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PERSONALITY TRAITS AND VULNERABILITY TO SPECIFIC DISORDERS

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Abstract: This article explores the relationship between the main personality traits (Openness to Experience, Conscientiousness, Extroversion, Agreeableness and Neuroticism) and vulnerability to developing mental disorders, based on neurotransmitters, hormones and brain regions involved. Dysfunctions in specific neurochemical systems, such as dopamine, serotonin and oxytocin, combined with genetic and environmental factors, are highlighted as catalysts for personality, mood and anxiety disorders. Fictional examples illustrate how different combinations of personality traits and biological factors can lead to the development of clinical conditions such as schizotypal personality disorder, obsessive-compulsive disorder, histrionic personality disorder and generalized anxiety disorder.

Keywords: Personality, Neurotransmitters, Mental Disorders, Dopamine, Serotonin, Personality Disorders

INTRODUCTION

Personality traits are enduring characteristics that influence individuals' behavior, emotions and cognition. Based on the "Big Five" model, these traits include Openness to Experience, Conscientiousness, Extroversion, Agreeableness and Neuroticism. Each of these traits is associated with different neurotransmitters, hormones and brain regions, which, when dysfunctional, can increase an individual's vulnerability to developing mental disorders. This article aims to analyze how neurochemical dysfunctions and genetic and environmental factors interact with these personality traits, contributing to the development of personality, mood and anxiety disorders. Using fictional examples, we illustrate how different combinations of personality traits and biological factors can lead to the emergence of specific clinical conditions. The relationship between personality and mental disorders is complex, and understanding the

neurobiological mechanisms underlying this relationship is fundamental to the identification and effective treatment of these conditions. This study seeks to contribute to this understanding by offering a detailed analysis of the vulnerabilities associated with each of the main personality traits.

DEVELOPMENT

The relationship between personality traits and vulnerability to specific disorders is an area of study that requires a detailed understanding of the underlying neurobiological and neurochemical bases. Personality traits, often regarded as stable behavioral predispositions, have been associated with a variety of neurotransmitters, hormones and brain regions, whose complex interactions modulate both the expression of these traits and susceptibility to neuropsychiatric disorders.

NEUROCHEMICAL MAPPING

Serotonin (5-HT): Serotonin plays a crucial role in regulating mood, anxiety and impulsive behavior. Its synthesis and release are predominantly modulated by the raphe nucleus, with projections affecting various cortical and subcortical regions, including the prefrontal cortex and amygdala. Deficiencies in serotonergic transmission have been correlated with traits such as neuroticism and predisposition to mood disorders such as major depression (Jiang et al., 2020).

Dopamine: Dopamine is closely associated with the reward and motivation systems, with origins in the ventral tegmental area (VTA) and projections that include the nucleus accumbens and the dorsolateral prefrontal cortex. Dopaminergic alterations have been implicated in personality traits such as novelty seeking and risk for the development of disorders such as schizophrenia and drug addiction (Zald & Treadway, 2017).

Norepinephrine: Norepinephrine, which originates mainly in the locus coeruleus, influences states of alertness, reactivity to stress and anxiety. Norepinephrine levels are associated with traits such as introversion and hypervigilance, and are also linked to predisposition to anxiety disorders, including panic disorder and generalized anxiety disorder (Sara & Bouret, 2012).

Cortisol: Cortisol, a hormone released in response to stress via the hypothalamic-pituitary-adrenal (HPA) axis, has profound effects on various brain functions, including the hippocampus and ventromedial prefrontal cortex. High cortisol levels are associated with neuroticism traits and greater vulnerability to depressive and anxiety disorders (McEwen, 2017).

NEUROANATOMICAL MAPPING

Amygdala: The amygdala is central to the regulation of emotions, particularly those associated with fear and aggression. Hyperactivity of the amygdala has been consistently associated with high anxiety traits and disorders such as post-traumatic stress disorder (PTSD) and generalized anxiety disorders (Phelps & LeDoux, 2005).

Dorsolateral Prefrontal Cortex (DLPC): The DLPC is involved in executive function, cognitive control and emotional regulation. Dysfunctions in this region are associated with traits such as impulsivity and vulnerability to disorders such as attention deficit hyperactivity disorder (ADHD) and obsessive-compulsive disorder (OCD) (Arnsten, 2009).

Hippocampus: The hippocampus, crucial for the formation of memories and mood regulation, is sensitive to chronic stress, which can result in hippocampal atrophy, often observed in individuals with depressive traits and disorders such as major depression (Sapolsky, 2000).

Mapping the interactions between these key neurotransmitters, hormones and brain structures reveals a complex underlying connection to both personality traits and vulnerability to specific disorders. This relationship highlights the importance of an integrative approach, which considers the dynamic interaction between biological and psychosocial factors in understanding vulnerability to mental disorders.

PERSONALITY TRAITS: NEUROBIOLOGICAL AND NEUROCHEMICAL JUSTIFICATIONS

Human personality traits, as outlined by the “Big Five” model, present complex interactions between neurotransmitters, hormones and specific regions of the brain. Each trait, described below, is supported by a specific set of neurobiological mechanisms that justify its manifestation.

1. Openness to Experience: Openness to experience is linked to intellectual curiosity and creativity and is often associated with dopaminergic activity, particularly involving the ventral tegmental area (VTA) and the dorsolateral prefrontal cortex. Dopamine, by modulating the expectation of reward and exploratory behavior, plays a crucial role in this trait (Zald & Treadway, 2017).

- Intellectual curiosity
- Creativity
- Active imagination
- Appreciation for art and beauty
- Preference for novelty and variety
- Tendency to seek out new and different experiences
- Flexibility of thought

2. Conscientiousness: Conscientiousness, which reflects self-discipline and organization, is related to the dorsolateral prefrontal cortex, an essential region for executive control. Serotonin also plays an important role in regulating this trait, influencing emotional and behavioral control (Arns-ten, 2009).

- Self-discipline
- Organization and planning
- Reliability and responsibility
- Persistence in achieving goals
- Attention to detail
- Preference for systematic behavior
- Impulse control

3. Extroversion: Extroversion, characterized by sociability and stimulus-seeking, is supported by a robust dopaminergic system, especially in the mesolimbic pathway that includes the nucleus accumbens and the ventromedial prefrontal cortex. These areas are crucial for the mediation of pleasure and social reward (Zald & Treadway, 2017).

- Sociability and the search for social interactions
- Assertiveness
- High level of energy and activity
- Enthusiasm and emotional expressiveness
- Propensity to seek external stimuli
- I like competitive and challenging situations
- Leadership skills

4. Agreeableness: Agreeableness, which involves cooperative and empathetic behavior, is strongly linked to oxytocin activity. This hormone facilitates the formation of social bonds and pro-social behavior, with particular influence on the nucleus accumbens and the anterior cingulate cortex (Kosfeld et al., 2005).

- Cooperation and collaboration with others
- Compassion and empathy
- Willingness to help
- Trust in others
- Flexibility in social situations
- Tendency to avoid conflict
- Altruistic behavior

5. Neuroticism: Neuroticism, associated with a tendency to negative emotions, is correlated with hyperactivity of the amygdala and increased activity of the hypothalamic-pituitary-adrenal (HPA) axis, which results in the release of cortisol. These biological factors contribute to greater susceptibility to stress and anxiety (McEwen, 2017).

- Tendency to experience negative emotions, such as anxiety and sadness
- Vulnerability to stress
- Emotional instability
- Ease of feeling angry or frustrated
- Excessive preoccupation with problems
- Tendency to react strongly to adverse situations
- Insecurity and low self-esteem

PERSONALITY TRAITS, NEUROTRANSMITTERS AND VULNERABILITY TO MENTAL DISORDERS

OPENNESS TO EXPERIENCE

NEUROTRANSMITTERS AND BRAIN REGIONS INVOLVED:

- **Neurotransmitters:** Dopamine
- **Brain Regions:** Ventral Tegmental Area (VTA), Dorsolateral Prefrontal Cortex, Hippocampus

VULNERABILITY TO MENTAL DISORDERS

Individuals with a high openness to experience may be more vulnerable to mood disorders, such as depression, and personality disorders, such as schizotypal disorder and borderline disorder. This personality trait, characterized by the search for new experiences and cognitive flexibility, can predispose individuals to altered mental states that approach psychosis or severe emotional dysregulation.

REASONS FOR VULNERABILITY

High openness to experience is strongly related to the dopaminergic system. Dopamine facilitates exploration and innovation, but in excess it can increase sensitivity to external stimuli, resulting in aberrant cognitive processing typical of disorders such as schizotypy. In addition, dopamine overload can exacerbate tendencies towards emotional dysregulation, increasing the risk of personality disorders such as borderline, characterized by impulsivity and emotional instability (Zald & Treadway, 2017).

TRIGGERING PERSONALITY DISORDERS

The development of personality disorders in individuals with a high openness to experience can result from a combination of genetic, environmental and neurochemical factors. Stressful events, combined with a neurobiological predisposition to dopaminergic hypersensitivity, can precipitate psychotic episodes or exacerbate maladaptive personality traits. Disorders such as schizotypal personality disorder, characterized by magical thinking and eccentric behaviour, and borderline personality disorder, marked by interpersonal and self-concept instability, are the most frequently associated with this trait.

FICTITIOUS EXAMPLES:

1. John - Schizotypal Personality Disorder: John grew up in a family environment that valued mystical and esoteric beliefs. This environment shaped his outlook from an early age. As a teenager, John was bullied for being different, which reinforced his social isolation and his inclination to retreat into his inner world. The lack of emotional support and social integration contributed to the consolidation and intensification of his eccentric beliefs.

- **Additional Reasons:**

- Environmental influences: Growing up in an environment that promoted alternative beliefs without question.
- Social trauma: Rejection and isolation during adolescence.
- Genetic factors: Possible genetic predisposition to schizotypal traits, amplified by environmental stressors.

2. Maria - Borderline Personality Disorder: Maria had a childhood marked by an unstable relationship with her parents, alternating between excessive attention and neglect. During her teenage years, she suffered a traumatic break-up, which deeply affected her self-image and ability to trust others. In addition to emotional dysregulation, Maria had a genetic predisposition to mood disorders, which ran in her family.

- **Additional Reasons:**

- History of relational trauma: Emotional instability resulting from inconsistent parental relationships and a traumatic break-up.
- Genetic predisposition: Family history of mood disorders.
- Social influences: Exposure to an environment that did not manage impulses and emotions in a healthy way.

3. Carlos - Bipolar Mood Disorder: Carlos grew up in a family where success was highly valued, with constant pressure to exceed expectations. Throughout his life, he went through several career changes, each with high levels of stress and uncertainty, exacerbating his tendency to emotional extremes. Carlos also had a history of substance abuse, which, combined with his genetic predisposition and ongoing stress, contributed to the development of bipolar disorder.

- **Additional Reasons:**

- Chronic stress: Constant pressure to succeed and frequent career changes.
- History of substance abuse: Use of alcohol and drugs as a way of coping with stress.
- Genetic predisposition: Family history of bipolar disorder, increasing susceptibility to the disorder.

CONSCIENTIOUSNESS

NEUROTRANSMITTERS AND BRAIN REGIONS INVOLVED:

- **Neurotransmitters:** Serotonin
- **Brain Regions:** Dorsolateral Prefrontal Cortex, Anterior Cingulate Cortex

VULNERABILITY TO MENTAL DISORDERS

Individuals with high conscientiousness may be more likely to develop obsessive-compulsive disorders and obsessive-compulsive personality disorders. This trait can lead to excessively rigid and perfectionist behaviors, which, in extreme cases, turn into compulsions and obsessions.

REASONS FOR VULNERABILITY:

Dysfunction in the serotonergic system is often associated with high conscientiousness. Serotonin regulates compulsive behavior and anxiety. Dysfunctional levels of this neurotransmitter can exacerbate the need for control and aversion to uncertainty, promoting repetitive and obsessive behaviors, typical of obsessive-compulsive disorder (Arnsten, 2009). The dorsolateral prefrontal cortex, involved in executive control, can reinforce this rigidity and obsession with detail.

TRIGGERING PERSONALITY DISORDERS:

Personality disorders in individuals with high conscientiousness arise from a combination of genetic predisposition, environmental factors and neurochemical dysfunctions. Extreme perfectionism, environmental pressure for control and genetic predisposition can lead to the development of obsessive-compulsive and anancastic personality disorders.

FICTITIOUS EXAMPLES:

1. Ana - Obsessive-Compulsive Disorder (OCD): Ana was known for her meticulous organization and high standards of perfectionism. The pressure to keep everything in perfect order led to the development of compulsive cleaning and checking rituals, which began to interfere with her daily life.

- **Additional Reasons:**

- Environmental influences: Strict family demands regarding performance and order.
- Genetic predisposition: Family history of OCD.
- Serotonergic dysfunction: Low serotonin levels, intensifying the compulsion for perfection.

2. Bruno - Obsessive-Compulsive Personality Disorder (OCPD): Bruno has always been dedicated to his work, obsessed with keeping everything in order and under control. Over time, this need for control has turned into extreme rigidity and inflexibility, negatively affecting his personal and professional relationships.

- **Additional Reasons:**

- Social influences: Exposure to a highly competitive work environment.
- Genetic predisposition: Family history of behavioral rigidity.
- Increased activity in the dorsolateral prefrontal cortex: Intensifying obsession with detail.

3. Carla - Generalized Anxiety Disorder (GAD): Carla, who is highly conscientious, has always been preoccupied with meeting deadlines and responsibilities. This constant worry evolved into a chronic state of anxiety, where she felt constantly overwhelmed by expectations.

- **Additional Reasons:**

- History of chronic stress: Continuous pressure to perform well in all areas of life.
- Genetic predisposition: Family history of anxiety disorders.
- HPA axis dysfunction: Contributing to a heightened stress response and persistent anxiety.

EXTROVERSION

Neurotransmitters and Brain Regions Involved:

- **Neurotransmitters:** Dopamine, Serotonin, Norepinephrine
- **Brain Regions:** Nucleus Accumbens, Ventromedial Prefrontal Cortex, Amygdala

VULNERABILITY TO MENTAL DISORDERS:

People with high extroversion may be at greater risk of developing histrionic and narcissistic personality disorders, due to their constant search for attention and external validation.

REASONS FOR VULNERABILITY:

High extroversion is often associated with the dopaminergic system, which regulates reward seeking. When dysregulated, dopamine can lead to a pathological need for validation and attention, central features of histrionic and narcissistic disorders (Zald & Treadway, 2017). Serotonin and norepinephrine also play roles in modulating impulsivity and emotional reactivity, exacerbating dramatic behavior and the search for immediate gratification.

TRIGGERING PERSONALITY DISORDERS:

The development of personality disorders in highly extroverted individuals can be driven by a combination of genetic, environmental and neurochemical factors. The constant search for approval and attention, exacerbated by genetic predispositions and an environment that values extroversion, can lead to the development of histrionic or narcissistic personality disorders.

FICTITIOUS EXAMPLES:

1. Lucas - Histrionic Personality Disorder: Lucas was always the center of attention wherever he went. His incessant search for social recognition led him to increasingly exaggerated and dramatic behavior, damaging his personal relationships.

- **Additional Reasons:**

- Social influences: Continuous encouragement to be the focus of attention from childhood.

- Genetic predisposition: Family history of dramatic and exaggerated behavior.
- Dopaminergic dysfunction: High sensitivity to social reward.

2. Mariana - Narcissistic Personality Disorder: Mariana has always been charismatic and assertive, but her need to be admired has led her to selfish behavior and manipulation of the people around her, characteristics of narcissistic personality disorder.

- **Additional Reasons:**
 - Family influences: Growing up in an environment that values superiority and personal success above all else.
 - Genetic predisposition: Narcissistic tendencies in the family.
 - Dopaminergic dysregulation: Exacerbating the search for gratification and validation.

3. Pedro - Borderline Personality Disorder: Pedro, extroverted and impulsive, began to have difficulties controlling his emotions and behavior, leading to extreme instability in his personal relationships.

- **Additional Reasons:**
 - Environmental influences: Exposure to unstable and unpredictable relationships during childhood.
 - Genetic predisposition: Family history of emotional instability.
 - Serotonergic dysregulation: Contributing to impulsivity and emotional lability.

PLEASANTNESS

Neurotransmitters and Brain Regions Involved:

- **Neurotransmitters:** Oxytocin, Serotonin
- **Brain Regions:** Nucleus Accumbens, Anterior Cingulate Cortex

VULNERABILITY TO MENTAL DISORDERS:

Individuals with high agreeableness may be more vulnerable to developing dependent and avoidant personality disorders, due to their tendency to prioritize others and avoid conflict.

REASONS FOR VULNERABILITY:

High agreeableness is associated with the oxytocinergic system, which promotes social bonding behaviors and empathy. Hyperactivity in this system can lead to excessive emotional dependence and aversion to conflict, predisposing the individual to dependent and avoidant personality disorders (Kosfeld et al., 2005). By regulating social behavior and anxiety, serotonin can influence the tendency to avoid confrontation and constantly seek approval from others.

TRIGGERING PERSONALITY DISORDERS:

The onset of personality disorders in highly agreeable people can be the result of an interaction between genetic predisposition, environmental experiences and neurochemical factors. The constant need to avoid conflict and seek approval, exacerbated by a family or social environment that discourages assertiveness, can lead to the development of disorders such as dependent personality disorder.

FICTITIOUS EXAMPLES:

1. Carla - Dependent Personality Disorder: Carla has always prioritized others over herself. Over time, she developed an extreme dependence on her partners and family to make decisions, becoming unable to function independently.

- **Additional Reasons:**
 - Family influences: Raised in an environment that discouraged independence and assertiveness.

- Genetic predisposition: Family history of emotional dependency.
- Hyperactivity of the oxytocinergic system: exacerbating the need for constant support and care.

2. Ana - Avoidant Personality Disorder:

Ana has always been extremely empathetic, but also very sensitive to rejection. Over time, she began to avoid social interactions for fear of being criticized or rejected, which led to the development of an avoidant personality disorder.

• Additional Reasons:

- Social influences: Growing up in a critical environment that discouraged self-confidence.
- Genetic predisposition: Family history of social anxiety disorders.
- Serotonergic dysregulation: Intensifying sensitivity to rejection and social anxiety.

3. Bruno - Generalized Anxiety Disorder (GAD):

Bruno has always been cooperative and attentive, but the need to please everyone around him has resulted in constant and overwhelming worry, leading to the development of generalized anxiety disorder.

• Additional Reasons:

- History of chronic stress: Continuous pressure to meet the expectations of others.
- Genetic predisposition: Family history of anxiety disorders.
- HPA axis dysfunction: elevated cortisol levels, exacerbating stress reactivity and vulnerability to anxiety.

NEUROTICISM

Neurotransmitters and Brain Regions Involved:

- **Neurotransmitters:** Serotonin, Norepinephrine, GABA
- **Brain Regions:** Amygdala, Ventromedial Prefrontal Cortex, Hypothalamus

VULNERABILITY TO MENTAL DISORDERS:

Individuals with high neuroticism are particularly vulnerable to developing anxiety disorders, depression and borderline personality disorders due to their tendency to experience intense negative emotions.

REASONS FOR VULNERABILITY:

High neuroticism is strongly associated with dysfunction in the serotonergic system, which plays a crucial role in regulating mood and anxiety. Low serotonin levels can increase emotional reactivity and the tendency to experience feelings of anxiety and depression (McEwen, 2017). In addition, hyperactivity of the hypothalamic-pituitary-adrenal (HPA) axis and elevated cortisol levels in response to stress contribute to vulnerability to the development of mood and personality disorders.

TRIGGERING PERSONALITY DISORDERS:

The onset of disorders in individuals with high neuroticism can be precipitated by a combination of genetic predisposition, environmental factors and neurochemical dysfunctions. The interaction between these factors can lead to the development of anxiety disorders, depression and borderline personality disorders, marked by emotional and behavioral instability.

FICTITIOUS EXAMPLES:

1. Lucas - Generalized Anxiety Disorder (GAD):

Lucas has always been anxious and worried about small details. Eventually, his constant worrying evolved into a chronic state of generalized anxiety, where he felt overwhelmed by everything around him.

• Additional Reasons:

- History of trauma: Exposure to stressful and traumatic events in childhood.

- Genetic predisposition: Family history of anxiety disorders.
- Dysregulation of the HPA axis: High levels of cortisol, exacerbating stress reactivity.

2. Mariana - Major Depression: Mariana, who is highly neurotic, experienced a severe depressive episode after facing several personal adversities. Her tendency to ruminate on negative events and her genetic vulnerability to depression contributed to the development of severe depression.

- **Additional Reasons:**
 - Stressful life events: Loss of a loved one and financial difficulties.
 - Genetic predisposition: Family history of depression.
 - Serotonergic dysfunction: Low serotonin levels, contributing to persistent feelings of sadness.

3. John - Borderline Personality Disorder: John has always experienced intense and unstable emotions. After a series of failed relationships, he developed impulsive behavior patterns and extreme emotional instability, characteristic of borderline personality disorder.

- **Additional Reasons:**
 - History of abandonment: Repeated experiences of emotional abandonment in childhood.
 - Genetic predisposition: Family history of emotional instability and impulsivity.
 - Serotonergic dysregulation: intensifying emotional lability and impulsive behavior.

CONCLUSION

The disorder that a person may develop, given their personality trait, is determined by a complex combination of factors that go beyond dysfunctional neurotransmitters. Genetic factors play a significant role, influencing the predisposition to certain disorders. In addition, environmental influences, life experiences, and the interaction between genes and environment are also crucial. Therefore, while neurotransmitters and hormones provide a neurochemical basis for the development of disorders, the final expression of these disorders depends on a set of genetic, environmental and individual factors that interact in unique ways for each person.

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