

Chapter 13

Impulsive Mind and Meditation

Dwivedi Krishna^{1*} & Saurav Nilesh²

¹Assistant Professor, Department of Yoga and Life Science, Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Bangalore, India.

²Ph.D. Scholar, Department of Yoga and Life Science, Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Bangalore, India.

*Corresponding author email: krishnadwivedi25k@gmail.com

DOI- <https://10.5281/zenodo.8331018>

<https://orcid.org/0009-0000-6479-8072>

Co-author- <https://orcid.org/0009-0000-8969-8959>

Received:-

19th August, 2023

Accepted:-

06th September, 2023

Published:-

(online)

27th October, 2023

ABSTRACT:- The human mind is a complex and dynamic entity, constantly bombarded by stimuli from the external world and its own internal thoughts and emotions. One of the challenges that individuals often face is dealing with impulsive thoughts and actions, which can lead to impulsive behaviors with negative consequences.

Impulsivity refers to a tendency to act on immediate desires or urges without considering the long-term consequences. An impulsive mind can result from various factors, such as genetic predisposition, environmental influences, personality traits, emotional states, and cognitive biases. It can manifest as impulsive decision-making, emotional outbursts, and difficulty in delaying gratification. While some degree of impulsivity is normal and even necessary in daily life, excessive impulsivity can lead to problems in various areas, such as addiction, poor financial choices, and strained relationships. Yoga is a traditional practice that comprises physical postures, breathing exercises, and meditation, with the aim of harmonizing the body, mind, and spirit. Yoga can help reduce impulsive

mind by calming the nervous system, relieving stress and anxiety, enhancing self-awareness and compassion, and transcending the limitations of the mind. There are different types of yoga, such as mindful yoga, hatha yoga, and kundalini yoga, that can be practiced to achieve these benefits. Research has shown that Yoga can have a profound impact on the brain, altering neural pathways and influencing cognitive processes. This chapter has focused on the ways in which traditional practices including yoga can modulate impulsivity and foster greater self-control. Recent advances in neuroscience have shed light on the neural mechanisms through which Yoga influences impulsivity. Functional MRI studies have shown that Yoga can lead to structural changes in the brain, particularly in areas associated with impulse control, such as the prefrontal cortex. Additionally, Yoga appears to enhance connectivity between brain regions involved in self-regulation. The impulsive mind is a facet of human psychology that has far-reaching consequences on our daily lives and overall well-being. Yoga is a viable method to regulate impulsivity and improve self-control. It is likely that as we learn more about the complex relationship between meditation and the impulsive mind, Yoga practice will become even more important for fostering mental health and personal development in our fast-paced and impulsive world.

Keywords: Impulsivity, yoga, meditation, mind, brain

1. INTRODUCTION

Impulsivity is a complex behavior that can have significant impacts on an individual's life. It's characterized by acting on sudden urges without considering the potential consequences. It involves a lack of self-control and can manifest in various ways, such as impulsive spending, substance abuse, or risky sexual behavior¹. People who are impulsive often struggle with delayed gratification and have difficulty regulating their emotions. Impulsive behavior can range from minor actions, like eating an extra piece of cake, to more serious decisions, like quitting a job without a backup plan. Understanding impulsivity is crucial because it can lead to negative outcomes in all aspects of life. Impulsivity can affect financial decisions, social relationships, and even physical health. By learning more about what causes impulsivity and how to manage it, we can make better choices and improve our overall

well-being. It is not always negative, however, as it can also lead to creativity and spontaneity in certain situations. Recent decades have seen a surge of interest in the effects of impulsivity on psychophysiological behavior. It is the tendency to act on impulse, without considering the consequences or appropriateness of the action²⁻⁴.



From a variety of angles, impulsivity has been studied, and different definitions have been put forth. Eysenck says that impulsivity is defined by unplanned dangerous activities and hasty decision-making from a characterological perspective⁵. According to Dickman, people with dysfunctional impulsivity behave without giving their actions as much thought as the majority of people with the same skill and knowledge. subsequently, Dickman highlighted a further element known as the inhibitory component, which appears as insufficient attention and is a root cause of impulsivity⁶. Barratt separated impulse into three categories⁷:

- (i) motor (action without thinking),
- (ii) cognitive (quick cognitive decision-making), and
- (iii) non-planning (decrease in orientation towards future) factors

According to Nigg *et al.* (2015) impulsivity is the tendency to act hastily when a thoughtful response would be more suitable⁸. Three elements, according to Patton *et al.*, influence impulsivity:

- (i) acting on the spur of the moment (motor activation),
- (ii) not focusing on the task at hand (inattentiveness), and
- (iii) not planning and thinking carefully (non-planning)

In order to encompass multiple cognitive-social and its characterological dimensions, Moeller et al. examine impulsivity from a bio-psycho-social perspective⁹. According to them, a complete description of impulsivity should incorporate each of these elements.

- (i) Decreased sensitivity to negative consequences of behavior.
- (ii) Immediate and unplanned reaction to stimuli before processing the information thoroughly.
- (iii) No regard for long-term consequences of a behavior.

In psychopathology perspective, impulsivity is categorized into three ways:

- (i) Fast reaction without thinking and conscious judgment,
- (ii) acting without enough thinking, and
- (iii) a tendency to act with less thinking compared to the others who have similar levels of knowledge and ability.

Biomedical and neuropsychological studies showed that impulsivity is a failure to inhibit potentially harmful impulses¹⁰ and is correlated with physiological arousal¹¹. Sometimes high impulsivity might have negative consequences on the body and mind, executive function, autonomic nervous system, hyperactivity disorder, depression, and anxiety disorder^{12,13}. Impulsive behaviors were also observed in neuropsychiatric disorders, such as bipolar disorder, eating disorders, personality disorders, drug addiction, and attention deficit hyperactivity disorder (ADHD)^{14,15}. An individual with high impulsivity is connected with mediocre academic performance and provokes proclivity for substance abuse in the general population¹⁶.

ROLE OF PREFRONTAL CORTEX IN IMPULSIVITY

Multiple brain areas and neurotransmitter systems are involved in the complicated attribute of impulsivity. It has been linked to prefrontal cortex dysfunction, a part of the brain responsible for decision-making, impulse control, and mood regulation¹⁷. According to studies, people with high levels of impulsivity have less activity in the ventromedial and dorsolateral parts of the prefrontal cortex¹⁸. This shows that impulsivity may be linked to a lowered capacity to control emotions and restrain impulsive behavior. Furthermore, neurotransmitter

abnormalities in reward-processing and motivation-related neurotransmitter systems like dopamine, serotonin, and norepinephrine have been associated to impulsivity. These systems' malfunction may be the root of the impulsive behavior seen in people with high levels of impulsivity. Since it is engaged in restraining automatic responses and taking the long view, the prefrontal cortex is essential in controlling impulsive behavior. According to studies, prefrontal brain injury or disease can cause damage that impairs decision-making and increases impulsivity. In addition, studies have shown that prefrontal cortex-enhancing therapies, including cognitive training or transcranial magnetic stimulation, may be successful in lowering impulsivity and enhancing decision-making skills.

THE ROLE OF GENETICS IN IMPULSIVITY

Impulsivity is a complex behavior that can be influenced by a variety of factors. One of the most significant factors is genetics. Research has shown that certain genes may predispose individuals to impulsive behavior. For example, variations in the gene encoding for dopamine receptors have been linked to impulsivity¹⁹. Impulse control is a critical aspect of decision-making and can have a significant impact on an individual's success in various areas of life. While environmental factors such as upbringing and life experiences can influence impulse control, research has also shown that genetic factors play a role.

Studies have identified several genes that are associated with impulse control and decision-making abilities. One such gene is the DRD4 (Dopamine receptor) gene, which has been linked to dopamine levels in the brain. Dopamine is a neurotransmitter that plays a crucial role in reward-motivated behavior and can influence an individual's impulse control²⁰.

Another gene that has been implicated in impulse control is the Catechol-O-methyltransferase (COMT) gene. This gene is responsible for producing an enzyme that breaks down dopamine in the prefrontal cortex, which is the part of the brain that is involved in decision-making and impulse control. Variations in the COMT gene can affect the activity of this enzyme, which can in turn impact an individual's ability to regulate their impulses²¹.

ROLE OF IMPULSIVITY IN RELATIONSHIPS

Socially, making and maintaining personal relationships can be significantly impacted by impulsivity. Impulsive actions can result in impulsive decisions, which can damage relationships. For instance, irresponsible spending or lying might undermine confidence and lead to argument. Additionally, impulsive behavior might make it difficult to speak clearly and resolve problems in a relationship. Impulsive behavior such as angry outbursts, substance abuse, and reckless driving can push away friends and family members. It can also lead to legal issues and incarceration, further isolating the individual from society.

ROLE OF ENVIRONMENT IN IMPULSIVITY

Environmental factors can also play a role in impulsivity. Childhood experiences, such as abuse or neglect, can lead to impulsive behavior later in life. Additionally, exposure to drugs and alcohol that alter the prefrontal cortex of the brain, which leads to people acting impulsively on strong urges. Impulsive behavior is a result of this altered prefrontal cortex function²².

ROLE OF FINANCE IN IMPULSIVITY

Impulsivity can have serious consequences on an individual's financial well-being. Impulsive spending, gambling, and substance abuse can lead to debt, bankruptcy, and financial ruin. Impulsivity can have a significant impact on financial planning and budgeting. It can lead to impulsive purchases, overspending, and debt²³. Additionally, impulsive decisions such as quitting a job without a plan or investing in high-risk ventures can also have negative financial consequences. Studies have shown that individuals with high levels of impulsivity are more likely to have lower credit scores, higher levels of debt, and less savings than those with lower levels of impulsivity. They are also more likely to engage in risky financial behaviors, such as gambling or investing in high-risk stocks. Impulsive spending on purchasing the things can also lead to feelings of guilt or regret, which can further affect our mental and emotional well-being.

ROLE OF FEAR OF MISSING OUT (FOMO) IN IMPULSIVITY

In today's connected society, fear of missing out (FOMO) is a common syndrome that is fueled by the continual stream of social media updates and the anxiety of missing out on interesting events or experiences²⁴. It has detrimental effects on mental health, such as

increased stress, depression, low self-esteem, and impulsivity. Studying the psychological relationships between impulsivity and the FOMO is a fascinating field that examines these two phenomena. The discomfort or unease that results from the perception that other people are partaking in exciting or rewarding events that one is not is known as FOMO. On the other hand, impulsivity is the propensity to act without thinking through the repercussions of sudden urges or desires. Impulsivity and FOMO have a relationship because they both have specific psychological characteristics. Both have a component of seeking short-term pleasure, frequently at the expense of long-term objectives or one's own well-being. By amplifying the desire for rapid fulfillment, FOMO might encourage impulsivity^{25,26}. People who worry about losing out on exciting opportunities may be more likely to act impulsively and sign up for social activities or buy things they think will make their experiences better. Fear of exclusion can cause people to lose their inhibitions and make choices that put their immediate gratification before their best interests. Therefore, we can assert that there may be a negative feedback loop between impulsivity and FOMO. An individual is more likely to experience the impacts of FOMO if they participate in more impulsive activities to prevent missing out since they run the risk of missing out on other possibilities. This may result in elevated anxiety, reduced choice satisfaction, and a cycle of impulsive behavior fueled by FOMO²⁷. It can make impulsive behavior worse, while impulsivity itself can make FOMO more intense. Making more deliberate, satisfying, and well-balanced decisions can result from being aware of these dynamics and using yogic techniques to control impulsivity and deal with FOMO.

ROLE OF PRANA IN IMPULSIVITY

A basic idea in several Eastern spiritual and healing systems, including Yoga, Ayurveda, and Traditional Chinese Medicine is prana, often known as chi or life energy. It is said to be the fundamental energy that keeps all living things alive. Prana moves through the body's energy pathways or channels, maintaining the harmony and balance required for general health^{28,29}.

Some holistic traditions contend that interruptions in pranic flow might affect mental and emotional states, possibly resulting in impulsive behavior, even if the scientific knowledge of prana and its

flow is still up for debate. Here are a few ways that pranic imbalance and impulsivity may be related.

- a. ***Disturbed Energy Flow:*** According to Ayurveda and Yoga, abnormalities in the flow of prana might result in blockages or an excessive flow of energy in particular parts of the body. These discrepancies are thought to throw off the body's and mind's natural homeostasis, possibly causing impulsive behavior.
- b. ***Energetic Centers:*** A number of traditions place a strong emphasis on the existence of energy centers, including meridians in Traditional Chinese Medicine and chakras in Yoga and Ayurveda. Unbalances in these energy centers may affect how emotions are regulated and how thoughts are processed, which may have an impact on impulsive behavior.
- c. ***Mind-Body Connection:*** An individual's mental and emotional emotions are said to be closely related to prana. Being impulsive is frequently related with emotional instability and bad decision-making, which can result from disruptions in prana flow.

ROLE OF ADHI AND VYADHI IN IMPULSIVITY

Let's first comprehend the terms "Adhi" and "Vyadhi" because they are crucial to comprehending both mental and physical health in the traditional Indian medical system known as Ayurveda. While Vyadhi is used to describe physical illnesses or disorders, Adhi is used to describe psychological disturbances or imbalances. These ideas are closely related and have an effect on several different facets of a person's well-being, including impulsivity³⁰.

- a. ***Adhi: Psychological Disturbances***
Adhi refers to a broad spectrum of psychological disorders that can influence a person's behavior and mental health. It covers issues including stress, anxiety, despair, and other emotional disorders. These disturbances can be caused by a variety of things, such as bad thought patterns, unresolved emotions, trauma, and lifestyle choices. Adhi has the potential to upset mental balance and trigger impulsive conduct.
- b. ***Vyadhi: Physical Diseases***
Physical ailments or bodily problems are referred to as vyadhi. These can be brought on by things like a poor diet, inactivity, exposure to pollutants in the environment, a hereditary

susceptibility, and physiological imbalances. The mind can be affected when there is a physical imbalance in the body. Vyadhi's physical discomfort or suffering might make people irritable and prone to impulsive behavior.

- c. *Adhi and Impulsivity*: Anxiety, stress, and anger can all increase emotional reactivity. When someone is emotionally distressed, they may be more likely to act rashly in order to cope. Someone suffering from anxiety, for example, may engage in impulsive activity to momentarily reduce their discomfort.
- d. *Vyadhi and Impulsive Behavior*: Vyadhi-caused physical discomfort or suffering can have an impact on an individual's mental state and decision-making. Chronic pain or discomfort can cause irritation, impatience, and a loss of reasonable thought. Individuals in such situations may make rash decisions in order to get respite or distraction from their bodily agony.

Adhi and Vyadhi are interrelated elements that can influence impulsivity by having an effect on one's emotional and physical conditions. Individuals can regulate impulsivity and attain a level of overall wellbeing by addressing these imbalances using Ayurvedic methods.

ROLE OF KOSHA IN IMPULSIVITY

In yogic philosophy, a "kosha" is a layer or sheath that represents different dimensions of human existence. These layers are believed to encapsulate the various aspects of an individual, ranging from the physical to the spiritual. There are five koshas (Annamaya Kosha (Physical Sheath) Pranamaya Kosha (Vital Energy Sheath), Manomaya Kosha (Mental Sheath), Vijnanamaya Kosha (intellectual Sheath), and Anandamaya Kosha (Bliss Sheath) each representing a different level of being. The mind has potential to influence all other kosha. It has a huge impact on our thoughts, feelings, and actions, as well as how impulsive we are. Manomaya kosha is closely related to our brain processes, thoughts, and cognitive capacities. Impulsivity is frequently caused by a person's inability to regulate their thoughts and desires. Manomaya kosha can become out of balance or excessively active, which can result in racing thoughts and make it more difficult to control impulsive behavior. Additionally, manomaya kosha creates our emotions. Intense emotional emotions can act as fuel for impulsivity.

For instance, irrational wrath or excessive frustration may result in impulsive actions or outbursts. Introspection and self-awareness are also intimately tied to manomaya kosha. A better understanding of one's own thoughts and feelings can lead to improved impulse control. This self-awareness is often cultivated through practices like self-control.

Yoga regulates all five Koshas in a proper manner, offers techniques to address impulsivity by harmonizing them. The concept of kosha provides a holistic framework for understanding the interplay between different dimensions of human existence and how they contribute to impulsive behavior. Yoga, an ancient practice that combines physical postures, breath control, meditation, and ethical principles, has been found to play a significant role in addressing and managing impulsivity. By nurturing each kosha through mindful practices, individuals can cultivate greater self-awareness, emotional regulation, and thoughtful decision-making, ultimately leading to a reduction in impulsivity and a more balanced approach to life.



Figure 2: Illustration of SuryaNamaskara & Pranayama

Ashtanga Yoga or Patanjali yoga is a holistic practice that encompasses various components such as Yama (Does), Niyama (Don't), Asana (Physical posture), Pranayama (Breathing technique), Pratyahara (Sense control), Dharana (effortful focus), Dhyana (meditation), and Samadhi (Blissful state)^[31]. Ashtanga Yoga emphasizes the synchronization of breath and movement. This focus on the breath-body connection enhances awareness and helps individuals become more

attuned to their sensations, thoughts, and emotions. By learning to observe these internal experiences without immediate reaction, practitioners can cultivate greater self-control. It offers a comprehensive approach to addressing impulsivity by promoting self-awareness, emotional regulation, mindfulness, and self-discipline^[32]. As a mind-body practice, it addresses the root causes of impulsive behavior and provides individuals with tools to make more conscious choices. However, it's important to note that while yoga can be a valuable tool in managing impulsivity. Individuals seeking to manage impulsivity should consider incorporating yoga into a holistic approach to well-being.

MANAGEMENT OF IMPULSIVITY

One effective strategy for managing impulsivity is to be aware, conscious, and attentive to the present moment. This involves being aware of your thoughts, feelings, and bodily sensations in the present moment without judgment. By practicing mindfulness regularly, you can develop greater self-awareness and self-control, which can help you make more deliberate choices instead of acting impulsively.

Another strategy is cognitive-behavioral therapy (CBT), which can help you identify and change negative thought patterns and behaviors that contribute to impulsivity. CBT can also teach you coping skills and relaxation techniques to manage stress and anxiety, which can trigger impulsive behavior.

Yoga and meditation have been introduced as a therapeutic intervention in the domains of physical and mental health problems. Impulsivity is related to mental health which percolates the physical health gradually. Several yoga and meditation research studies have reported their impact on the mental and physical health. One of the studies found the resting state EEG brain potentials in the frontal region are linked to impulsive behavior and can be influenced by the practice of meditation. The brain potentials of resting-state EEG showed higher alpha and lower beta power in the right frontal region³³. These outcomes suggest that meditators were relaxed which may help to control the impulsive behavior related to attention, motor and non-planning behavior. Previous studies reported that the right frontal region of the brain is associated with reorienting of attention, working memory, decision making, and impulsive control³⁴. Moreover, the motor

inhibitory control is linked to the right frontal cortex which helps in regulating the positive and negative emotional impulse responses. Shreds of evidence indicates that the meditation practice may have improved the functional brain connectivity of the right frontal region which facilitates the control over impulsive attention, motor, and non-planning behavior. The functional connectivity of the frontal brain network includes the intrinsic activity of the interior frontal-insular region involved in executive control, goal-directed behavior, initiation, and inhibition of cognitive functions³⁵. From meditation to attention and motor control behavior involves five cortical regions i.e., anterior cingulate cortex, insula cortex, dorsolateral prefrontal cortex, frontal parietal network, and primary motor cortex that help individual for preparation to execution of the task³⁶. The prefrontal cortex demonstrated the impulse control functions via motor inhibitory system³⁷. A previous study reported alpha brain activity associated with novel creativity, thinking, focus, meditative state, restfulness, and relaxed wakefulness state³⁸. However, recent research suggests that people with high impulsivity and low alpha may have less capacity for response inhibition in the right frontal lobe³⁹. These evidences suggest right frontal cortex plays an important role in the inhibitory process which is indeed important for controlling impulsivity. Therefore, we claim that meditation enhances alpha power in the frontal lobe by reducing neuronal activity resulting in reduced impulsive behavior in the practitioners.

The modulation of beta power is associated with motor planning, which can be influenced by impulsivity⁴⁰. In meditators, low beta is primarily found in the frontal lobe⁴¹ which is associated with inhibitory processes⁴². A frontal higher beta is associated with the degree of mental effort required to complete the problem-solving task, decision-making, and stimulus assessment⁴³. Thus, a decrease in beta power could be a sign of non-judgmental behavior in the meditators. The beta band showed a positive correlation with impulsivity which suggests that the frontal beta power can influence impulsive behavior. Evidence suggests that meditation reduces the motor process and induces internalized attention.

CONCLUSION

In conclusion, we have discussed the definition of impulsivity and provided examples of impulsive behavior. We also explored the various factors that contribute to impulsivity, including genetics, environment, social relationship and brain chemistry. It is important to note that impulsivity can have negative consequences on an individual's life, such as financial, social, physical and mental health problems. However, there are strategies that can be used to manage impulsivity, such as cognitive-behavioral therapy, yoga and medication. It is crucial to understand and manage impulsivity because it can impact every aspect of our lives. By recognizing our impulsive tendencies and implementing effective management techniques, we can improve our decision-making abilities and overall well-being.

REFERENCE

1. Korponay, C., Dentico, D., Kral, T. R. A., *et al.* (2019). The Effect of Mindfulness Meditation on Impulsivity and its Neurobiological Correlates in Healthy Adults. *Sci Rep.*, 9(1),11963. doi:10.1038/s41598-019-47662-y
2. De Wit, H. (2009). Impulsivity as a determinant and consequence of drug use: A review of underlying processes. *Addict Biol.*, 14(1), 22-31. doi:10.1111/J.1369-1600.2008.00129.X
3. Kaiser, A., Holz, N. E., Banaschewski, T., *et al.* (2022). A Developmental Perspective on Facets of Impulsivity and Brain Activity Correlates From Adolescence to Adulthood. *Biol Psychiatry Cogn Neurosci Neuroimaging.*, 7(11),1103-1115. doi:10.1016/j.bpsc.2022.02.003
4. McMullin, S. D., Shields, G. S., Slavich, G. M., Buchanan, T. W. (2021). Cumulative lifetime stress exposure predicts greater impulsivity and addictive behaviors. *J Health Psychol.*, 26(14), 2921-2936. doi:10.1177/1359105320937055
5. Eysenck, S. B. G. (1993). The I \ddagger : Development of a measure of impulsivity and its relationship to the superfactors of personality. In: *The Impulsive Client: Theory, Research, and Treatment*. American Psychological Association,141-149. doi:10.1037/10500-009

6. Dickman, S. J. (1990). Functional and dysfunctional impulsivity: Personality and cognitive correlates. *J Pers Soc Psychol.*, 58(1), 95-102. doi:10.1037/0022-3514.58.1.95
7. Barratt, E. (2023). Impulsiveness and aggression. Published online 1994. Accessed August 14, <https://psycnet.apa.org/record/1994-97083-003>
8. Nigg, J. T., Silk, K. R., Stavro, G., & Miller, T. (2005). Disinhibition and borderline personality disorder. *Dev Psychopathol.*, 17(4), 1129-1149. doi:10.1017/S0954579405050534
9. Moeller, F. G., Barratt, E. S., Dougherty, D. M., Schmitz, J. M., & Swann, A. C. (2001). Psychiatric aspects of impulsivity. *Am J Psychiatry.*, 158(11), 1783-1793. doi:10.1176/appi.ajp.158.11.1783
10. Chamberlain, S. R., & Sahakian, B. J. (2007). The neuropsychiatry of impulsivity. *Curr Opin Psychiatry.*, 20(3), 255-261. doi:10.1097/YCO.0b013e3280ba4989
11. Zhang, S., Hu, S., Hu, J., Wu, P. L., Chao, H. H., Li, & C. S. R. (2015). Barratt impulsivity and neural regulation of physiological arousal. *PLoS One.*, 10(6), e0129139. doi:10.1371/journal.pone.0129139
12. Chudasama, Y. (2011). Animal models of prefrontal-executive function. *Behav Neurosci.*, 125(3), 327-343. doi:10.1037/a0023766
13. Peters, J. R., Eisenlohr-Moul, T. A., Walsh, E. C., & Derefinko, K. J. (2018). Exploring the pathophysiology of emotion-based impulsivity: The roles of the sympathetic nervous system and hostile reactivity. *Psychiatry Res.*, 267, 368-375. doi:10.1016/j.psychres.2018.06.013
14. Ozten, M., & Erol, A. (2019). Impulsivity differences between bipolar and unipolar depression. *Indian J Psychiatry.*, 61(2), 156-160. doi:10.4103/psychiatry.IndianJPsychiatry_166_18
15. Bakhshani, N. M. (2014). Impulsivity: A Predisposition Toward Risky Behaviors. *Int J High Risk Behav Addict.*, 3(2), e20428. doi:10.5812/ijhrba.20428
16. Duckworth, A. L., & Seligman, M. E. P. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychol Sci.*, 16(12), 939-944. doi:10.1111/j.1467-9280.2005.01641.x

17. Kim, S., & Lee, D. (2011). Prefrontal Cortex and Impulsive Decision Making. *Biol Psychiatry.*, 69(12), 1140-1146. doi:10.1016/j.biopsych.2010.07.005
18. Coplan, J. D., Webler, R., Gopinath, S., Abdallah, C. G., & Mathew, S. J. (2018). Neurobiology of the dorsolateral prefrontal cortex in GAD: Aberrant neurometabolic correlation to hippocampus and relationship to anxiety sensitivity and IQ. *J Affect Disord.*, 229,1-13. doi:10.1016/j.jad.2017.12.001
19. Pine, A., Shiner, T., Seymour, B., & Dolan, R. J. (2010). Dopamine, Time, and Impulsivity in Humans. *J Neurosci.*, 30(26), 8888-8896. doi:10.1523/JNEUROSCI.6028-09.2010
20. Schultz, W. (2007). Multiple Dopamine Functions at Different Time Courses. *Annu Rev Neurosci.*, 30(1), 259-288. doi:10.1146/annurev.neuro.28.061604.135722
21. Qayyum, A., Zai, C. C., Hirata, Y., et al. (2015). *Send Orders for Reprints to Reprints@benthamscience.Ae The Role of the Catechol-o-Methyltransferase (COMT) Gene Val158Met in Aggressive Behavior, A Review of Genetic Studies.*
22. de Wit, H. (2009). Impulsivity as a determinant and consequence of drug use: a review of underlying processes. *Addict Biol.* 14(1), 22-31. doi:10.1111/j.1369-1600.2008.00129.x
23. Tahir, M. S., Shahid, A. U., & Richards, D. W. (2022). The role of impulsivity and financial satisfaction in a moderated mediation model of consumer financial resilience and life satisfaction. *Int J Bank Mark.*, 40(4), 773-790. doi:10.1108/IJBM-09-2021-0407
24. Barry, C. T., Sidoti, C. L., Briggs, S. M., Reiter, S. R., & Lindsey, R. A. (2017). Adolescent social media use and mental health from adolescent and parent perspectives. *J Adolesc.*, 61(1), 1-11. doi:10.1016/j.adolescence.2017.08.005
25. Li, L., Griffiths, M. D., Mei, S., & Niu, Z. (2021). The Mediating Role of Impulsivity and the Moderating Role of Gender Between Fear of Missing Out and Gaming Disorder Among a Sample of Chinese University Students. *Cyberpsychol Behav Soc Netw.*, 24(8), 550-557. doi:10.1089/CYBER.2020.0283
26. Li, L., Griffiths, M. D., Niu, Z., & Mei, S. (2020). Fear of Missing Out (FoMO) and Gaming Disorder among Chinese University

- Students: Impulsivity and Game Time as Mediators. *Issues Ment Health Nurs.*, 41(12), 1104-1113. doi:10.1080/01612840.2020.1774018
27. Elhai, J. D., Gallinari, E. F., Rozgonjuk, D., & Yang, H. (2020). Depression, anxiety and fear of missing out as correlates of social, non-social and problematic smartphone use. *Addict Behav.*, 105, 106335. doi:10.1016/j.addbeh.2020.106335
28. Srinivasan, T. (2014). Prana and electrons in health and beyond. *Int J Yoga.*, 7(1), 1. doi:10.4103/0973-6131.123469
29. KJ, S., NK, M., & PG, A. (2023). Ayurveda, yoga, and acupuncture therapies in alleviating the symptom score among patients with spinal cord injury - A systematic review. *J Ayurveda Integr Med.*, 14(4), 100749. doi:10.1016/J.JAIM.2023.100749
30. Venkatesananda, S. (2010). *The Concise Yoga Vâsîcmha*. State University of New York Press. <https://books.google.co.in/books?id=IbqFcTyGlEgC>
31. Taimni, I. K., & Patañjali. (2010). *The Science of Yoga: The Yoga-Sûtras of Patañjali in Sanskrit with Transliteration in Roman, Translation and Commentary in English*.
32. Cohen, S. C. L., Harvey, D. J., Shields, R. H., et al. (2018). The Effects of Yoga on Attention, Impulsivity and Hyperactivity in Pre-school Age Children with ADHD Symptoms. *J Dev Behav Pediatr.*, 39(3), 200. doi:10.1097/DBP.0000000000000552
33. Krishna, D., Prasanna, K., Angadi, B., Singh, B., Anurag, S., & Deepeshwar, S. (2022). Heartfulness meditation alters electroencephalogram oscillations: An electroencephalogram study. *Int J Yoga.*, 15(3), 205. doi:10.4103/ijoy.ijoy_138_22
34. Fellows, L. K. (2011). Orbitofrontal contributions to value-based decision making: evidence from humans with frontal lobe damage. *Ann N Y Acad Sci.*, 1239(1), 51-58. doi:10.1111/J.1749-6632.2011.06229.X
35. Sutherland, M. T., McHugh, M. J., Pariyadath, V., & Stein, E. A. (2012). Resting state functional connectivity in addiction: Lessons learned and a road ahead. *Neuroimage.*, 62(4), 2281-2295. doi:10.1016/j.neuroimage.2012.01.117

36. Kral, T. R. A., Lapate, R. C., Imhoff-Smith, T., *et al.* (2022). Long-term Meditation Training Is Associated with Enhanced Subjective Attention and Stronger Posterior Cingulate-Rostrolateral Prefrontal Cortex Resting Connectivity. *J Cogn Neurosci.*, 34(9), 1576-1589. doi:10.1162/JOCN_A_01881
37. Sebastian, A., Jung, P., Krause-Utz, A., Lieb, K., Schmahl, C. T.Ä. & Fischer, O. (2014). Frontal Dysfunctions of Impulse Control â€” A Systematic Review in Borderline Personality Disorder and Attention-Deficit/Hyperactivity Disorder. *Front Hum Neurosci.*, 8. doi:10.3389/fnhum.2014.00698
38. Shanok, N. A., Saldias-Manieu, C., Mize, K. D., Chassin, V., & Jones, N. A. (2022). Mindfulness-Training in Preadolescents in School: The Role of Emotionality, EEG in Theta/Beta Bands, Creativity and Attention. *Child Psychiatry Hum Dev.*, 3, 1-15. doi:10.1007/s10578-022-01318-7
39. Lee, J. Y., Park, S. M., Kim, Y. J., *et al.* (2017). Resting-state EEG activity related to impulsivity in gambling disorder. *J Behav Addict.*, 6(3), 387-395. doi:10.1556/2006.6.2017.055
40. Tzagarakis, C., Thompson, A., Rogers, R. D., & Pellizzer, G. (2019). The Degree of Modulation of Beta Band Activity During Motor Planning Is Related to Trait Impulsivity. *Front Integr Neurosci.*, 13, 1. doi:10.3389/fnint.2019.00001
41. Hinterberger, T., Schmidt, S., Kamei, T., Walach, H. (2014). Decreased electrophysiological activity represents the conscious state of emptiness in meditation. *Front Psychol.*, 5(FEB). doi:10.3389/fpsyg.2014.00099
42. Maitra, S., Sasidharan, A., Mukhopadhyay, K., Sinha, S., & Chatterjee, M. (2020). Working memory, impulsivity and emotional regulation correlates with frontal asymmetry of healthy young subjects during auditory session. *Neural Netw World.*, 30(6), 365-378. doi:10.14311/NNW.2020.30.024
43. Garcia, A., Uribe, C. E., Tavares, M. C. H., & Tomaz, C. (2011) EEG and autonomic responses during performance of matching and non-matching to sample working memory tasks with emotional content. *Front Behav Neurosci.*, 5, 82. doi:10.3389/fnbeh.2011.00082

