



Bridging Neuroscience and Qur'anic Ethics: A Biopsychospiritual Approach to Anger Management

Alyatal Husn Munsarif,^{1*} Hasyim Muhammad¹, Hurriyyah Komara Putri², Dede Rodin¹, Ibnu Farhan¹

¹ Universitas Islam Negeri Walisongo Semarang, Indonesia

² Universitas Islam Negeri Syarif Hidayatullah Jakarta, Indonesia

Citation (APA):

Munsarif, A.H., Muhammad, H., Putri, H.K., Rodin, D., Farhan, I. (2022). Bridging Neuroscience and Qur'anic Ethics: A Biopsychospiritual Approach to Anger Management. *International Journal Ihya' 'Ulum al-Din*, 27(2), 105-122. <https://doi.org/10.21580/ihya.27.2.29263>

Submitted: 30 Oct 2025

Revised: 25 Nov 2025

Accepted: 27 Nov 2025

Published: 31 Dec 2025

Copyright: © 2022 by International Journal Ihya' 'Ulum al-Din.

Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution-ShareAlike 4.0 International License.



Abstract: This paper examines the integration between neuroscience and Qur'anic ethics in explaining anger regulation through a biopsychospiritual framework. Using the Qur'anic verse Āli 'Imrān [3]:134 as a moral anchor, "those who restrain their anger and forgive others," the study connects neurobiological mechanisms of anger control, particularly the amygdala–prefrontal dynamics, with Qur'anic guidance on self-restraint (kazm al-ghayz). Neuroscientific research shows that prefrontal activation inhibits limbic impulsivity, a process paralleled in the Qur'anic concept of taqwā and forgiveness as higher moral regulation. This synthesis offers an integrative model where biological control, psychological awareness, and spiritual virtue operate harmoniously to manage anger.

Keywords: Anger, Neuroscientific, Qur'anic Ethics

Abstrak: Artikel ini menelaah integrasi antara neurosains dan etika Qur'ani dalam menjelaskan pengendalian kemarahan melalui pendekatan biopsikospiritual. Dengan menjadikan ayat QS. Āli 'Imrān [3]:134 sebagai jangkar moral — "(yaitu) orang-orang yang menahan amarahnya dan memaafkan (kesalahan) orang lain" — kajian ini mengaitkan mekanisme neurobiologis pengendalian marah (dinamika amigdala–prefrontal) dengan ajaran Qur'an tentang kazm al-ghayz (menahan marah). Penelitian neurosains menunjukkan bahwa aktivasi korteks prefrontal menekan impulsivitas limbik; hal ini sejalan dengan konsep taqwa dan pemaafan dalam Qur'an sebagai regulasi moral tertinggi. Sintesis ini menawarkan model integratif di mana kontrol biologis, kesadaran psikologis, dan kebajikan spiritual bekerja selaras dalam mengelola emosi marah.

Kata Kunci: Kemarahan; Neurosains; Etika Qur'ani

*Corresponding Author: alyatalhusnmunsarif@gmail.com, Faculty of Ushuluddin, Universitas Islam Negeri Walisongo Semarang, Indonesia.

Introduction

In contemporary society, anger dysregulation, the inability to control emotional arousal, has emerged as a psychological and social concern of global proportion (Richard et al., 2023). The increasing frequency of impulsive aggression, online hostility, and emotional reactivity reflects a deeper failure in self-regulation mechanisms, both biological and moral (Fourie et al., 2020). In the neuroscientific literature, anger is no longer viewed merely as a moral weakness or behavioral excess, but as a complex neurocognitive process involving limbic hyperactivation and prefrontal cortical inhibition deficits. (Romero-Martínez et al., 2024). These findings illustrate that the human brain's emotional circuitry, particularly the amygdala–prefrontal pathway, governs the initiation and modulation of anger, determining whether emotional arousal leads to aggression or restraint (Griffin et al., 2015).

In psychological terms, anger represents an approach-oriented emotion—one that mobilizes the individual toward confronting perceived injustice or threat. (Sorella et al., 2021). While adaptive in mild forms, dysregulated anger manifests as impulsivity, verbal hostility, and violence. (Klaus & Schutter, 2021). Modern neuroscience has shown that when the prefrontal cortex, especially the ventromedial and orbitofrontal regions, fails to exert inhibitory control, the amygdala—the emotional alarm center—dominates behavioral output, producing reactive and destructive patterns. (Nikolic et al., 2022). Consequently, anger regulation is not solely a moral exercise but a biopsychological phenomenon, rooted in the integration between emotion, cognition, and executive control (Kim et al., 2021).

From the Islamic ethical perspective, anger (*ghadab*) occupies a profound moral dimension. Classical scholars such as al-Ghazālī (d. 1111) and Ibn Qayyim al-Jawziyyah (d. 1350) recognized anger as both a natural energy (*quwwah ghaḍabiyyah*) and a spiritual test (*ibtilā' nafsānī*) that can elevate or degrade the soul depending on its regulation. Islam does not demand the annihilation of anger, but its discipline and channeling toward moral virtue. This ethical stance finds its quintessential expression in Qur'an Surah Āli 'Imrān [3]:134, which states:

"Alladzīna yunfiqūna fī as-sarrā'i wa ḍ-ḍarrā'i wal-kāzimīna al-ghayṣa wal-āfīna 'anī an-nās; wallāhu yuḥibbul muḥsinīn."

"Those who spend (in charity) during ease and hardship, who restrain anger and pardon others; and Allah loves the doers of good."

This verse encapsulates a three-tiered paradigm of self-regulation. The first layer is socioeconomic regulation (*infaq*)—restraint of material attachment through generosity. The second is emotional regulation (*kāzm al-ghayṣ*)—restraining the physiological surge of anger without suppressing the moral awareness it signals. The third is spiritual regulation (*afw and iḥsān*)—transforming negative energy into forgiveness and benevolence. These layers align remarkably with modern neuropsychological hierarchies: regulation at the biological level (limbic control), the psychological level (reappraisal), and the spiritual level (transcendence and compassion) (Eshel et al., 2021; Jayatilaka N.W.S. & Jayasinha B.L.E., 2024; Puii et al., 2020).

The phrase "*wal-kāzimīna al-ghayṣa*" specifically emphasizes the containment of anger rather than its absolute eradication. Linguistically, *kāzm* denotes 'closing the mouth of a full vessel under pressure,' reflecting the conscious containment of internal emotional turbulence (Ibn Manzḥur, *Lisān al-'Arab*). From an epistemological standpoint, this Islamic ethical concept operates analogously to what modern cognitive neuroscience describes as top-down executive inhibition, mediated by the dorsolateral prefrontal cortex (dlPFC) over subcortical emotional centers (Eshel et al., 2021; Puii et al., 2020). In classical Islamic ethical psychology—as expounded by scholars like al-Ghazālī and al-Rāghib al-

Aṣfahānī—this process represents a form of *mujāhadah an-naḥs* (inner spiritual struggle), wherein the intellect (*‘aql*) subdues the impulsive tendencies of the commanding self (*naḥs ammārah*) and tames the aggressive faculty (*quwwah ḡhaḍabiyyah*). Moving beyond mere restraint, *al-‘āfina ‘ani an-nās* (forgiving others) conceptually parallels cognitive reappraisal, a process mediated by the anterior cingulate cortex (ACC) and insula, which underlie social cognition and empathy (Ryland, 2025; Sorella et al., 2022). Thus, Qur’anic moral instruction mirrors the neural architecture of emotion regulation, wherein *iḥsān* (doing good) represents the highest form of neuroethical harmony between cognition, emotion, and spirituality (Margulies et al., 2016).

Rather than establishing a literal one-to-one empirical identity, this alignment functions as an interpretive heuristic model. It suggests that neuroscience and Qur’anic ethics provide complementary perspectives on anger regulation. While neuroscience offers the empirical mechanics of control (*how* the brain modulates arousal), the Qur’an provides the teleological and spiritual purpose of that control (*why* and *toward what end* emotion should be directed). Where modern psychology prescribes mindfulness or cognitive reappraisal (Aki et al., 2020; Bochicchio et al., 2024; O’Dean et al., 2025), the Qur’an prescribes *taqwā*, *ṣabr*, and *iḥsān* as spiritual metaregulators that reorient the human soul toward divine proximity and social harmony.

The relationship between the Qur’an and neuroscience is described as much as like the synergy between sacred revelation and profane science, which built upon conceptual foundations and complementary dynamics (Malik et al., 2026). This alignment is not based on assumed direct empirical or biological equivalences, which risk inducing reductionism. To prevent such reductionism, this study explicitly adopts a framework of conceptual analogy and complementarity. While neuroscience addresses empirical-material mechanisms—explaining *how* the nervous system drives raw emotions, *how* the prefrontal cortex (PFC) exerts control over the amygdala, and *how* physical and mental practices alter neural pathways—Qur’anic ethics elucidates *why* emotional regulation is necessary, *toward what end* morality is focused, and the *spiritual meaning* behind self-restraint (Mullins, 2025).

Accordingly, this study aims to bridge neuroscience and Qur’anic ethics in formulating a biopsychospiritual model of anger management. By correlating the neurobiological dynamics of emotional regulation with Qur’anic injunctions on moral restraint, it proposes that effective anger control arises from the harmony between reason (*‘aql*), psyche (*naḥs*), and faith (*īmān*). This integrative framework not only deepens the interdisciplinary dialogue between religion and science but also contributes to developing Islamic neuroethics—a field that situates neuroscientific findings within the epistemology of revelation and spirituality. (Billingsley & Losin, 2017; Binney & Ramsey, 2020). Therefore, the proposed correlation between Qur’anic concepts and neural structures functions as an interpretive heuristic model, aimed at fostering a mutually enriching dialogue between cognitive neuroscience and Islamic moral psychology, while strictly respecting the clear epistemological boundaries between empirical science and divine revelation.

Ultimately, anger regulation, viewed through both the neural and Qur’anic lenses, is a journey from reaction to reflection, from instinct to intention, and from limbic emotion to moral elevation. The biopsychospiritual paradigm proposed here seeks to reaffirm that proper self-control is not achieved by suppressing emotion, but by transforming it into compassion, as both the brain and revelation are designed to enable.

Results and Discussion

The Neural Mechanisms of Anger Regulation

Anger is a multifaceted emotional State that arises as a defensive response to perceived threat, injustice, or frustration (Billingsley & Losin, 2017). From a neuroscientific standpoint, it represents one of the most evolutionarily conserved affective systems, primarily mediated by subcortical structures of the limbic system—most notably, the amygdala and the hypothalamus—that prepare the organism for “fight or flight” behavior (Puiu et al., 2020; Richard et al., 2023). Activation of the amygdala constitutes the instinctive alarm mechanism: it rapidly evaluates stimuli that signal social threat or provocation and initiates autonomic arousal, including increased heart rate, cortisol secretion, and muscular tension (Nikolic et al., 2022).

In the methodological framework bridging revealed texts and biological structures, this connection is articulated through classical Islamic psychology. In the Islamic intellectual tradition, as articulated by al-Ghazālī in *Iḥyā’ ‘Ulūm ad-Dīn*, al-Rāghib al-Aṣḥānī in *al-Mufradāt*, and Ibn Qayyim al-Jawziyyah in *al-Rūḥ*, self-regulation such as *kazm al-ghayz* represents an internal dynamic of the soul (Akhyar et al., 2026). Al-Aṣḥānī etymologically defines *kazm* as the act of compressing and tying shut a full vessel to prevent its contents from overflowing, which psychologically depicts the containment of anger, commonly referred to as *al-quwwah al-ghaḍabiyyah* (Wahid et al., 2025).

However, anger regulation involves far more than this reflexive circuitry (Ma & Jiang, 2020). The prefrontal cortex (PFC)—especially the orbitofrontal cortex (OFC), ventromedial prefrontal cortex (vmPFC), and dorsolateral prefrontal cortex (dlPFC)—serves as the executive control hub responsible for inhibition, evaluation, and moral reasoning (Eshel et al., 2021; Sorella et al., 2021). These cortical regions exert top-down modulation over the amygdala, dampening excessive limbic reactivity and allowing for reflective, socially appropriate responses rather than impulsive aggression (Buon et al., 2016). The strength and integrity of this amygdala–prefrontal connectivity are therefore essential for emotional self-regulation and prosocial behavior (Koush et al., 2019).

When this bidirectional communication between the limbic system and the prefrontal cortex is disrupted, a State known as limbic dominance emerges (Bulaj et al., 2021). In such conditions, emotional impulses override rational evaluation, resulting in reactive aggression, impulsivity, and emotional dyscontrol (Will et al., 2015). Functional neuroimaging studies consistently show that individuals with high trait anger or aggressive tendencies display hyperactivation of the amygdala accompanied by hypoactivation of the prefrontal cortex, particularly in the orbitofrontal and anterior cingulate areas (Nikolic et al., 2022; Sorella et al., 2022). This neural imbalance explains why anger often feels overwhelming: the biological “accelerator” (amygdala) is active, while the “brake system” (PFC) is underactive (Du & Wang, 2025).

Moreover, meta-analytic evidence demonstrates that the insula, inferior frontal gyrus (IFG), and anterior cingulate cortex (ACC) participate in higher-order processes of anger perception and self-awareness (Sorella et al., 2021). The insula, for instance, contributes to the interoceptive awareness of anger—how one “feels” the internal bodily heat and tension associated with the emotion—while the ACC integrates emotional experience with cognitive control (Silver & Ochsner, 2024). Together, these structures enable what neuroscientists term “top-down regulation”, the brain’s ability to consciously

modulate innate emotional responses through attention, reflection, and contextual appraisal. (Li et al, 2023).

This top-down regulation represents the neural basis of what, in moral and spiritual traditions, is called self-restraint or temperance (Buckley et al, 2017). Studies by Sorella et al. (2022) show that individuals who practice mindful awareness or cognitive reappraisal demonstrate increased prefrontal activation and reduced amygdala reactivity, confirming that neuroplastic changes can be cultivated through mental discipline (Sukhodolsky et al, 2001). In essence, the neural control of anger is both structural and functional: structurally anchored in prefrontal–limbic pathways, functionally sustained through training, self-reflection, and moral cognition (Witten et al, 2025).

From a systems perspective, the process can be summarized as a three-phase regulation loop:

1. Limbic Activation – The amygdala detects a potential threat or provocation (Hart et al, 2015).
2. Cortical Appraisal – The prefrontal cortex assesses context, norms, and consequences (Hosie et al, 2022).
3. Behavioral Modulation – Inhibitory circuits in the OFC and dlPFC suppress reactive impulses, translating emotion into reasoned behavior (Wood & Worthington, 2017).

This tripartite mechanism reflects the neurobiological substratum of self-control, providing a scientific grounding for ethical injunctions that emphasize the value of restraining anger rather than expressing it impulsively (Choi-Kwon et al, 2013). In this sense, modern neuroscience does not contradict spiritual ethics; it anatomically maps how the brain's architecture facilitates moral restraint (Miller & Cohen, 2001). The prefrontal cortex, as the center of judgment and foresight, performs the very function described in Qur'anic ethics—transforming immediate emotional reaction (*ghadab*) into reflective and constructive moral action (Hardin et al, 2022).

Thus, neuroscientific insight affirms a profound alignment between neural regulation and ethical regulation: both require the conscious engagement of higher faculties to master primitive impulses (Fynn et al, 2021). As the subsequent section will demonstrate, this alignment finds a striking expression in Qur'an Surah Āli 'Imrān [3]:134, where *kazm al-ghayz* (restraining anger) represents not suppression, but the activation of a higher-order moral and spiritual control system parallel to the brain's prefrontal top-down mechanisms (Rao et al, 2009)..

Qur'anic Framework of Anger Control: Reading Āli 'Imrān [3]:134

The Qur'an provides a deeply layered moral-psychological framework for understanding and regulating anger, expressed succinctly in Surah Āli 'Imrān [3]:134, which declares:

"Alladzīna yunfiqūna fī as-sarrā'i wa ḍ-ḍarrā'i wal-kāzīmīna al-ghayza wal-'āfīna 'ani an-nās; wallāhu yuḥibbul muḥsinīn."

"Those who spend (in charity) during ease and hardship, who restrain anger and pardon others; and Allah loves the doers of good."

This verse presents not merely an ethical exhortation, but a psychospiritual anatomy of self-regulation (Raine et al, 2006). It delineates a three-tiered process—containment (*kazm al-ghayz*), forgiveness (*afw*), and benevolence (*ihsān*)—that parallels the hierarchical operation of the human brain's emotional control systems.

Kazm al-ghayz — Containment, Not Suppression, the phrase “*wal-kāzimīna al-ghayza*” stems from the Arabic root *kazama*, which literally means “to tie or close the mouth of a water vessel filled to the brim,” implying containment under pressure. Thus, *kazm al-ghayz* does not signify the annihilation of anger, but its containment and conscious regulation (Ibn Manzhūr, *Lisān al-‘Arab*). This concept resonates closely with what neuroscience identifies as impulse inhibition, mediated primarily by the prefrontal cortex.

Man, from a psychospiritual perspective, possesses four interacting entities: *rūh* as the divine substance providing transcendental consciousness, *‘aql* as the rational faculty evaluating truth, *nafs* as the realm of egoic drives and biological desires, and *qalb* as the executive center of moral consciousness (*al-qalbu huwa al-aṣl*). In the phenomenon of *kazm al-ghayz*, a process of *mujāhadah an-nafs* (spiritual struggle) occurs, wherein *‘aql*, illuminated by *rūh*, guides the *qalb* to subdue the impulsivity of *nafs ammārah* and tame the surges of *quwwah ghaḍabiyyah* (Akhyar et al., 2026).

Only after these classical psychospiritual dynamics are mapped can a conceptual analogy be heuristically linked to modern neuroscientific mechanisms without reducing their spiritual essence. The process of *mujāhadah*, in which *‘aql* and *qalb* govern *quwwah ghaḍabiyyah*, is analogously mapped to the executive control functions of the prefrontal cortex (PFC) in particular and the Anterior Cingulate Cortex (ACC), which execute top-down regulatory control to suppress amygdalar hyperactivity during emotional surges (Mullins, 2025). Meanwhile, the attainment of *nafs al-muṭma’innah* through the continuum of *dhikr* and *kazm* is analogously mapped to the reorganization of consciousness modulation and affective regulation networks, such as the stabilization of the Default Mode Network (DMN) (Akhyar et al., 2026). Thus, neural structures are positioned as the vessel or material cause of embodied biological human experience, whereas Qur’anic ethics provides the ultimate determinant of its meaning, value, and spiritual purpose.

In functional neuroimaging studies, anger containment involves heightened activation of the orbitofrontal cortex (OFC) and dorsolateral prefrontal cortex (dlPFC)—regions associated with cognitive control, moral evaluation, and behavioral inhibition (Puiu et al., 2020; Sorella et al., 2022). When these cortical structures effectively downregulate the amygdala, the brain prevents the escalation of emotional arousal into reactive behavior (Williams et al., 2019). From an epistemological standpoint, *kazm al-ghayz* functions analogously to this neurobiological state of top-down cortical governance over the limbic system (Lesser, 1981).

Anchored in classical Islamic ethical psychology—as formulated by scholars such as al-Ghazālī (*Ihyā’ ‘Ulūm ad-Dīn*) and al-Rāghib al-Aṣfahānī (*al-Mufradāt*)—this containment corresponds to *mujāhadah an-nafs*, the conscious inner struggle wherein reason (*‘aql*) and faith (*īmān*) subdue the impulsive drives of the commanding self (*nafs ammārah*) and tame the aggressive faculty (*quwwah ghaḍabiyyah*). It is not psychological repression (*kafā*), which can be neuropsychologically harmful, but the intentional redirection of affective energy. The Qur’an’s moral lexicon, therefore, conceptually encapsulates what modern cognitive neuroscience describes as executive inhibition—the disciplined capacity to delay reactive output while maintaining inner spiritual awareness (*murāqabah*) (Leszczyński et al., 2021).

The second moral stratum, “*wal-‘āfina ‘ani an-nās*” (“those who forgive others”), transcends restraint and enters the domain of transformative emotional regulation. The term *‘afw* implies not only forgiveness but erasure—a cognitive and spiritual act of reframing the offender’s action within a broader

context of compassion and divine consciousness. In neuropsychological terms, this process operates analogously to cognitive reappraisal, the reinterpretation of emotionally charged situations to reduce their negative impact (Bannon et al., 2015; Richard et al., 2023).

Empirical studies show that forgiveness activates the anterior cingulate cortex (ACC) and insula, areas involved in empathy, moral reasoning, and social cognition (Eshel et al., 2021; Sorella et al., 2021). The ACC mediates conflict monitoring and perspective-taking, allowing one to understand another's motives beyond immediate provocation, while the insula integrates emotional awareness with compassion (Choi-Kwon & Kim, 2022). rather than establishing a direct empirical equivalence, this neural activation conceptually parallels the Qur'anic transition from restraint (*kazm*) to understanding (*'afw*)—shifting from controlling raw emotion to spiritually transforming it.

Theologically and ethically, *'afw* represents a moral alignment with divine mercy—emulating Allah's attribute as *al-'Afūw*. Its practice implies neurocognitive restructuring: the individual rewires emotional networks by replacing hostility with empathy, reducing stress-related hormonal output, and activating parasympathetic pathways linked to calm and compassion (Nikolic et al., 2022). Hence, the act of forgiving is not passive resignation, but a form of neurospiritual transcendence—a deliberate shift in consciousness from aggression to benevolence (Jansen, 2023).

The final clause, "*wallāhu yuḥibbul muḥsinīn*" ("and Allah loves the doers of good"), elevates the discourse to the realm of *iḥsān*—benevolence performed not out of obligation, but out of divine consciousness (*taqwā*) and spiritual excellence. Within the brain, this state correlates analogously with the activation of the Default Mode Network (DMN)—a set of regions (medial prefrontal cortex, posterior cingulate, and temporoparietal junction) associated with self-reflection, moral introspection, and prosocial motivation (Ortega Andrade et al., 2017; Sorella et al., 2022).

When an individual attains the station of *iḥsān*, the brain's moral-reflective circuitry governs over reactive subcortical systems. Acts of compassion and altruism trigger dopaminergic reward pathways and oxytocin release, reinforcing inner tranquility (*sakīnah*) and social connectedness (Eshel et al., 2021). The Qur'an's ethical progression from containment (*kazm*), to transformation (*'afw*), and ultimately to transcendence (*iḥsān*) sequentially mirrors the three-tiered hierarchy of neural regulation: from impulse inhibition, to emotional reappraisal, and to prosocial activation (Ruddle et al., 2017).

Table 1

Interpretive Heuristic Model of Conceptual Parallels between Qur'anic Ethics and Neural Regulation

Qur'anic Concept	Associated Neural Function (Conceptual Analogy)	Psychological Parallel
<i>Kazm al-ghayṣ</i> (restraining anger)	Activation of the prefrontal cortex suppressing the amygdala	Impulse inhibition
<i>'Afw 'ani an-nās</i> (forgiveness)	Activation of insula & ACC (empathy, moral reasoning)	Cognitive reappraisal
<i>Iḥsān</i> (benevolence)	Default Mode Network (moral reflection, prosocial intent)	Prosocial emotion

Thus, the Qur'an's moral structure anticipates what contemporary neuroscience empirically validates: that emotional mastery involves a sequential neurocognitive transformation—from physiological control to cognitive reframing and finally to moral transcendence.

In this sense, Āli 'Imrān [3]:134 serves not only as a scriptural guide for spiritual ethics but as a profound framework that conceptually parallels modern understanding of the self, where divine moral principles operate in harmony with the layered architecture of human cognition. What modern affective neuroscience describes as 'top-down modulation' functions analogously to the Qur'anic virtue of *kazm al-ghayz*; what cognitive psychologists term 'reappraisal' resonates conceptually with *'afw*; and what prosocial neuroscience recognizes as 'empathic activation' finds its moral and spiritual zenith in *ihsān*. Rather than establishing a literal one-to-one identity, this convergence highlights how revelation and neuroscience offer complementary lenses on the process of emotional regulation.

The harmony between these domains underscores the Qur'an's timeless insight into the biopsychological nature of human emotion. It affirms that spiritual ethics and neural science converge on a single truth: true strength lies not in anger's expression, but in its conscious transformation—a process that unites the brain's control systems with the soul's striving for divine favor.

Toward a Biopsychospiritual Model of Anger Management

The synthesis of neuroscience and Qur'anic ethics offers a profound foundation for developing a biopsychospiritual model of anger management—an integrative framework that unites the biological, psychological, and spiritual dimensions of the human self. Such a model situates anger not as a pathology to be eradicated, but as a moral emotion that, when regulated through neural discipline, cognitive awareness, and spiritual consciousness, becomes a source of ethical strength and inner growth (Osborne-Crowley & McDonald, 2018; Sorella et al., 2022).

At the biological level, anger regulation originates within the body's self-regulation system, encompassing neural inhibition and hormonal equilibrium (Martínez et al., 2019). The amygdala, hypothalamus, and limbic circuits initiate instinctive arousal in response to perceived threat, while the prefrontal cortex (PFC) imposes top-down control, preventing the escalation of emotional reactivity into aggression (Eshel et al., 2021; Nikolic et al., 2022). This neural inhibition functions analogously to the Qur'anic command of *kazm al-ghayz*—restraining anger through conscious modulation rather than suppression. The orbitofrontal cortex (OFC) evaluates the social and ethical context of anger, and the ventromedial prefrontal cortex (vmPFC) integrates moral reasoning with emotional regulation (Garofalo et al., 2018). Hormonal homeostasis, particularly involving serotonin, dopamine, and cortisol, underpins the body's physiological balance, ensuring that emotional responses remain adaptive rather than destructive (Topino et al., 2024).

Moving to the psychological dimension, anger management depends on awareness (*murāqabah*), mindfulness, and cognitive reappraisal. The psychological counterpart of neural inhibition is attentional control—the ability to notice the rising intensity of emotion without immediate reaction (Tang et al., 2017). Contemporary therapies such as Mindfulness-Based Cognitive Therapy (MBCT) and Cognitive Behavioral Therapy (CBT) employ these principles by teaching individuals to observe anger as a transient mental event, not an identity-defining state (Filipčíková et al., 2024; Richard et al., 2023). From a

Qur'anic perspective, this aligns with *tafakkur* (reflective thought) and *tazkiyah an-nafs* (self-purification), which cultivate metacognitive awareness over emotional impulses.

Cognitive reappraisal—reinterpreting provocative situations through empathy and perspective-taking—activates the anterior cingulate cortex (ACC) and insula, the same regions involved in *'afw* (forgiveness) (Fahed & Steffens, 2021). This neural mechanism allows emotional energy to be redirected toward understanding and compassion rather than hostility (Toussaint et al., 2019). As such, the psychological and neurobiological processes of anger regulation are mutually reinforcing: awareness stabilizes physiological arousal, while calm physiology enhances mindful cognition (Treadway & Zald, 2011).

At the spiritual dimension, the Qur'an situates anger control within the moral ideals of *taqwā* (God-consciousness), *'afw* (forgiveness), and *iḥsān* (benevolence). These virtues represent the transcendent phase of emotional regulation—where the individual not only inhibits and reappraises emotion but transforms it into a spiritual act of devotion. The Qur'anic ethic thus completes what neuroscience begins: if biology provides the structure, and psychology provides the method, spirituality provides the purpose and direction of regulation. In this stage, emotional restraint becomes a form of *'ibādah* (worship), as it reflects the soul's submission to divine will (Leshem et al., 2019).

Neurotheological studies have shown that practices involving spiritual reflection, prayer, and compassion meditation activate the Default Mode Network (DMN)—including the medial prefrontal cortex and posterior cingulate cortex—which are associated with self-referential thought, moral evaluation, and transcendental awareness (Andreu Rodríguez et al., 2009). Thus, *iḥsān*, as the Qur'an's moral apex, correlates with the brain's capacity for reflective consciousness and prosocial motivation. When viewed through this tripartite lens, anger management emerges as an ascending continuum:

Limbic Reactivity → Prefrontal Control → Spiritual Transcendence
(Biological) (Psychological) (Spiritual)

This progression illustrates that human emotional maturity involves sequential mastery—from instinctive survival (limbic) to rational control (cortical) to spiritual elevation (transcendental) (Pedrero-Pérez et al., 2009). The integration of MBCT techniques with *tazkiyah al-nafs* (Islamic self-purification) can operationalize this biopsychospiritual harmony. MBCT trains attentional focus and emotional acceptance, while *tazkiyah* provides the metaphysical orientation, transforming mindfulness into *murāqabah lillāh* (conscious awareness of God).

Such integration has both therapeutic and moral implications (Riadh et al., 2019). On the one hand, it aligns with neuroplastic evidence that consistent self-regulatory practice rewires prefrontal-limbic connectivity (Sorella et al., 2022). On the other, it restores the spiritual meaning of emotion within the human journey—seeing anger not as an enemy to be silenced but as raw moral energy to be sublimated toward justice, mercy, and *iḥsān*. In the words of al-Ghazālī, “The noblest struggle is against one's own anger, for therein lies the victory of the heart over the self.”

Therefore, the biopsychospiritual model proposed here offers a comprehensive paradigm: the biological regulates emotion's mechanism, the psychological manages its awareness, and the spiritual sanctifies its purpose (Starkstein et al., 2005). When these three levels function harmoniously, anger is neither repressed nor unleashed—it is refined. This equilibrium represents not only the ideal of Qur'anic ethics but the optimal design of the human neurocognitive system as revealed through modern science.

Ethical and Spiritual Relevance of Anger Regulation in the Qur'anic Perspective

From the Qur'anic standpoint, the regulation of anger (*kazm al-ghayz*) is not merely a psychological exercise but a spiritual discipline (*riyāḍah nafsīyyah*) aimed at purifying the soul and refining moral consciousness. In Surah Āli 'Imrān [3]:134, the moral sequence—restraining anger (*kazm*), forgiving (*'afw*), and embodying goodness (*ihsān*)—portrays an ascending path of tazkiyah al-nafs, or spiritual purification. This Qur'anic structure illustrates that true emotional mastery lies not in the annihilation of anger, but in transforming it into a force for moral and spiritual elevation (al-Ghazālī, 1983).

In classical Qur'anic exegesis, anger is seen as a double-edged faculty (*quwwah ghaḍabiyyah*)—necessary for moral courage and defense of justice, yet destructive when uncontrolled. Al-Rāghib al-Aṣḥānī describes *ghayz* as “the boiling of the heart due to perceived harm,” emphasizing its physiological and spiritual nature (al-Mufradāt fī Gharīb al-Qur'ān). The virtue of *kazm al-ghayz* thus signifies inner governance, wherein the intellect (*'aql*) and faith (*īmān*) subdue impulsive tendencies of the *nafs ammārah* (the commanding self). In this way, the Qur'an situates anger within a moral teleology—not to be suppressed but to be sanctified (al-Rāghib al-Aṣḥānī, 2009).

From a neuroscientific perspective, this moral struggle corresponds to what contemporary researchers term moral emotion regulation, involving the prefrontal cortex (PFC) and anterior cingulate cortex (ACC)—regions responsible for moral reasoning empathy, and ethical decision-making (Sorella et al., 2022). These neural mechanisms enable what Islamic ethics identifies as *mujāhadah an-nafs*—the conscious struggle to align one's desires with divine guidance. The repeated act of self-restraint reinforces neural pathways of inhibition and compassion, a process that modern neuroscience describes as neuroplasticity: the brain's ability to reshape itself through moral practice (Hayes & Rockwood, 2020; Richard et al., 2023).

The Qur'anic view of anger, therefore, anticipates what moral neuroscience now confirms—that ethical transformation requires both neural and spiritual effort. The human being is not a passive recipient of emotion but an active moral agent whose spiritual discipline (*riyāḍah*) can reorganize both the structure of the brain and the disposition of the soul. In the words of Ibn 'Aṭā' Allāh al-Sakandarī, “Whosoever overcomes his anger, his soul becomes luminous with the light of tranquility.” This luminous state, achieved through *kazm al-ghayz* and *'afw*, reflects the state of *ihsān*—acting with excellence out of consciousness of God (*murāqabah*).

Hence, anger control is not only an ethical command but a spiritual pedagogy (Antonioni et al., 2024). It teaches the believer to navigate between the impulses of the *nafs* and the serenity of the *rūḥ*. Neuroscientifically, this corresponds to the regulation of limbic reactivity by higher cortical structures—a biological reflection of the Qur'an's call to let *'aql* (reason) and *īmān* (faith) guide the passions. The Qur'an, therefore, embodies what modern scholars call neurospiritual integration: the harmony of brain, mind, and soul in pursuit of divine virtue (Correro et al., 2021).

In this light, *mujāhadah an-nafs* may be viewed as both a spiritual discipline and a neuroethical process—a continuous recalibration between instinct, cognition, and divine awareness. The believer who masters anger through remembrance (*dhikr*), reflection (*tafakkur*), and moral awareness embodies the Qur'anic promise: “Allah loves those who do good” (Āli 'Imrān [3]:134). Such mastery represents the

summit of *ihsān*, where ethical behavior becomes an expression of spiritual consciousness, and spiritual consciousness refines ethical behavior.

It is critical to note that the *qalb* is neither a biological heart organ nor a mere locus of raw subjective emotions, but rather the spiritual center of moral wisdom and divine orientation (Abroo Aman, 2024). This aligns with al-Ghazālī's earlier stance, which positions the *qalb* as the executive center of human moral consciousness. Meanwhile, the concept of spiritual tranquility or illumination is not merely passive physical relaxation, but the result of soul purification (*tazkiyah*) and the attainment of the tranquil soul state (*nafs al-muṭma'innah* / *sakīnah*) (Picken, 2005). This state is realized when moral reason, guided by the *rūḥ*, successfully subdues the impulsivity of *nafs al-ammārah*. These spiritual constructs exist on an ontological plane distinct from, yet complementary to, empirical neuroscientific metrics such as prefrontal inhibition or amygdala downregulation (Abroo Aman, 2024).

Ultimately, the Qur'anic approach transcends both moral psychology and behavioral regulation—it articulates an integrated anthropology of the self in which emotion, intellect, and spirituality converge. The neuroscience of anger thus finds its completion in Qur'anic ethics: the prefrontal act of restraint becomes an act of worship, and the neurocognitive control of emotion becomes the path to divine proximity.

Conclusion

The dialogue between neuroscience and Qur'anic ethics reveals that the management of anger is not merely a matter of emotional restraint, but a journey of moral and spiritual transformation. Neuroscience explains the biological architecture of anger — the dynamic interaction between the amygdala, limbic system, and prefrontal cortex — while the Qur'an frames it as a moral test, a moment in which the soul must choose between instinct and transcendence. When both perspectives are integrated, a holistic understanding emerges: the human being is simultaneously a biological organism, a psychological agent, and a spiritual being.

Surah Āli 'Imrān [3]:134 captures this tripartite reality through its ethical sequence — restraining anger (*kazm al-ghayḥ*), forgiving others (*'afw*), and acting with excellence (*ihsān*). These stages correspond respectively to the biological, psychological, and spiritual levels of emotional regulation. At the biological level, the brain's prefrontal systems inhibit impulsive reactions; at the psychological level, the mind reinterprets anger through empathy and awareness; and at the spiritual level, the heart transforms emotion into compassion and benevolence. Thus, the Qur'anic call to self-mastery finds its scientific echo in the mechanisms of neural self-regulation.

The proposed biopsychospiritual model demonstrates that anger can serve as a bridge between body, mind, and soul. Rather than suppressing emotion, Islam encourages conscious containment — transforming reactive energy into ethical strength and spiritual clarity. Neuroscience confirms that repeated acts of self-restraint and forgiveness strengthen the neural pathways associated with moral control, empathy, and reflection. In this light, Qur'anic ethics does not contradict science; it completes it. Where neuroscience explains the “how” of emotional regulation, the Qur'an provides the “why” — grounding the act of restraint in divine consciousness (*taqwā*).

Ultimately, the mastery of anger represents the unity of reason (*'aql*), emotion (*nafs*), and spirit (*rūḥ*). It is both an act of worship and an expression of inner balance. To restrain anger is to align the human brain with its moral design; to forgive is to elevate the soul toward transcendence. When the believer

attains this harmony — biological control, psychological awareness, and spiritual illumination — he fulfills the essence of *iḥsān*: acting with excellence because he knows that Allah sees him.

The primary contribution of this study lies in proposing an integrative conceptual framework that bridges cognitive neuroscience and Qur'anic ethics regarding anger regulation. By demonstrating that the Qur'anic progression from containment (*kazm*) to forgiveness (*'afw*) and benevolence (*iḥsān*) conceptually parallels the hierarchy of neural control mechanisms, this research offers a novel interdisciplinary synthesis. Furthermore, this article illustrates how Islamic moral guidance can enrich contemporary neuroethical reflection—moving neuroethics beyond secular biological determinism toward a holistic model that respects teleological and spiritual dimensions

In conclusion, bridging neuroscience and Qur'anic ethics offers not only a scientific model of emotional regulation but a spiritual path toward human wholeness. It reveals that faith and reason, revelation and cognition, are not opposing forces but complementary lights that illuminate the same truth: the path to divine love lies through the mastery of the self

References

- Abroo Aman, P. (2024). Human Psychology and Spiritual Development: An Islamic Perspective. 7(3), 1–104. <https://doi.org/10.2139/ssrn.5054029>
- Akhyar, M., Faruq, M. A. A., & Majasius, D. (2026). Self-Efficacy as a Mechanism in Sufi Psychotherapy for Psychological Disorders based on the Tazkiyat al-Nafs Approach: A Gadamerian Hermeneutic Analysis.
- Aki, B. D., Lamptey, E., Hembah, S. N., Oibiokpa, O. M., & Tachin, T. R. (2020). COVID-19 Lockdown: Psychological Implications on Life Quality. *Journal of Human, Earth, and Future*, 1(2), 78–86. <https://doi.org/10.28991/HEF-2020-01-02-04>
- al-Ghazālī. (1983). *Iḥyā' 'Ulūm al-Dīn*. Dār al-Ma'rifah.
- al-Rāghib al-Aṣfahānī. (2009). *Al-Mufradāt fī Gharīb al-Qur'ān*. Dār al-Qalam.
- Andreu Rodríguez, J. M., Peña Fernández, M. E., & Ramírez, J. M. (2009). Cuestionario de agresión reactiva y proactiva: un instrumento de medida de la agresión en adolescentes. *Revista de Psicopatología y Psicología Clínica*, 14(1). <https://doi.org/10.5944/RPPC.VOL.14.NUM.1.2009.4065>
- Antonioni, A., Raho, E. M., Sensi, M., Di Lorenzo, F., Fadiga, L., & Koch, G. (2024). A new perspective on positive symptoms: expression of damage or self-defence mechanism of the brain? *Neurological Sciences*, 45(5), 2347–2351. <https://doi.org/10.1007/S10072-024-07395-X>
- Bannon, S. M., Salis, K. L., & Daniel O'Leary, K. (2015). Structural brain abnormalities in aggression and violent behavior. *Aggression and Violent Behavior*, 25, 323–331. <https://doi.org/10.1016/J.AVB.2015.09.016>

- Billingsley, J., & Losin, E. A. R. (2017). The Neural Systems of Forgiveness: An Evolutionary Psychological Perspective. *Frontiers in Psychology*, 8(MAY), 737. <https://doi.org/10.3389/fpsyg.2017.00737>
- Binney, R. J., & Ramsey, R. (2020). Social Semantics: The role of conceptual knowledge and cognitive control in a neurobiological model of the social brain. *Neuroscience and Biobehavioral Reviews*, 112, 28–38. <https://doi.org/10.1016/j.neubiorev.2020.01.030>
- Bochicchio, V., Scandurra, C., Dolce, P., Scandurra, A., Freda, M. F., & Mezzalana, S. (2024). Affective Regulation and Trait Anger Personalities: The Buffering Effect of the Companion Animal Bond. *European Journal of Investigation in Health, Psychology and Education*, 14(8), 2377–2389. <https://doi.org/10.3390/EJHPE14080157>
- Buckley, L., Kaye, S. A., Stork, R. P., Heinze, J. E., & Eckner, J. T. (2017). Traumatic brain injury and aggression: A systematic review and future directions using community samples. *Aggression and Violent Behavior*, 37, 26–34. <https://doi.org/10.1016/J.AVB.2017.08.004>
- Bulaj, G., Clark, J., Ebrahimi, M., & Bald, E. (2021). From Precision Metapharmacology to Patient Empowerment: Delivery of Self-Care Practices for Epilepsy, Pain, Depression and Cancer Using Digital Health Technologies. *Frontiers in Pharmacology*, 12. <https://doi.org/10.3389/fphar.2021.612602>
- Buon, M., Seara-Cardoso, A., & Viding, E. (2016). Why (and how) should we study the interplay between emotional arousal, Theory of Mind, and inhibitory control to understand moral cognition? *Psychonomic Bulletin and Review*, 23(6), 1660–1680. <https://doi.org/10.3758/s13423-016-1042-5>
- Choi-Kwon, S., Han, K., Cho, K. H., Choi, S., Suh, M., Nah, H. W., & Kim, J. S. (2013). Factors associated with post-stroke anger proneness in ischaemic stroke patients. *European Journal of Neurology*, 20(9), 1305–1310. <https://doi.org/10.1111/ENE.12199>
- Choi-Kwon, S., & Kim, J. S. (2022). Anger, a Result and Cause of Stroke: A Narrative Review. *Journal of Stroke*, 24(3), 311–322. <https://doi.org/10.5853/JOS.2022.02516>
- Correro, A. N., Paitel, E. R., Byers, S. J., & Nielson, K. A. (2021). The role of alexithymia in memory and executive functioning across the lifespan. *Cognition and Emotion*, 35(3), 524–539. <https://doi.org/10.1080/02699931.2019.1659232>
- Du, G., & Wang, X. (2025). Fighting Mobile Phone Addiction with Forgiveness Following Interpersonal Transgressions: A Psychological Compensation Perspective. *Behavioral Sciences (Basel, Switzerland)*, 15(9). <https://doi.org/10.3390/bs15091209>
- Eshel, N., Maron-Katz, A., Wu, W., Abu-Amara, D., Marmar, C. R., & Etkin, A. (2021). Neural correlates of anger expression in patients with PTSD. *Neuropsychopharmacology*, 46(9), 1635–1642. <https://doi.org/10.1038/S41386-020-00942-Y>;TECHMETA

- Fahed, M., & Steffens, D. C. (2021). Apathy: Neurobiology, assessment and treatment. *Clinical Psychopharmacology and Neuroscience*, 19(2), 181–189. <https://doi.org/10.9758/CPN.2021.19.2.181>
- Filipčíková, M., Quang, H., Cassel, A., Darke, L., Wilson, E., Wearne, T., Rosenberg, H., & McDonald, S. (2024). Exploring neuropsychological underpinnings of poor communication after traumatic brain injury: The role of apathy, disinhibition and social cognition. *International Journal of Language and Communication Disorders*, 59(2), 433–448. <https://doi.org/10.1111/1460-6984.12836>
- Fourie, M. M., Hortensius, R., & Decety, J. (2020). Parsing the components of forgiveness: Psychological and neural mechanisms. *Neuroscience and Biobehavioral Reviews*, 112, 437–451. <https://doi.org/10.1016/j.neubiorev.2020.02.020>
- Fynn, D. M., Gignac, G. E., Becerra, R., Pestell, C. F., & Weinborn, M. (2021). The Prevalence and Characteristics of Alexithymia in Adults Following Brain Injury: A Meta-Analysis. *Neuropsychology Review*, 31(4), 722–738. <https://doi.org/10.1007/S11065-021-09484-6>
- Garofalo, C., Velotti, P., & Zavattini, G. C. (2018). Emotion regulation and aggression: The incremental contribution of alexithymia, impulsivity, and emotion dysregulation facets. *Psychology of Violence*, 8(4), 470–483. <https://doi.org/10.1037/VIO0000141>
- Griffin, B. J., Worthington, E. L., Lavelock, C. R., Wade, N. G., & Hoyt, W. T. (2015). Forgiveness and Mental Health. *Forgiveness and Health*, 77–90. https://doi.org/10.1007/978-94-017-9993-5_6
- Hardin, K. M., Contreras, I. M., Kosiak, K., & Novaco, R. W. (2022). Anger rumination and imagined violence as related to violent behavior before and after psychiatric hospitalization. *Journal of Clinical Psychology*, 78(9), 1878–1895. <https://doi.org/10.1002/JCLP.23334>
- Hart, T., Brockway, J. A., Fann, J. R., Maiuro, R. D., & Vaccaro, M. J. (2015). Anger self-management in chronic traumatic brain injury: Protocol for a psycho-educational treatment with a structurally equivalent control and an evaluation of treatment enactment. *Contemporary Clinical Trials*, 40, 180–192. <https://doi.org/10.1016/J.CCT.2014.12.005>
- Hayes, A. F., & Rockwood, N. J. (2020). Conditional Process Analysis: Concepts, Computation, and Advances in the Modeling of the Contingencies of Mechanisms. *American Behavioral Scientist*, 64(1), 19–54. <https://doi.org/10.1177/0002764219859633>
- Hosie, J., Simpson, K., Dunne, A., & Daffern, M. (2022). A study of the relationships between rumination, anger rumination, aggressive script rehearsal, and aggressive behavior in a sample of incarcerated adult males. *Journal of Clinical Psychology*, 78(9), 1925–1939. <https://doi.org/10.1002/JCLP.23341>
- Jansen, J. M. (2023). Mediating effects of impulsivity and alexithymia in the association between traumatic brain injury and aggression in incarcerated males. *Aggressive Behavior*, 49(6), 629–642. <https://doi.org/10.1002/AB.22101>

- Jayathilaka N.W.S., & Jayasinha B.L.E. (2024). A Review of Biological Foundations of Anger. *Journal of Health Sciences and Innovative Research*, 5(01). <https://doi.org/10.31357/jhsir.v5i01.7727>
- Kim, M. J., Elliott, M. L., Knodt, A. R., & Hariri, A. R. (2021). A Connectome-wide Functional Signature of Trait Anger. *Clinical Psychological Science: A Journal of the Association for Psychological Science*, 10(3), 584. <https://doi.org/10.1177/21677026211030240>
- Klaus, J., & Schutter, D. J. L. G. (2021). Functional topography of anger and aggression in the human cerebellum. *NeuroImage*, 226. <https://doi.org/10.1016/j.NEUROIMAGE.2020.117582>
- Koush, Y., Pichon, S., Eickhoff, S. B., Van De Ville, D., Vuilleumier, P., & Scharnowski, F. (2019). Brain networks for engaging oneself in positive-social emotion regulation. *NeuroImage*, 189, 106–115. <https://doi.org/10.1016/j.neuroimage.2018.12.049>
- Leshem, R., van Lieshout, P. H. H. M., Ben-David, S., & Ben-David, B. M. (2019). Does emotion matter? The role of alexithymia in violent recidivism: A systematic literature review. *Criminal Behaviour and Mental Health*, 29(2), 94–110. <https://doi.org/10.1002/CBM.2110>
- Lesser, I. M. (1981). A review of the alexithymia concept. *Psychosomatic Medicine*, 43(6), 531–543. <https://doi.org/10.1097/00006842-198112000-00009>
- Leszczyński, P., Pietras, T., & Mokros, Ł. (2021). Post-stroke alexithymia – A review. *Postępy Psychiatrii i Neurologii*, 30(3), 190–196. <https://doi.org/10.5114/PPN.2021.110679>
- Li, J., Qiu, J., & Li, H. (2023). Connectome-based predictive modeling of trait forgiveness. *Social Cognitive and Affective Neuroscience*, 18(1). <https://doi.org/10.1093/scan/nsad002>
- Ma, L., & Jiang, Y. (2020). Empathy Mediates the Relationship Between Motivations After Transgression and Forgiveness. *Frontiers in Psychology*, 11, 1466. <https://doi.org/10.3389/fpsyg.2020.01466>
- Malik, N. H. A., Anwar, R., Solehudin, S., & Khairani, I. F. S. R. (2026). A Conceptual Paradigm of Al-Nafs in the Tafsirs of Al-Ṭabarī and Al-Rāzī: Tracing Epistemological Shifts in the Classical Exegetical Tradition. *Jurnal Iman Dan Spiritualitas*, 6(1), 401–414. <https://doi.org/10.15575/jis.v6i1.49632>
- Margulies, S., Anderson, G., Atif, F., Badaut, J., Clark, R., Empey, P., Guseva, M., Hoane, M., Huh, J., Pauly, J., Raghupathi, R., Scheff, S., Stein, D., Tang, H., & Hicks, M. (2016). Combination therapies for traumatic brain injury: Retrospective considerations. *Journal of Neurotrauma*, 33(1), 101–112. <https://doi.org/10.1089/NEU.2014.3855>
- Martínez, Á. R., Lila, M., & Moya-Albiol, L. (2019). The importance of considering alexithymia during initial stages of intimate partner violence interventions to design adjuvant treatments. *International Journal of Environmental Research and Public Health*, 16(19). <https://doi.org/10.3390/IJERPH16193695>

- Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, 24, 167–202. <https://doi.org/10.1146/ANNUREV.NEURO.24.1.167>
- Mullins, A. (2025). What Does Self-control Look Like? Considerations about the Neurobiology of Temperance and Fortitude. *Conatus*, 10(1), 165–191. <https://doi.org/10.12681/cjp.36665>
- Nikolic, M., Pezzoli, P., Jaworska, N., & Seto, M. C. (2022). Brain responses in aggression-prone individuals: A systematic review and meta-analysis of functional magnetic resonance imaging (fMRI) studies of anger- and aggression-eliciting tasks. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 119, 110596. <https://doi.org/10.1016/j.pnpbp.2022.110596>
- O'Dean, S. M., Summerell, E., Harmon-Jones, E., Creswell, J. D., & Denson, T. F. (2025). The associations and effects of mindfulness on anger and aggression: A meta-analytic review. *Clinical Psychology Review*, 118. <https://doi.org/10.1016/j.cpr.2025.102584>
- Ortega Andrade, N., Alcázar-Olán, R., Matías, O. M., Rivera Guerrero, A., & Domínguez Espinosa, A. (2017). Anger Rumination Scale: Validation in Mexico. *Spanish Journal of Psychology*, 20. <https://doi.org/10.1017/SJP.2016.105>
- Osborne-Crowley, K., & McDonald, S. (2018). A review of social disinhibition after traumatic brain injury. *Journal of Neuropsychology*, 12(2), 176–199. <https://doi.org/10.1111/JNP.12113>
- Pedrero-Pérez, E. J., Ruiz-Sánchez De León, J. M., Llanero-Luque, M., Rojo-Mota, G., Olivar-Arroyo, A., & Puerta-García, C. (2009). Frontal symptoms in substance abusers under treatment using the Spanish version of the frontal system behaviour scale. *Revista de Neurologia*, 48(12), 624–631. <https://doi.org/10.33588/RN.4812.2008654>
- Picken, G. (2005). Tazkiyat al-nafs: The Qur'anic Paradigm. *Journal of Qur'anic Studies*, 7(2), 101–127. <https://doi.org/10.3366/jqs.2005.7.2.101>
- Puii, A. A., Wudarczyk, O., Kohls, G., Bzdok, D., Herpertz-Dahlmann, B., & Konrad, K. (2020). Meta-analytic evidence for a joint neural mechanism underlying response inhibition and state anger. *Human Brain Mapping*, 41(11), 3147–3160. <https://doi.org/10.1002/hbm.25004>
- Raine, A., Dodge, K., Loeber, R., Gatzke-Kopp, L., Lynam, D., Reynolds, C., Stouthamer-Loeber, M., & Liu, J. (2006). The reactive-proactive aggression questionnaire: Differential correlates of reactive and proactive aggression in adolescent boys. *Aggressive Behavior*, 32(2), 159–171. <https://doi.org/10.1002/AB.20115>
- Rao, V., Rosenberg, P., Bertrand, M., Salehinia, S., Spiro, J., Vaishnavi, S., Rastogi, P., Noll, K., Schretlen, D. J., Brandt, J., Cornwell, E., Makley, M., & Miles, Q. S. (2009). Aggression after traumatic brain injury: Prevalence and correlates. *Journal of Neuropsychiatry and Clinical Neurosciences*, 21(4), 420–429. <https://doi.org/10.1176/JNP.2009.21.4.420>

- Riadh, O., Naoufel, O., Rejeb, M. R. Ben, & Le Gall, D. (2019). Neuro-cognitive correlates of alexithymia in patients with circumscribed prefrontal cortex damage. *Neuropsychologia*, 135. <https://doi.org/10.1016/J.NEUROPSYCHOLOGIA.2019.107228>
- Richard, Y., Tazi, N., Frydecka, D., Hamid, M. S., & Moustafa, A. A. (2023). A systematic review of neural, cognitive, and clinical studies of anger and aggression. *Current Psychology*, 42(20), 17174–17186. <https://doi.org/10.1007/S12144-022-03143-6/FIGURES/3>
- Romero-Martínez, Á., Sarrate-Costa, C., Sánchez-Barba, G. G. P., Ortega, L. V., López-Santamaría, S., Burgos-López, S., García, J., & Moya-Albiol, L. (2024). Revealing the Mechanisms That Contribute to Anger Expression Proneness in Patients with Brain Damage: The Importance of Executive Dysfunctions and Alexithymia. *Psychiatry International* 2024, Vol. 5, Pages 338-347, 5(3), 338–347. <https://doi.org/10.3390/PSYCHIATRYINT5030023>
- Ruddle, A., Pina, A., & Vasquez, E. (2017). Domestic violence offending behaviors: A review of the literature examining childhood exposure, implicit theories, trait aggression and anger rumination as predictive factors. *Aggression and Violent Behavior*, 34, 154–165. <https://doi.org/10.1016/J.AVB.2017.01.016>
- Ryland, H. (2025). Understanding violence in the context of psychosis: contribution of phenomenology and its limitations. *BJPsych Advances*, 31(1), 36–38. <https://doi.org/10.1192/BJA.2024.40>
- Silver, B. M., & Ochsner, K. N. (2024). Changes in Online Moral Discourse About Public Figures During #MeToo. *Affective Science*, 5(4), 346–357. <https://doi.org/10.1007/s42761-024-00250-4>
- Sorella, S., Grecucci, A., Piretti, L., & Job, R. (2021). Do anger perception and the experience of anger share common neural mechanisms? Coordinate-based meta-analytic evidence of similar and different mechanisms from functional neuroimaging studies. *NeuroImage*, 230, 117777. <https://doi.org/10.1016/J.NEUROIMAGE.2021.117777>
- Sorella, S., Vellani, V., Siugzdaite, R., Feraco, P., & Grecucci, A. (2022). Structural and functional brain networks of individual differences in trait anger and anger control: An unsupervised machine learning study. *European Journal of Neuroscience*, 55(2), 510–527. <https://doi.org/10.1111/ejn.15537>
- Starkstein, S. E., Ingram, L., Garau, M. L., & Mizrahi, R. (2005). On the overlap between apathy and depression in dementia. *Journal of Neurology, Neurosurgery and Psychiatry*, 76(8), 1070–1074. <https://doi.org/10.1136/JNNP.2004.052795>
- Sukhodolsky, D. G., Golub, A., & Cromwell, E. N. (2001). Development and validation of the anger rumination scale. *Personality and Individual Differences*, 31(5), 689–700. [https://doi.org/10.1016/S0191-8869\(00\)00171-9](https://doi.org/10.1016/S0191-8869(00)00171-9)

- Tang, W. K., Liu, X. X., Liang, H., Chen, Y. K., Chu, W. C. W., Ahuja, A. T., Abrigo, J., Mok, V. C. T., Ungvari, G. S., Wong, K. S., & Spalletta, G. (2017). Location of acute infarcts and agitation and aggression in stroke. *Journal of Neuropsychiatry and Clinical Neurosciences*, 29(2), 172–178. <https://doi.org/10.1176/APPI.NEUROPSYCH.15110400>
- Topino, E., Griffiths, M. D., & Gori, A. (2024). Attachment and Gambling Severity Behaviors Among Regular Gamblers: A Path Modeling Analysis Exploring the Role of Alexithymia, Dissociation, and Impulsivity. *International Journal of Mental Health and Addiction*, 22(6), 3760–3774. <https://doi.org/10.1007/S11469-023-01080-4>
- Toussaint, L., Sirois, F., Hirsch, J., Kohls, N., Weber, A., Schelling, J., Vajda, C., & Offenbäecher, M. (2019). Anger rumination mediates differences between fibromyalgia patients and healthy controls on mental health and quality of life. *Personality and Mental Health*, 13(3), 119–133. <https://doi.org/10.1002/PMH.1445>
- Treadway, M. T., & Zald, D. H. (2011). Reconsidering anhedonia in depression: Lessons from translational neuroscience. *Neuroscience and Biobehavioral Reviews*, 35(3), 537–555. <https://doi.org/10.1016/J.NEUBIOREV.2010.06.006>
- Wahid, A., Karneli, Y., Solfema, S., & Qorib, F. (2025). Al-Ghazali's Psycho-Spiritual Counseling Theory: Guidance and Counseling from the Perspective of Islamic Philosophers. *Al-Musyrif: Jurnal Bimbingan Dan Konseling Islam*, 8(1), 1–11. <https://doi.org/10.38073/almusyrif.v8i1.2325>
- Will, G. J., Crone, E. A., & Güroğlu, B. (2015). Acting on social exclusion: Neural correlates of punishment and forgiveness of excluders. *Social Cognitive and Affective Neuroscience*, 10(2), 209–218. <https://doi.org/10.1093/scan/nsu045>
- Williams, C., Wood, R. L., & Howe, H. (2019). Alexithymia is associated with aggressive tendencies following traumatic brain injury. *Brain Injury*, 33(1), 69–77. <https://doi.org/10.1080/02699052.2018.1531302>
- Witten, J. A., Coetzer, R., Rowlands, L., & Turnbull, O. H. (2025). “Talk and Chalk”: An emotion regulation intervention for anger after acquired brain injury. *Applied Neuropsychology: Adult*, 32(4), 928–943. <https://doi.org/10.1080/23279095.2023.2224481>
- Wood, R. L., & Worthington, A. (2017). Neurobehavioral abnormalities associated with executive dysfunction after traumatic brain injury. *Frontiers in Behavioral Neuroscience*, 11. <https://doi.org/10.3389/FNBEH.2017.00195>