

## Karate as an Embodied Framework for Emotional Regulation: A Theoretical Perspective

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### ABSTRACT

Karate offers a unique framework for understanding the integration of physical, cognitive, and emotional regulation. Beyond its athletic dimension, karate functions as an embodied cognitive-cultural system that cultivates executive control, attentional focus, and emotional balance. Rooted in *budo* philosophy, it unites motor discipline with moral cognition, training practitioners to regulate impulses and maintain composure under stress. Drawing on cognitive theories of skill acquisition and embodied cognition, this paper argues that the structured routines of *kihon*, *kata*, and *kumite* mirror core processes of executive functioning—working memory, inhibition, and cognitive flexibility. Empirical evidence suggests that regular karate practice enhances self-regulation, emotional stability, and neurocognitive plasticity. Thus, karate exemplifies an embodied model of adaptive control, bridging traditional martial philosophy with contemporary research on cognition, emotion, and resilience.

**Keywords:** karate, executive functioning, emotion regulation, embodied cognition, self-regulation

Physical activity (PA) refers to any bodily movement produced by skeletal muscles that results in energy expenditure (Caspersen et al., 1985). Intentions to engage in PA are shaped by attitudes, subjective norms, and perceived behavioural control (Ajzen, 2012; Bosnjak et al., 2020). When individuals perceive clear benefits, feel socially supported, and believe in their ability to act, they are more likely to translate intentions into behaviour (Hagger et al., 2002).

Among various forms of PA, karate is uniquely positioned as both a physical discipline and a system of psychological regulation (Piepiora & Vveinhardt, 2025). Beyond its physiological benefits, karate requires sustained attention, inhibition, and self-regulation (Kusnierz, et al., 2023); cognitive mechanisms central to executive functioning and emotion regulation. Therefore, karate training represents a compelling model which can be used to explore how structured physical training can shape higher-order cognitive processes.

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### *Cognitive Foundations of Karate Training*

Originating in Okinawa in 1922 during a demonstration initiated by the Japanese Ministry of Education, and formalized in early twentieth-century Japan (Jakhel & Pieter, 2012), karate integrates physical mastery with philosophical discipline (Pasečiak, 2025). The term itself combines *kara* (“empty”) and *te* (“hand”), signifying unarmed combat based on precision and control (Critchley et al. 1999). Its training system revolves around three complementary components: *kihon* (fundamental techniques practiced individually), *kata* (choreographed sequences symbolizing combat), and *kumite* (sparring that develops adaptive and anticipatory responses).

This tripartite structure reflects cognitive principles of skill acquisition and automaticity (Fitts & Posner, 1967). Repeated practice of *kihon* and *kata* promotes the transition from deliberate to implicit cognitive control, engaging neural circuits that underlie attention, working memory, and motor sequencing. Over time, these processes foster efficient sensorimotor integration, mirroring the shift from controlled to automatic stages of cognitive processing.

Modern karate was shaped by figures such as Gichin Funakoshi and Masatoshi Nakayama, who systematized its pedagogy and emphasized on moral as well as technical development. The establishment of the Japan Karate Association (JKA) in 1949 codified this dual focus, institutionalizing karate as both a sport and a moral discipline. This evolution parallels the interplay between cognitive control and moral cognition, i.e., the regulation of behaviour through both deliberate self-monitoring and internalized ethical norms (McRae, 2023).

### *Cultural Foundations of Karate*

Karate’s historical development produced a distinctive cultural framework grounded in the principles of *budo*, that emphasizes self-development and discipline over mindless combat, and *bushido*, which focuses not only on physical strength but also to develop a moral code through the practice of self-control (Piepiora & Vveinhardt, 2025). This tradition emphasizes honour, respect, and restraint that shapes both external behaviour and internal emotional states. Through ritualized practice and hierarchical socialization within the dojo, practitioners internalize behavioural scripts that promote self-control and prosocial conduct. Such moral enculturation parallels cognitive self-regulation, in which social rules and personal values act as top-down modulators of attention and impulse. Martial Arts and Combat Sports (MACS), like karate, are intrinsically embodied activities indicating the interaction between body, environment and action that shapes cognition (Channon & Jennings, 2014). It implies that higher order cognition is integrated in the experiences of the sensory-motor systems.

The role of masters (*sensei* and *shihan*) in this process extends beyond instruction in technique. They function as role models of ethical cognition, transmitting norms that help prevent the misuse of physical power. This system of guided discipline exemplifies how social learning and moral reinforcement shape the development of inhibitory control, core to both cognitive and emotional regulation (Vygotsky, 1978).

Contemporary cognitive theories of embodied cognition (Wilson, 2002, Vera et al., 2018) offer a useful framework for understanding how karate integrates bodily movement with higher-order processes. Physical forms, such as *kata*, operate as embodied schemas that unite sensory feedback, attentional focus, and emotional control. Repeated motor sequences

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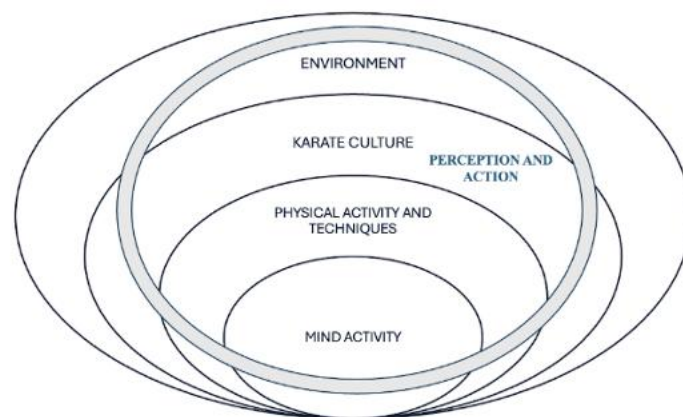
reinforce neural pathways associated with executive functions, creating a feedback loop between motor precision and cognitive regulation.

Karate's evolution has also produced a dual identity—traditional and sport-oriented. Traditional karate prioritizes moral cultivation, mindfulness, and internal balance, while sport karate emphasizes performance optimization, strategic adaptability, and measurable outcomes (Bompa & Buzzichelli, 2019). This distinction parallels the dual-process model of cognition (Evans, 2008): traditional karate aligns with reflective, value-based control, whereas sport karate recruits automatic, high-speed processing. Together, they illustrate how embodied practices engage both deliberate and automatic systems of cognitive control, reinforcing karate's relevance to experimental models of attention, emotion, and motor regulation.

### *Karate as an Embodied Cognitive System*

Beyond its physical dimension, karate functions as a multilevel system for cognitive, emotional, and moral development. Regular training enhances executive functioning, particularly inhibitory control, cognitive flexibility, and working memory, abilities crucial for managing complex motor actions and emotional responses (Diamond, 2013). The attentional stability required to execute precise movements under pressure parallels the mental discipline needed for emotional restraint.

Empirical studies support the link between karate and self-regulation. Potoczny et al., (2022) found that karate practitioners exhibit greater emotional stability, lower aggression, and improved impulse control compared to non-practitioners, indicating a direct connection between motor discipline and emotional regulation. Similarly, structured martial arts training has been associated with improvements in cognitive performance and stress tolerance (Greco & Ronzi, 2020). Marre, et al., (2021) showed that memory improves when learning involves rich sensorimotor simulation especially when imagery is encoded from a first-person perspective. During imagery assisted rehearsal, the body reacts as if it is actually performing the movements. In karate practice, students mentally rehearse the techniques by imaging themselves performing each movement from within their body.



**Figure 1: Embodied model of Karate**

The first-person motor imagery activates the motor and sensory system used during actual training. And, such bodily reenactment strengthens learning, execution and memory of

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complex sequences. Thus, embodied motor imagery in karate not only refines techniques but also enhances memorization of form, timing and spatial precision.

These outcomes align with evidence that physical activity enhances neural plasticity, including prefrontal - striatal connectivity that supports attention and inhibitory control (Erickson et al., 2009; Nakagawa et al., 2020). The repeated alternation of tension and relaxation in karate practice stimulates parasympathetic regulation and stress recovery, mechanisms that are closely tied to emotion regulation and well-being.

### ***Emotion regulation***

Emotion regulation has emerged as a central construct in contemporary cognitive, developmental, and affective science. Emotions are multi-component response systems shaped by evolutionary, cognitive, and social demands. They comprise coordinated changes across behavioural, physiological, and experiential domains (Cacioppo et al., 1992; Mauss et al., 2005). These response patterns accomplish several adaptive functions: they prepare the organism for rapid motor action (Frijda, 1986), facilitate decision-making and evaluation (Oatley & Johnson-Laird, 1987), and regulate social interaction by signalling intentions and affective states (Fridlund, 1994; Keltner & Buswell, 1997).

Gross (1998) defines emotion regulation as the processes by which individuals influence which emotions they have, when they have them, and how they experience and express them. Regulation may target positive or negative emotions and may involve increasing, maintaining, or decreasing emotional intensity. It can operate at any stage of the emotion-generative sequence through situation selection, situation modification, attentional deployment, cognitive change (e.g., reappraisal), or response modulation. Crucially, Gross posits that regulation ranges from effortful, deliberate processes to automatic, implicit adjustments, challenging earlier assumptions that regulation is always conscious or volitional. Complementing Gross's process model, Gratz and Roemer (2004) conceptualize emotion regulation as a multidimensional capacity involving - Awareness, understanding, and acceptance of emotions; Ability to engage in goal-directed behaviour under distress; Inhibiting impulsive responses when emotionally activated; Flexibly employing context-appropriate strategies; and Tolerance of emotional discomfort when pursuing meaningful goals. This framework positions emotion regulation not as the suppression of emotion but as the flexible, context-sensitive management of emotional dynamics.

Therefore, karate practice reinforces self-awareness and emotional intelligence. By requiring practitioners to recognize and modulate arousal during combat, it trains meta-cognitive awareness of affective states, a skill transferable to everyday emotion regulation. Cognitively, the need to anticipate and adapt to an opponent's movements engages working memory updating and attentional shifting, two executive subcomponents central to flexible emotional control.

### ***Role of Executive Functions in Emotional Regulation***

A growing body of evidence indicates that emotion regulation is closely supported by executive functions (EFs), such as, inhibitory control, working memory, and cognitive flexibility (Diamond & Lee, 2011). Inhibitory control supports the suppression of prepotent emotional impulses, while working memory maintains goal-relevant appraisals, strategies, and reappraisals during emotional states and cognitive flexibility enables individuals to shift perspectives, reinterpret events, and adjust behavioural responses as contexts evolve.

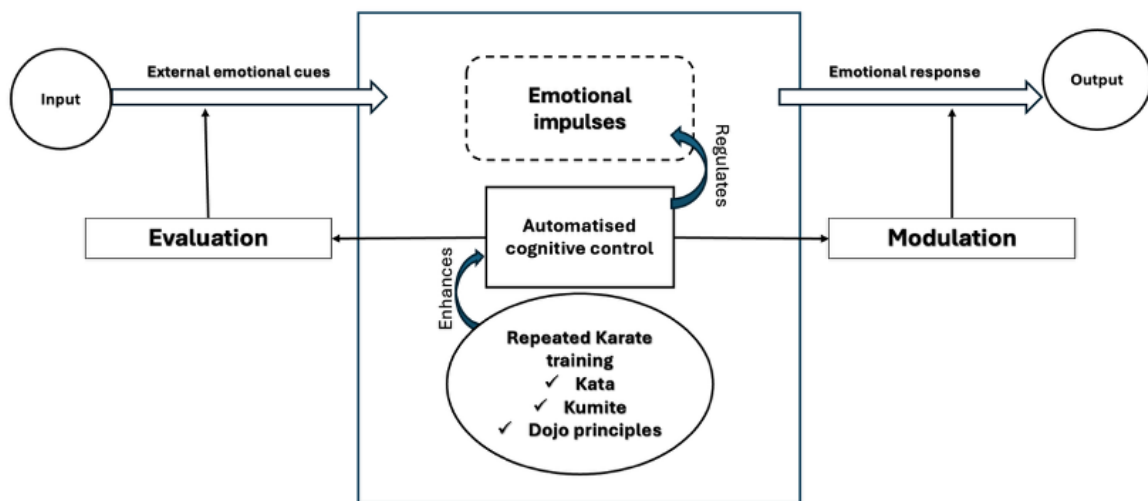
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These cognitive mechanisms are bidirectionally linked with emotional processes. Emotions can bias attention and working memory, and conversely, regulatory strategies recruit EF resources to shape emotional outcomes. This integration underpins the distinction between emotion sensitivity (initial reactivity) and emotion regulation (secondary modulation; Baumann et al., 2007).

### *Emotion Regulation in Karate*

Karate offers a rich naturalistic context for examining emotion regulation, given its emphasis on precision, control, and adaptive responsiveness under physical and social pressure. Martial arts training requires practitioners to regulate arousal, sustain attention, and inhibit impulsive actions, all of which align with core mechanisms of emotion regulation.

Karate practice integrates structured, rhythmical movement patterns that foster autonomic control, including parasympathetic recovery. Breathing patterns during kata and kumite serve as embodied regulation strategies, modulating arousal and promoting physiological calm. Dojo ethics and the formal culture of karate emphasise respect, restraint, and deliberate control over movement. Sparring requires practitioners to strike with precision while simultaneously restraining excessive force.



**Figure 2: Role of Karate in regulating emotional impulses**

This dynamic mirrors inhibitory processes central to emotion regulation, preventing impulsive expression while maintaining readiness for action (Figure 2). Karate imposes shifting cognitive demands. Kata routines require sustained attention, sequencing, and mindful awareness, whereas kumite demands rapid attentional shifts, anticipation, and strategic flexibility. These cognitive skills align closely with the EF components that support emotion regulation. Karate involves close interpersonal interaction such as, reading intentions, maintaining eye contact, responding to partners' actions, which fosters forms of social cognition relevant to emotion regulation. Synchrony, distance regulation, and controlled engagement with opponents reinforce implicit emotion-management skills.

Research demonstrates that martial arts training enhances self-control, reduces impulsivity and aggression, and improves emotional stability (Birrner et al., 2012; Potoczny et al., 2022). Physical activity more broadly improves neurocognitive functioning, including EF and

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emotion-related processes (Erickson et al., 2009; Niedermeier et al., 2020). Karate therefore provides a structured environment in which cognitive and emotional regulation systems can be developed together.

### *Integrative Implications*

Thus, karate fosters cooperative discipline and social cognition through partner drills (*kumite*) and group kata practice. The maintenance of eye contact, synchronized timing, and nonverbal coordination engages theory-of-mind and mirror neuron systems, facilitating empathy and prosocial awareness (Adolphs, 2009). These interactions extend emotion regulation beyond the individual level, embedding it within a relational and cultural context. These observations illustrate how physical practice can scaffold cognitive and emotional capacities. The repetition of structured, mindful movement translates into procedural learning that automates self-regulatory habits, while reflective components, such as, respect rituals, ethical codes, and mindfulness, sustain deliberate control.

In contemporary contexts, this integration carries dual significance. For sport psychologists, karate exemplifies how training regimens can cultivate cognitive resilience and attentional control. For cognitive scientists, it provides a naturalistic model of how embodied, socially mediated practices contribute to executive and emotional regulation through dynamic brain–body–environment interactions.

## CONCLUSION

Karate, as both an art and a sport, encapsulates the dynamic relationship between body, mind, and cognition. Rooted in the *budo* philosophy of discipline and self-control, it operationalizes the very mechanisms that cognitive psychology identifies as central to executive functioning and emotion regulation. Its structured routines train not only the body's coordination but also the mind's capacity for inhibition, flexibility, and attentional focus.

By merging physical mastery with moral cultivation, karate serves as an embodied laboratory for studying self-regulation, bridging the gap between physiological activity and psychological adaptation. In doing so, it exemplifies how traditional practices can inform contemporary models of cognitive control, emotional resilience, and integrative human development.

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