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Review

THE MORAL BRAIN: A NEUROPSYCHIATRIC PERSPECTIVE ON MORAL BEHAVIOR AND MOTIVATION

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SUMMARY

This review explores the interplay between neurobiological, psychological, and social factors that underpin moral behavior and motivation. Integrating insights from neuropsychiatry, it examines the roles of key brain regions such as the prefrontal cortex, amygdala, and anterior cingulate cortex, as well as neurotransmitters like serotonin and dopamine, in shaping moral reasoning and ethical decision-making. The historical evolution of moral motivation theories, from ancient philosophy to modern psychological and neurobiological perspectives, provides a foundation for understanding intrinsic and extrinsic motivators, emotional influences, and the impact of social norms and cultural contexts. The review also addresses the effects of psychiatric disorders on moral behavior, highlighting how conditions like antisocial personality disorder, frontotemporal dementia, and schizophrenia can lead to moral deficits. By presenting a multidisciplinary approach, this review offers a comprehensive understanding of moral motivation and behavior, emphasizing the importance of fostering ethical conduct and addressing moral challenges in clinical, educational, and societal settings.

Key words: *morality – neuropsychiatry – ethics - psychology*

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INTRODUCTION

The drive to act according to ethical principles and pursue moral goals is a complex phenomenon influenced by cognitive, emotional, and social factors (Brink 1997, Schroeder et al. 2010). Authors sometimes refer to these morality phenomena respectively as moral behavior and moral motivation (Zahn 2014). Understanding moral motivation affects personal behavior, social interactions, and societal norms, and requires the interdisciplinarity of multiple disciplines.

From a neuropsychiatric perspective, exploring moral motivation involves examining the brain structures and neural pathways underlying moral reasoning and behavior. Advances in neuroimaging and neurophysiological techniques have identified specific brain regions associated with moral cognition, such as the prefrontal cortex, amygdala, and anterior cingulate cortex (Fumagalli & Priori 2012). Additionally, the roles of neurotransmitters and hormones, such as dopamine, serotonin, and oxytocin, are increasingly recognized in modulating moral emotions and decisions (Crockett 2016). Moral motivation and behavior are affected in various personality and psychiatric disorders, including antisocial personality, psychopathy, depression, anxiety disorders, and autism spectrum disorders (Azimpour et al. 2019) and are therefore important to know for psychiatrists.

The primary objectives of this review are to summarize the current state of knowledge on the neural, biobehavioral and social correlates of moral behavior and motivation, examine the impact of psychiatric disorders on moral motivation and the underlying neurobiological mechanisms.

HISTORY AND DEFINITIONS OF MORAL BEHAVIOR AND MOTIVATION

The study of moral motivation has deep roots in philosophy, psychology, and theology. Throughout history, various thinkers have explored the nature and origins of moral behavior. In ancient philosophy, moral motivation was often discussed in the context of virtue ethics. Aristotle, for example, believed that moral virtue is a state of character concerned with choice, lying in a mean. According to Aristotle, moral actions stem from a desire to achieve eudaimonia, or human flourishing, which involves cultivating virtues like courage, temperance, and justice (Curzer 2018). Religious traditions have also significantly influenced views on moral motivation. In Christianity, moral motivation is often linked to the concept of divine command and the intention to fulfill God's will (Blamires 1983). Similarly, in Buddhism, moral motivation is associated with the intention to reduce suffering and achieve enlightenment through ethical conduct and mental discipline (Brear 1974). During the Enlightenment, moral motivation began to be examined more scientifically. Immanuel Kant proposed that moral actions are motivated by a sense of duty and adherence to the categorical imperative, which commands actions that can be universally willed (Wilson & Denis 2008). Conversely, utilitarian thinkers like Jeremy Bentham and John Stuart Mill argued that moral motivation is driven by the desire to maximize happiness and minimize suffering (Viner 1949). In the 20th century, psychological theories started to shed light on the mechanisms underlying moral motivation. Sigmund Freud's psychoanalytic

theory suggested that moral behavior is influenced by the superego, which internalizes societal norms and values (Rorty 1980).

Moral motivation and behavior encompass a wide array of psychological and neurobiological processes that drive individuals to act according to ethical principles and moral norms. Moral motivation refers to the impetus behind individuals' decisions to act morally or ethically (Wallace 2006). Intrinsic motivation comes from within the individual, driven by personal values, principles, and the desire to maintain self-integrity: people with strong intrinsic moral motivation act ethically because it aligns with their internal beliefs and values (Van der Werff et al. 2013). On the other hand, extrinsic motivation is influenced by external factors such as social approval, fear of punishment, or desire for rewards, particularly in structured environments like schools or workplaces (Graafland & Van de Ven 2006).

Cognitive and psychological factors play a significant role in moral motivation. Moral reasoning, as explored in cognitive development theories by Jean Piaget and Lawrence Kohlberg, suggests that moral reasoning evolves through distinct stages. For instance, Kohlberg's stages range from obedience and punishment orientation in early childhood to abstract principles and ethical reasoning in adulthood. Higher stages of moral reasoning involve the application of abstract principles, such as justice and rights, which guide individuals to make decisions beyond mere self-interest or social conformity (Carpendale 2000, Moheghi et al. 2020).

Moral identity, or the degree to which being a moral person is central to an individual's self-concept, also influences moral motivation. People with a strong moral identity are more likely to engage in prosocial behaviors because their self-concept drives their actions. Moral identity also affects how people interpret and respond to moral dilemmas, often leading to a stronger consistency between their beliefs and actions (Boegershausen et al. 2015).

Emotional and affective components are crucial for moral motivation: for instance, empathy, the ability to understand and share the feelings of others, prompts prosocial behaviors such as helping, sharing, and comforting. Moral emotions like guilt, shame, and pride play significant roles in moral motivation. Guilt and shame often follow transgressions, motivating individuals to make amends and adhere to moral norms in the future (Schumacher 2021, Silfver-Kuhalampi 2009).

Social and cultural influences also shape moral motivation and behavior. Social norms significantly impact moral behavior, as individuals tend to conform to the ethical standards of their peer groups, communities, or cultures to gain acceptance and avoid ostracism. Social learning theory suggests that people learn moral behaviors by observing and imitating others, especially authority figures or role models. Cultural variations indicate that while some moral principles are universal, the emphasis and interpretation of these principles can vary widely, influencing how people are motivated to act morally (Wren 1982, Zahn 2014).

NEUROANATOMY OF THE MORAL BRAIN

Several key regions that interact to support moral judgment, decision-making, and behavior. At the forefront of this network is the prefrontal cortex (PFC), particularly the ventromedial prefrontal cortex (vmPFC) and the dorsolateral prefrontal cortex (dlPFC). The vmPFC is integrates emotional and social information when making moral judgments and evaluates the emotional significance of actions and their outcomes: when individuals face moral dilemmas, the vmPFC helps to weigh the emotional consequences of different choices. On the other hand, the dlPFC is involved in cognitive control and deliberative processes: it helps regulating impulsive responses and allows individuals to apply abstract moral principles and make reasoned decisions. It is therefore involved in considering long-term consequences and adhering to societal norms during moral reasoning (Garr 2024).

The amygdala is also known for its role in emotional processing, as it is involved in responses to moral emotions such as guilt, empathy, and disgust. The amygdala helps detect and respond to morally relevant stimuli, especially those that are emotionally charged or perceived as threats. Its activation can influence the intensity of moral emotions, impacting how individuals perceive and react to moral situations (Rolls et al. 2023). The anterior cingulate cortex (ACC) helps to integrate emotional and cognitive aspects of moral decision-making, allowing individuals to detect conflicts between moral values and potential actions. When faced with moral choices that involve competing interests or values, the ACC's involvement ensures that individuals can evaluate the consequences and make more balanced decisions (Cui et al. 2021). The temporal parietal junction (TPJ) helps individuals predict and interpret the behavior of others, which contributes to making fair and empathetic moral decisions.

Finally, the insula is associated with the experience of empathy and the processing of bodily states, including those related to moral emotions like guilt and shame. The insula's involvement in interoceptive awareness allows individuals to connect their physical and emotional states, contributing to the emotional aspect of moral judgments. This connection is particularly evident in responses to harm and fairness, where the insula helps individuals feel the emotional weight of moral transgressions (Chen et al. 2023, Wu et al. 2023).

NEUROCHEMISTRY OF THE MORAL BRAIN

The influence of neurotransmitters on moral behavior is a complex and multifaceted area of study, intertwining various chemical messengers with distinct roles in decision-making processes.

Serotonin is particularly influential in moral decision-making, as highlighted by several studies. Serotonin, linked with impulsivity, affects moral decisions under risk and stress (Sarmiento Rivera & Gouveia 2021). Serotonin's involvement also extends in prosocial emotions such as empathy, guilt, and pity, which are critical in ethical decision-making (Tost & Meyer-Lindenberg 2010). Increasing serotonin levels can heighten individuals' aversion to harming others, promoting prosocial behavior and influencing moral judgments, especially in emotionally salient scenarios. This suggests that serotonin's modulation can lead to a greater emphasis on harm aversion in moral decisions (Crockett et al. 2010a,b).

Dopamine is linked to the valuation of outcomes and learning in decision-making contexts (Sarmiento Rivera & Gouveia 2021). There are gender-specific effects of dopamine on moral acceptability, finding that enhanced dopaminergic transmission can make females' responses to moral dilemmas more rational and similar to those of males, who generally engage less emotionally in such decisions (Pellegrini et al. 2017). Additionally, broader neurobiological and epigenetic perspectives highlight how dopamine, along with noradrenaline, serotonin, and glutamine, influences behaviors related to hedonism, altruism, and conscience (De Silva 2023). This comprehensive view integrates the roles of various brain regions, such as the prefrontal cortex and hippocampus, in modulating these behaviors and underscores the importance of epigenetic changes in shaping moral tendencies.

SOCIAL INFLUENCES ON MORALITY

Social influences play a significant role in shaping moral behavior, impacting how individuals make ethical decisions and judgments. One study utilizing immersive virtual reality (IVR) revealed that social influence can drive individuals to act in moral dilemmas more frequently than in text-based scenarios, suggesting the powerful impact of social contexts on moral behavior (Thorn 2020). Another investigation into the effects of social distance and gender on moral decisions found that social distance significantly affects moral judgments, with men showing a stronger tendency towards egoistic behaviors when social distance is greater (Szczepaniak et al. 2024).

In educational settings, the social environment, including interactions with peers, teachers, and the community, significantly influences the moral development of learners (Lickona 2013). Similarly, the influence of the social environment, including family, peers, and mass media, was identified as crucial in developing students' morals and characters, suggesting that positive social environments promote better moral outcomes. The role of peers is particularly notable during adolescence. Good peer relationships are associated with positive social development and acquisition of social skills, while poor peer relationships can lead to maladaptive behaviors (Judy & Nelson 2000). Gender differences, peer closeness, and family socioeconomic status also modulate these influences. Mentors also play a crucial role in the cultivation of moral behavior (Nakamura & Condren 2018).

PSYCHIATRIC DISORDERS AND MORALITY

The relationship between morality and psychiatric disorders is intricate. Some personality disorders, such as antisocial and narcissistic personality disorders, are characterized by moral deficiencies, like hypo-morality, where individuals exhibit a lack of moral conscience and empathy. In contrast, conditions such as obsessive-compulsive personality disorder can involve hyper-morality, where individuals may rigidly adhere to moral codes and display excessive concern for moral correctness (Azimpour et al. 2019).

Moreover, the intersection of psychiatry and morality is crucial in understanding how psychiatric conditions impact moral agency and ethical behavior. Broader mental health issues affect societies, such as poverty and violence, which also have moral implications (Perales 2016). The challenge lies in addressing these issues without conflating psychiatric problems with societal moral failings. For instance, the interpretation of Cluster B personality disorders, which include borderline, histrionic, and antisocial personality disorders, often blurs the lines between medical pathology and moral judgment. These disorders typically involve behaviors considered immoral, such as manipulation and aggression. However, understanding these behaviors through the lens of virtue ethics and moral responsibility without blame can help reconcile medical and moral perspectives, suggesting that these disorders are both a moral and medical concern (Rogoża-Žuklys & Bartkienė 2022).

Moral emotions, crucial for prosocial behaviors, can be significantly impaired in neuropsychiatric conditions like frontotemporal dementia (FTD) and schizophrenia. These impairments lead to difficulties in moral decision-making and behavioral adaptation, highlighting the role of moral emotions in maintaining ethical conduct (Auger et al. 2022). Finally, the concept of moral perception in psychiatric ethics emphasizes the relational aspect of moral agency in clinical practice. This perspective encourages moving away from an individual-

listic view of morality towards an intersubjective approach, fostering better therapeutic relationships and shared decision-making in mental health care.

CONCLUSION

Exploring moral behavior and motivation from a neuropsychiatric perspective helps us understand how brain structures, neurochemistry, and social factors influence our ethical actions. This review has shown the important roles of the prefrontal cortex, amygdala, anterior cingulate cortex, temporal parietal junction, and insula in shaping moral thoughts and emotions. Neurotransmitters like serotonin, dopamine, and oxytocin also play key roles in moral decision-making, indicating that changes in these systems can affect ethical behavior.

The study of moral motivation, traditionally rooted in philosophy, theology, and psychology, now includes insights from neurobiology and social science. The combination of internal and external motivations, emotions, and social and cultural influences makes moral behavior complex. Understanding these aspects is important for practical applications in mental health, education, and social policy.

The link between morality and psychiatric disorders is an important area for further research. Disorders such as antisocial personality disorder, frontotemporal dementia, and schizophrenia show how moral deficits can result from neurobiological and psychological issues. Recognizing these deficits as both medical and moral problems can lead to better treatment and social support.

In conclusion, studying moral motivation and behavior from multiple disciplines enhances our understanding of ethical actions. By integrating neuropsychiatry, psychology, and social sciences, we gain valuable insights into what drives moral behavior and how to support it.

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References

1. *Auger RL, Mouchabac S, Daigmorte C, Gallarda T, Hamisultane J & Azuar C: Moral emotions in neuropsychiatry : Testing FTD and Schizophrenia patients with the MEA scale. Alzheimer's & Dementia 2022; 18(S7):e061330. https://doi.org/10.1002/alz.061330*
2. *Azimpour A, Derakhshan Z & Ghanbari S: Morality and psychopathology : Tendencies to personality disorders and some other mental disorders among individuals with high and low moral identity. Iranian Journal of Psychiatry and Behavioral Sciences 2019; 13. https://brieflands.com/articles/ijpbs-14966.html*
3. *Blamires H: Against the stream : CS Lewis and the Literary Scene. Journal of the Irish Christian Study Centre 1983; 1:11-22*
4. *Boegershausen J, Aquino K & Reed IIA: Moral identity. Current Opinion in Psychology 2015; 6:162-166*
5. *Brear AD: The nature and status of moral behavior in Zen Buddhist tradition. Philosophy East and West 1974; 24:429-441*
6. *Brink DO: Moral Motivation. Ethics 1997; 108:4-32. https://doi.org/10.1086/233786*
7. *Carpendale JI: Kohlberg and Piaget on stages and moral reasoning. Developmental Review 2000; 20:181-205*
8. *Chen T, Li Q, Peng M & Li X: Moral transgression modulates empathy for pain : Evidence from ERP and EEG data. Biological Psychology 2023; 176:108467*
9. *Crockett MJ: Neurochemical modulation of moral judgment. Moral brains: The neuroscience of morality 2016; 237*
10. *Crockett, MJ, Clark L, Hauser MD & Robbins TW: Serotonin selectively influences moral judgment and behavior through effects on harm aversion. Proceedings of the National Academy of Sciences 2010a; 107:17433-17438. https://doi.org/10.1073/pnas.1009396107*
11. *Crockett MJ, Clark L, Lieberman MD, Tabibnia G & Robbins TW: Impulsive choice and altruistic punishment are correlated and increase in tandem with serotonin depletion. Emotion 2010b; 10:855*
12. *Cui F, Huang X, Li X, Liao C, Liu J & Luo Y: Moral conflict in economic decision making : The role of the anterior cingulate cortex - striatum pathway. Cerebral Cortex 2021; 31:5121-5130*
13. *Curzer HJ: Aristotle and moral virtue. The Oxford handbook of virtue 2018; 104-129*
14. *De Silva PN: Neurobiological and epigenetic perspectives on hedonism, altruism and conscience. BJPsych Advances 2023; 29:198-203*
15. *Fumagalli M & Priori A: Functional and clinical neuroanatomy of morality. Brain 2012; 135:2006-2021*
16. *Garr AK: The role of the ventromedial prefrontal cortex in moral cognition : A value-centric hypothesis. Philosophical Psychology 2024; 37:970-987. https://doi.org/10.1080/09515089.2023.2166820*
17. *Graafland J & Van de Ven B: Strategic and moral motivation for corporate social responsibility. Journal of corporate citizenship 2006; 22:111-123*
18. *Judy B & Nelson ES: Relationship between parents, peers, morality, and theft in an adolescent sample. The high School journal 2000; 83:31-42*
19. *Lickona T: Moral development in the elementary school classroom. In Handbook of moral behavior and development (p. 143-162). Psychology Press, 2013. https://www.taylorfrancis.com/chapters/edit/10.4324/9780203763070-7/moral-development-elementary-school-classroom-thomas-lickona*
20. *Moheghi M, Ghorbanzadeh M & Abedi J: The investigation and criticism moral development ideas of Kohlberg, Piaget and Gilligan. International Journal of Multicultural and Multireligious Understanding 2020; 7:362-374*
21. *Nakamura J & Condren M: A systems perspective on the role mentors play in the cultivation of virtue. Journal of Moral Education 2018; 47:316-332. https://doi.org/10.1080/03057240.2018.1444981*

22. Pellegrini S, Palumbo S, Iofrida C, Melissari E, Rota G, Mariotti V, Anastasio T, Manfrinati A, Rumiati R & Lotto L: Genetically-driven enhancement of dopaminergic transmission affects moral acceptability in females but not in males : A pilot study. Frontiers in Behavioral Neuroscience 2017; 11:156
23. Perales A: Ética, psiquiatría y salud mental. Acta bioethica 2016; 22:27-36
24. Rogoża-Žuklys D & Bartkienė A: The Problem of Interpreting Cluster B Personality Disorders : At the Intersection of Psychiatry and Morality. Problemos 2022; 102:118-130
25. Rolls ET, Deco G, Huang CC & Feng J: Human amygdala compared to orbitofrontal cortex connectivity, and emotion. Progress in Neurobiology 2023; 220:102385
26. Rorty R: Freud, morality, and hermeneutics. New Literary History 1980; 12:177-185
27. Sarmiento Rivera LF & Gouveia A: Neurotransmitters and Hormones in Human Decision-Making. In P. Á. Gargiulo & H. L. Mesones Arroyo (Éds.), Psychiatry and Neuroscience Update (p. 149-167). Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-61721-9_15
28. Schroeder T, Roskies AL & Nichols S: Moral motivation. 2010. https://psycnet.apa.org/record/2015-36267-003
29. Schumacher M: Guilt as a Positive Motivation for Action? Guilt: A Force of Cultural Transformation 2021; 29
30. Silfver-Kuhalampi M: The sources of moral motivation : Studies on empathy, guilt, shame and values. 2009. https://core.ac.uk/download/pdf/14918917.pdf
31. Szczepaniak Z, Gaboriaud A, Quinton J-C & Smeding A: The Effects of Social Distance and Gender on Moral Decisions and Judgments : A Reanalysis, Replication, and Extension of. Social Psychology 2024; 55:25-36. https://doi.org/10.1027/1864-9335/a000537
32. Thorn JT: An investigation into the effects of social influence on moral behaviour using immersive virtual reality [PhD Thesis, UCL (University College London)]. 2020. https://discovery.ucl.ac.uk/id/eprint/10096701/
33. Tost H & Meyer-Lindenberg A: I fear for you : A role for serotonin in moral behavior. Proceedings of the National Academy of Sciences 2010; 107:17071-17072. https://doi.org/10.1073/pnas.1012545107
34. Van der Werff E, Steg L & Keizer K: It is a moral issue : The relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. Global environmental change 2013; 23:1258-1265
35. Viner J: Bentham and JS Mill : The utilitarian background. The American economic review 1949; 39:360-382
36. Wallace RJ: Moral motivation. Contemporary debates in moral theory 2006; 182-195
37. Wilson EE & Denis L: Kant and Hume on morality. 2008. https://plato.stanford.edu/Entries/kant-hume-morality/
38. Wren TE: Social Learning Theory, Self-Regulation, and Morality. Ethics 1982; 92:409-424. https://doi.org/10.1086/292352
39. Wu X, Lu X, Zhang H, Bi Y, Gu R, Kong Y & Hu L: Sex difference in trait empathy is encoded in the human anterior insula. Cerebral Cortex 2023; 33:5055-5065
40. Zahn R: Neuropsychiatry of social knowledge and moral motivation. Journal of Neurology, Neurosurgery & Psychiatry 2014; 85:e3-e3

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