported by Reuille-Dupont (2021), who researched somatic psychology, clinical evidence has shown that when an individual intentionally engages his/her body positioning and movement as a form of intervention, he/she can effectively manage and/or decrease symptomology associated with both dissociation and dysregulation [18].

According to Rosendahl et al. (2021) in a systematic review and meta-analysis of body psychotherapy, there was sufficient empirical support indicating that body oriented therapeutic interventions were significantly beneficial to improve both psychological functioning (including well-being) and stress regulation [19]. Additionally, according to Kuhfuß et al. (2021) there is a strong empirical basis to suggest that utilizing somatic experiencing techniques; including engaging in intentional activities to increase awareness of one's own body positioning and postures, resulted in significant decreases in physiological hyper-arousal [13].

Gross (2015) also noted that many commonly used cognitive based emotion regulation strategies attempt to influence the manner in which we appraise our environment through what is referred to as "top down" processes [9]. However, Gross (2015) also stated that while these cognitive approaches may be successful at times in influencing our emotional responses, most often they do not successfully alter the underlying physiological substrate that underlies our emotional responses [9]. This is where somatic and postural approaches directly impact our emotional response through "bottom up" processes.

In addition to providing evidence of the effectiveness of utilizing postural and somatic approaches as methods for regulating emotional responses, Tsur et al. (2016) found that increased body awareness was positively related to enhanced emotional clarity and authenticity in terms of behaviors [24]. Furthermore, Tsur et al. (2016) suggested that this relationship was mediated through mindfulness [24]. Finally, alongside Tsur et al. (2016), Tang et al. (2015) found that mindfulness based approaches that incorporated training that focused on developing increased somatic awareness produced measurable neurological effects that corresponded with improved ability to regulate emotionally and improved focus/attention [23]. Collectively, these studies provide a substantial empirical foundation for understanding the importance of engaging in active attempts to manipulate the way you physically interact with your surroundings – i.e., through posture – as an effective method for improving your ability to regulate your emotional responses (See Figure 1).

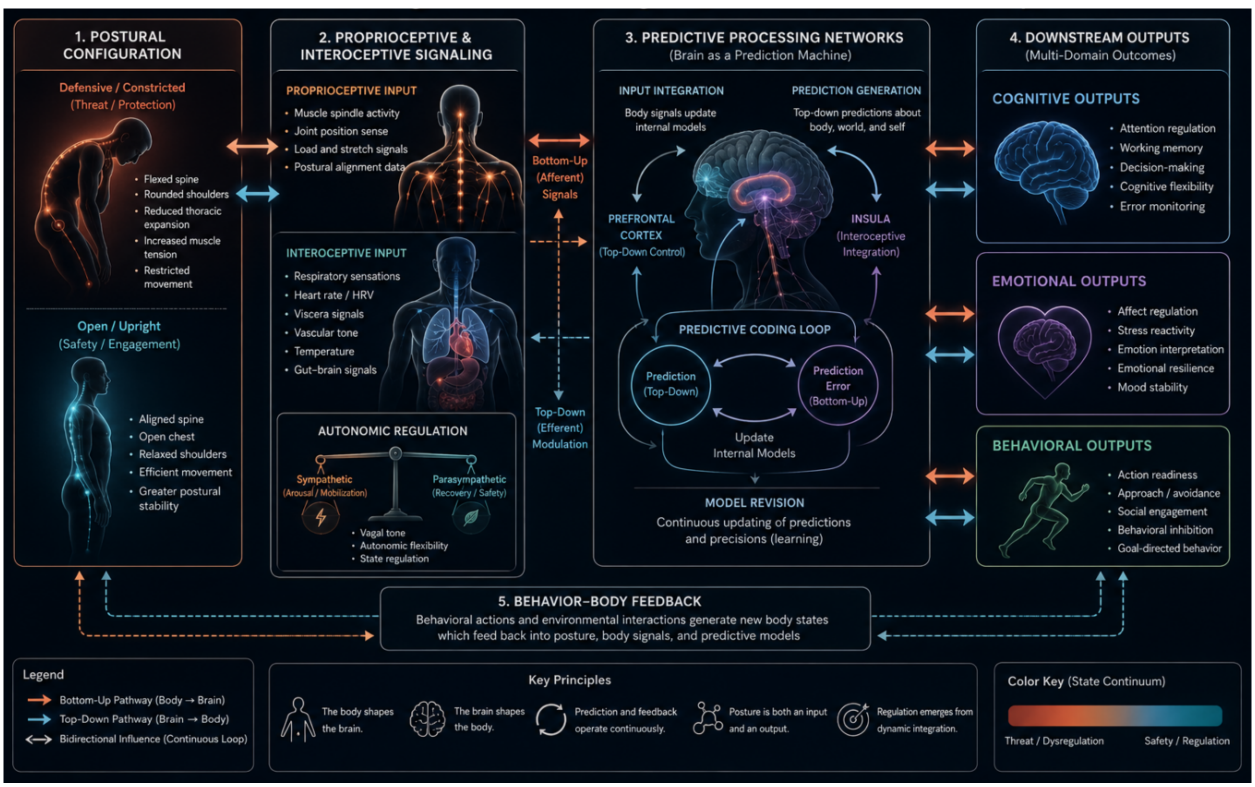

Fig. 1. Bidirectional Posture–Cognition–Emotion Regulatory Model

Methodology. This study uses a methodological approach based on theoretical synthesis – consistent with standard approaches used for theory development in both behavioral science and neuroscience research [6] – to provide a comprehensive conceptual framework for understanding how postural configuration can be considered a regulatory process. Therefore, it does not involve reporting empirical results from new studies. Rather than developing a new conceptual framework for postural regulation as a process, this study provides the theoretical basis for developing methods to apply postural regulation within specific structural body-mind practices.

To achieve the goal of developing a unified conceptual framework and establishing the theoretical foundation for developing practical applications of postural regulation through structured body-mind practices, three phases were implemented during the analytical process:

Phase one involved conducting a literature search related to four areas of investigation. These four domains are: (1) the theory of embodied cognition (and its evidence base) [5; 12; 14; 22; 25; 26]; (2) bidirectional mechanisms among posture-cognition-emotion [4; 10; 20; 27]; (3) interoception and the prediction of postural information [1; 2; 8; 11; 21]; and (4) somatic/physical interventions and regulation [3; 13; 17; 18; 19].

During Phase two, functional cross-domain relationships were determined and specifically focused on the bi-directional influence between postural configuration and all aspects of the autonomic system (e.g., sympathetic and parasympathetic systems), the interoceptive nervous system (including perception of internal bodily sensations), cognitive processes, and emotions.

Phase three entailed synthesizing the findings from Phase Two to create a conceptual model (Figure 1 and Table 1) that views postural regulation as a structured regulatory strategy with multiple effects in different domains. The conceptual model also defines SRM as a sequential activation-recovery cycle with six distinct phases, including postural recalculation as a functionally relevant part of each sequence to assist in developing regulation as a trainable, measurable and transferable capacity.

Findings. The study identified five primary findings that together provide empirical justification for treating postural configuration as an active regulatory function, rather than simply a passive physical parameter within the framework of structured body-mind practice.

Posture functions as a bi-directional regulatory variable that continues throughout time, not as a single directional motor output. Research demonstrates that postural position (configuration) is able to reflect and modify cognition/emotion/autonomic states via both proprioceptive and interoceptive feedback mechanisms [10; 20]. It is this bi-directionality that allows deliberate postural manipulation to have regulatory impacts.

Postural position directly regulates attentional capacity. Caron et al. (2023) demonstrated that posture affects all aspects of attention, providing evidence that posture realignment is also a cognitive as well as physical intervention [4]. Therefore, it follows that Phase 1 of the SRM – in addition to serving as a physical "warm up" – serves as a direct priming mechanism for enhancing attention.

Regulatory capacity related to postural positioning is capable of being trained and measured. Weiniger and Schilaty (2024) demonstrated that the development of awareness of one's posture using structured practices can improve measurable levels of postural positioning accuracy and enhance overall regulatory functioning [27]. As previously mentioned, this ability to develop regulation (in addition to developing postural regulation) is a central tenet of the SRM and a fundamental aspect of its design principles – namely that regulation (including postural regulation), can be systematically developed, measured and applied.

Signals generated by postural configurations become input to the predictive processing system and participate in generating or modifying emotional experience.

Barrett (2017) and Barrett et al. (2025) provided research demonstrating that interoceptive inputs (such as those generated by proprioceptive signals indicating the body's position) are processed by the brain's predictive models of internal state and lead to modifications of emotional appraisal and behavior-readiness [1; 2]. In other words, postural realignments generate changes in how the brain generates its models of self and environment.

Lastly, body-based interventions incorporating awareness of postural positioning result in similar outcome patterns across various studies, populations and contexts regarding improvements in mental health/well-being, stress resilience, and emotion regulation [13; 18; 19]. Consistency across researchers/practitioners/settings provides additional empirical justification for establishing these outcomes as method-specific and therefore amenable to inclusion in standardized structural formats (such as the SRM) for widespread application.

Table 1

Postural Configuration Variables and Their Regulatory Effects

Postural Variable	Mechanism	Regulatory Effect	Key Evidence
Upright, open alignment	Proprioceptive signaling; vagal tone	Increased attentional stability; reduced arousal	Caron et al. (2023); Hall et al. (2023)
Collapsed / contracted posture	Interoceptive input profile shift	Reduced cognitive flexibility; increased negative affect	Bu & Wang (2020); Barrett (2017)
Grounded, stable base	Proprioceptive resonance; readiness-to-act	Enhanced behavioral orientation; cognitive clarity	Sanna (2025); Weiniger & Schilaty (2024)
Deliberate postural recalibration	Predictive model update via interoception	Emotional appraisal shift; regulatory state change	Seth (2013); Barrett et al. (2025)

Structured somatic movement sequences	Bottom-up nervous system recalibration	Reduced hyperarousal; improved well-being	Rosendahl et al. (2021); Kuhfuß et al. (2021)

Note: regulatory effects refer to documented outcomes from reviewed empirical and review studies

Discussion. A critical component of this research is the identification of four different mechanistic pathways through which posture exerts its regulatory influence. The first pathway is proprioceptive: postural configuration generates continuous proprioceptive signals representing body orientation, segment position, and muscular tension state, which are continually interpreted by the nervous system as information regarding the organism's readiness. These signals become the source of emotion and cognition [20; 27]. The second pathway is interoceptive-predictive: these proprioceptive signals are processed in the brain's predictive processing architecture, which utilizes them to create models of the organism's internal state that provide the foundation for emotional experience and cognitive appraisal [1; 2; 21]. The third pathway is autonomic: postural configuration affects the ANS via its effect on respiratory mechanics (thoracic expansion), diaphragmatic function (diaphragmatic mobility), and visceral positioning (visceral positioning), thus influencing the physiological substratum of regulatory capacity [10; 16]. The fourth pathway is attentional: posture directly impacts attentional performance through common neuroanatomical structures; therefore, postural recalibration is a cognitive as well as a physical intervention [4] (See Figure 2).

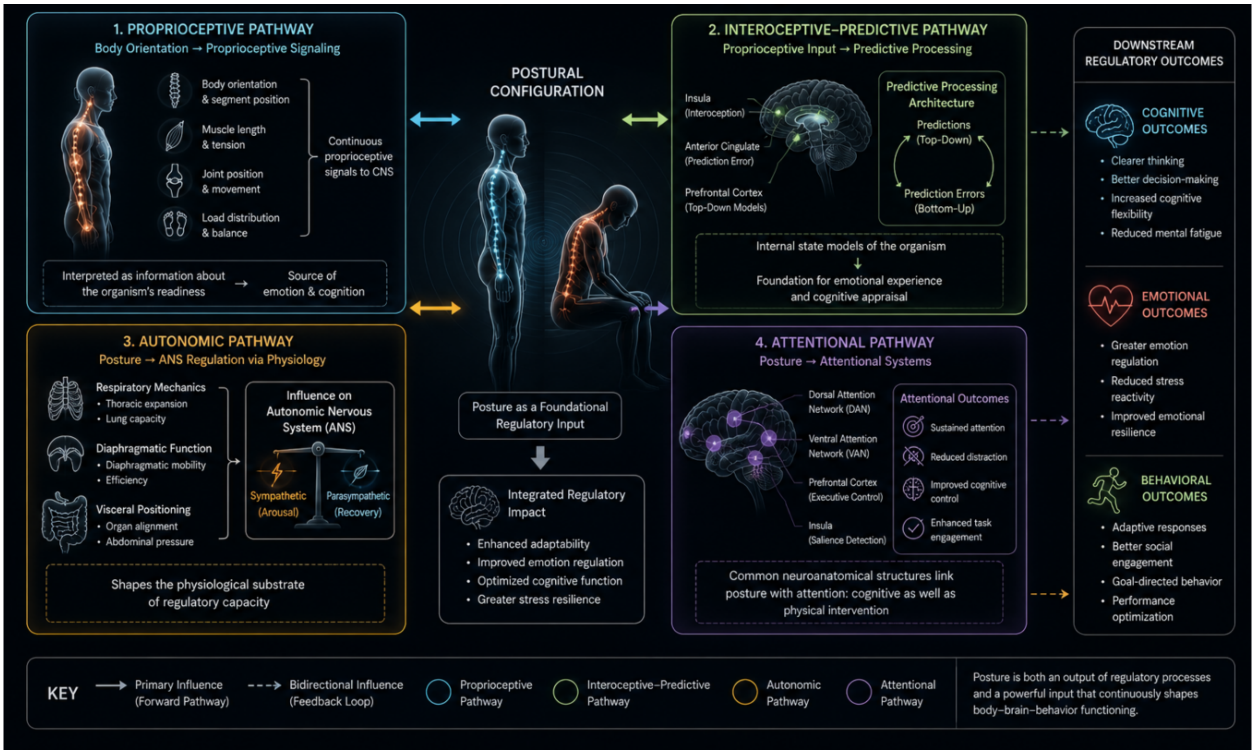

Fig. 2. Four Mechanistic Pathways Through Which Posture Exerts Regulatory Influence: Proprioceptive, Interoceptive-Predictive, Autonomic, and Attentional Mechanisms Linking Postural Configuration to Cognitive, Emotional, and Behavioral Regulation

In sum, the integration of these four pathways indicates that intentional postural regulation is not simply a physically based intervention, but rather a multi-systems based regulatory input that concurrently impacts physiological, interoceptive, autonomic and attentional systems. This is precisely the multi-systems regulatory structure present in the Somatic Reset Method^{TM} (SRM). In the SRM, Phase 1 (Somatic Awareness and Interoceptive Training) includes postural orientation as a fundamental aspect of establishing regulatory baselines. There is now a clear theoretical basis for this approach: awareness of postural orientation provides the reference point for interoception and proprioception from which all subsequent regulatory phases (breath-based regulation, attentional stabilization, cognitive deconditioning, and nervous system recalculation) are able to effectively operate.

One additional feature of the predictive processing dimension of postural regulation is particularly noteworthy because it illustrates a mode of influence that transcends the musculoskeletal system to include the generative architecture of emotional experience. According to Barrett's (2017; 2025) framework, emotions do not arise as a result of receiving information from the body that the brain interprets as emotional [1; 2]. Rather, the brain actively constructs emotional experience through a predictive inference process in which bodily signals serve as data for updating internal models. Postural configuration serves as a constant interoceptive input stream during this construction process: A collapsed posture will generate an interoceptive input profile that will be incorporated into the brain's predictive models as indicative of low energy, threat or defeat. Thus, the resulting emotional and cognitive experiences will reflect those same states. Similarly, an upright posture with grounding and openness will generate an input profile indicative of readiness, safety and engagement – resulting in shifts in emotional appraisal, attentional orientation and behavioral strategies. This is not metaphorically speaking; posture influences what data is available for generating emotional realities.

As such, there are direct implications of this finding for how we apply body/mind interventions. Specifically, if postural configuration contributes to the generation of emotional experience through predictive processing, then it follows that a deliberate attempt to alter posture would also constitute an intervention in the generation of emotional experience – not just a downstream consequence of having altered emotional experience. As such, the SRM's embodiment-first model of regulation is predicated upon this very understanding. By establishing a conscious, recalibrated postural baseline in phase 1 prior to introducing attentional/cognitive processes, the SRM allows for a new interoceptive signal stream that recalculates the predictive architecture from which all subsequent cognitive and emotional experiences arise. This ordering is theory-driven – not just conventionally ordered.

Additionally, another finding of this research related to training is important for application purposes. Weiniger and Schilaty (2024) demonstrated that interoceptive awareness of posture is not a fixed trait but rather a trainable skill through structured feedback-informed training practices – with resultant increases in postural accuracy and functional outcomes [27]. This supports a foundational design premise of the SRM: regulation – including its postural aspects – is a trainable capability and not a static individual characteristic. The SRM was designed to develop this trainable capacity over multiple sessions using its progressive six-phase delivery format – with outcomes assessed across the six domains of the Somatic Reset IndexTM (SRI): Physical Ease, Attentional Stability/Clearness, Cognitive Clarity/Ease – each being impacted directly by postural regulatory quality.

This framework has an additional source of supporting evidence from the applied research area. Rosendahl et al. (2021), via meta-analytic examination, have established that Body-Oriented Interventions (BOI) significantly contribute to enhanced psychological well-being and reduced stress levels [19]. Similarly, Reuille-Dupont (2021) showed reliably effective regulatory changes in Clinical Somatic Psychology contexts using Movement & Body Configuration Engagement [18]. In addition, Kuhfuß et al. (2021) confirmed that somatic-experiencing based on techniques can be used to regulate physiological hyper-arousal via postural & movement based approaches [13]. The consistent findings regarding postural regulatory effects across the various types of applied settings provide further evidence that postural regulatory effects are both scalable and method dependent – two features necessary for the delivery of regulation in the structured formats of the SRM (See Figure 3).

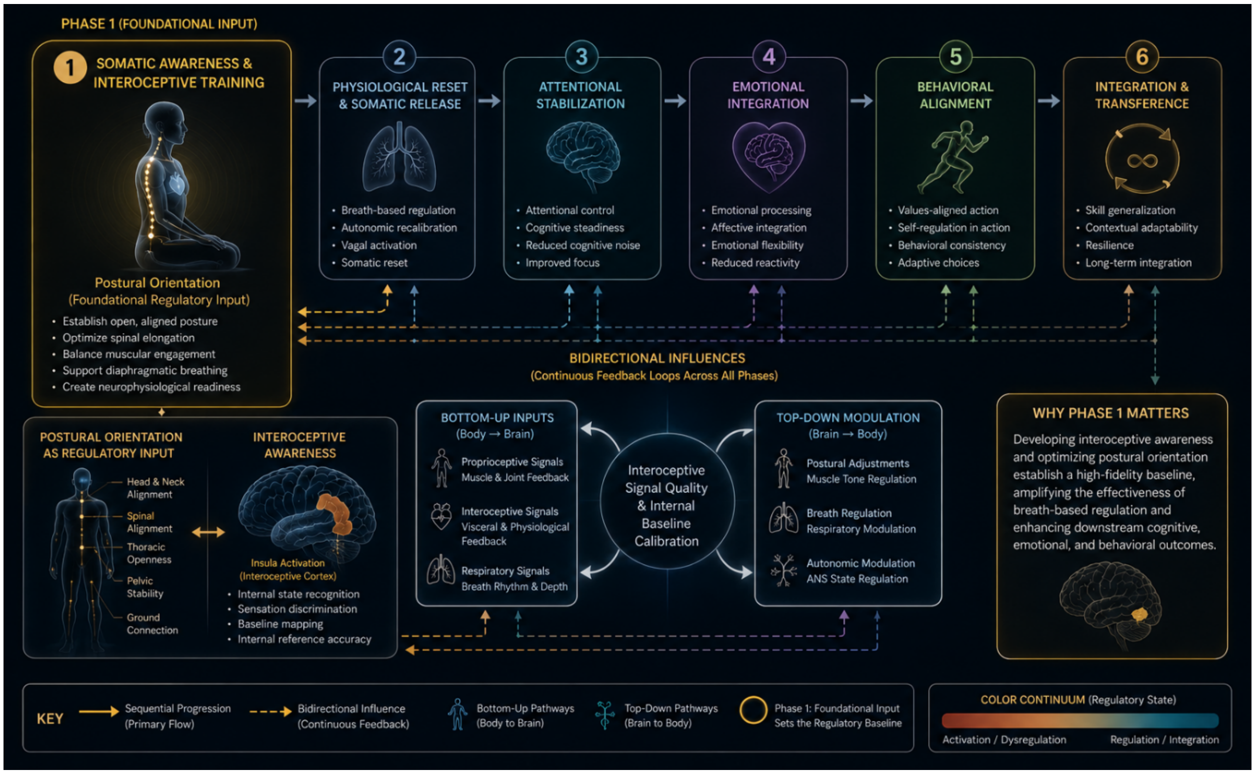

Fig. 3. Positioning of Postural Regulation within the SRM Six-Phase Sequential Framework

A wider theoretical implication of the present study relates to the relationship between Embodied Cognition (EC) and Regulatory System Design. As per Newen et al.'s (2018) 4E cognition model, cognition is fundamentally Embodied, Embedded, Enacted and Extended; however, with very few exceptions, all existing methodologies for applying regulatory systems still focus almost exclusively upon treating the body as a secondary variable when attempting to address cognitive and affective states by means of top-down verbal and/or cognitive methods [14]. The present review provides substantial support for the idea that the methodology employed to design most current applied regulation systems systematically underutilize the most direct regulatory pathways available: Postural Configuration/ Proprioception /Interoceptive Recalibration. The SRM's Embodied-First Architecture is an example of Methodology to respond to this Gap – as it is directly informed by both the empirical and theoretical literature on how best to initiate and sustain regulatory change.

Conclusions. This paper defines posture as an active, bi-directional, and trainable control process mediated by multiple simultaneous neurophysiological pathways (proprioceptive, interoceptively predictive, autonomic and attentional). The literature demonstrates that willfully changing posture results in reliable and quantifiable regulatory impacts on both cognition and affect as well as on ANS function - impacts that vary depending upon methodological design, can be scaled up or down based on population sample size, and are at their greatest potential for impact when included as part of a structural, sequential regulatory strategy.

At the center of our discussion is the claim that posture is an active input into the brain's generative model of how it experiences emotion and cognition, and therefore postural control should not simply be viewed as a peripheral physical manifestation of psychological states. Instead we propose that postural control represents a key regulatory interface; one where postural awareness, if approached with intentional structure, allows for immediate and generalizable changes to the individual's overall internal regulatory state. Therefore, our proposed Somatic Reset Method (SRM), provides a comprehensive activation-recovery cycle that positions the first phase of awareness regarding posture as the foundation from which all other regulatory efforts proceed. Additionally, SRM presents data indicating that when postural regulation is treated as a trainable and measurable skill set, it leads to reliable and replicable outcomes across different practitioner groups, practice formats, and organizational settings.

We recommend future studies examine the efficacy of specific structured postural regulation methodologies utilized in conjunction with multistage regulatory strategies. We also suggest developing standardized measurement techniques (e.g., interoceptive posture awareness assessments and integrative regulation metrics such as the Somatic Reset Index (SRI)) that can capture the systemic effects of purposeful postural involvement on body-mind practice.

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