Journal Name

Review Paper

The Cognitive Neuroscience of Narcissism

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Article history
Received:
Revised:
Accepted:

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Abstract: Narcissistic Personality Disorder (NPD) is a personality disorder that involves a long-term pattern of abnormal behavior characterized by exaggerated feelings of self-importance, an excessive need for admiration, and a lack of understanding of others' feelings. Sadism is an additional factor observed in the most severe type of NPD, malignant narcissism. At the psychological level NPD is usually diagnosed or studied using some type of self-report diagnostic instrument. While there is not a large body of research on the neuroscience of NPD, there are consistencies pointing to abnormalities in certain brain areas, especially the insular cortex, that are associated with features of NPD, especially lack of empathy. The origins of NPD remain unknown, however biological, psychological and social factors all play important roles in the etiology of this disorder. Further clinical and neuroscience studies of empathy disorders, especially NPD and malignant narcissism, are necessary in order to better understand the environmental factors that contribute to this disorder.

Keywords: Narcissism; Narcissistic Personality Disorder, Cognitive Neuroscience; Magnetic Resonance Imaging; Insular Cortex

Introduction

Understanding Narcissism

The father of American psychology, William James, believed that, "…phenomena are best understood when placed within their series, studied in their germ and in their over-ripe decay" (James, 1902, p. 373). Accordingly, if we take the phenomena of self-interest and observe it in its most germinal form, we see a Darwinian instinct that has great survival value. Moving up the series, a more severe form of self-interest, known as selfishness, produces excessive or exclusive concern with oneself. The narcissistic need to maintain a relatively positive self-image underlies individuals' needs for validation and affirmation as well as the motivation to overtly and covertly seek out validation and self-enhancement experiences from the social environment (Kohut, 1977; Pincus et al., 2009). This need can produce selfish behaviors, such as cheating and lying, which undermine the efforts of organized society. However, selfishness is not considered pathological. Self-interest reaches its "over-ripe decay" at the point of a narcissistic personality disorder (NPD), which depicts a pathological complex that is self-reinforcing and produces deleterious effects on the individual, close relationships, and possibly the broader social community. These significant functional impairments and related areas of maladjustment include: psychopathy, substance abuse, relational dysfunction, interpersonal conflict and sexual aggression, impulsivity, homicidal ideation, and parasuicidal/suicidal behaviors (Pincus et al., 2009).

History of the Construct

In ancient Greece, this type of behavior was identified as hubris. There are many stories of honorable people becoming afflicted with hubris and ultimately leading their community to destruction. The problem was illustrated in Ovid's myth of Narcissus, a handsome Greek youth who rejected the strong advances of the nymph Echo. As punishment, he was doomed to fall in love with his own reflection in a pool of water. Unable to consummate his self-love, Narcissus withered away and changed into a flower that bears his name, the narcissus.

Science Publications

In 1898, Havelock Ellis, an English sexologist, used the term "narcissus-like" in reference to excessive masturbation and auto-eroticism, whereby the person becomes his or her own sex object (Millon 2004). In 1899, Paul Näche was the first person to use the term "narcissism" in a study of sexual perversions (Millon 2004). Not too long thereafter, Otto Rank in 1911 published the first psychoanalytical paper specifically concerned with narcissism, linking it to vanity and self-admiration (Millon, 2004).

In 1914, Sigmund Freud published a paper titled "*On Narcissism: An Introduction",* in which he suggested that narcissism is a normal part of the human psyche. He argued that narcissism is the desire and energy that drives one's instinct to survive and referred to it as "primary narcissism" (Freud, 1914). Freud also conceived of a "secondary narcissism" that he described as a pathological condition, which occurs when the libido withdraws from objects outside the self. Freud (1914) put forward two main paths towards the choice of an object: the narcissistic path: where love is for the image of oneself, what one was, what one would like to be, or someone who once was part of oneself; or the anaclitic (attachment) path: where love is for those who feed or protect us. Freud therefore saw narcissism as an immature self-centered trait, indulged in at the expense of object love. Relinquishing one's narcissism was seen as an important maturational step.

During the 1960s and 1970s, psychoanalysts Otto Kernberg and Heinz Kohut helped spark renewed interest in narcissism. Kernberg (1967) introduced the term "narcissistic personality structure." Kernberg (1970) described the relationships of narcissistic personalities as 'exploitative and parasitic:' it is as if they feel they have the right to control others and to exploit them without guilt. Often patients are considered dependent "...but on a deeper level they are completely unable to depend on anybody because…the deep-seated belief is that anything good will vanish" (p. 52).

It was Kohut (1968) who first introduced the term *narcissistic personality disorder* (NPD) and went on to take some of Freud's earlier ideas about narcissism and expand upon them. Narcissism played an important role in Kohut's theory of self-psychology, which suggested that narcissism allows people to suppress feelings of low self-esteem and develop a positive sense of self. Essentially, Kohut's theory centers on the development of two archaic narcissistic configurations: 1) the "grandiose self", an exhibitionistic "I am perfect" image of the self, which represents an archaic "normal" primitive self (not a pathological structure as for Kernberg); and 2) the idealized parent image or omnipotent object, whereby perfection is ascribed to an admired self-object, the "you are perfect but I am part of you" view of the parent (Russell, 1985).

The social psychologist Erich Fromm (1964) first coined the term "malignant narcissism" describing it as a "severe mental sickness" representing "the quintessence of evil". He characterized the condition as "…the most severe pathology and the root of the most vicious destructiveness and inhumanity." Fromm's personality theory rests on data he gathered from a variety of sources, including psychotherapy, cultural anthropology, and psychohistory. Fromm applied the techniques of psychohistory to the study of several historical people, including Adolf Hitler--the person Fromm regarded as the world's most conspicuous example of someone with the syndrome of decay, which includes necrophilia, malignant narcissism, and incestuous symbiosis (Fromm, 1964).

Others soon elaborated on this concept of malignant narcissism. Edith Weigert (1967) saw malignant narcissism as a "regressive escape from frustration by distortion and denial of reality", while Herbert Rosenfeld (1971) described it as "a disturbing form of narcissistic personality where grandiosity is built around aggression and the destructive aspects of the self become idealized" (Ahktar, 2009, p. 163). Otto Kernberg (1970) pointed out that the antisocial personality was fundamentally narcissistic and without morality. He believed malignant narcissism includes a sadistic element creating, in essence, a sadistic psychopath. In his 1970 article, "malignant narcissism" and psychopathy are employed interchangeably, with Kernberg describing malignant narcissism as a syndrome characterized by NPD, antisocial features, paranoid traits, and ego syntonic aggression. Other symptoms may include an absence of conscience, a psychological need for power, and a sense of importance (grandiosity). Similarly, Pollock (1978) wrote that the malignant narcissist is pathologically grandiose, lacking in conscience and behavioral regulation with characteristic demonstrations of joyful cruelty and sadism.

Kernberg believed that malignant narcissism should be considered part of a spectrum of pathological narcissism, which he saw as ranging from Hervey M. Cleckley's antisocial character (today's psychopath or antisocial personality) at the high end of severity, through malignant narcissism, and then to NPD at the low end (Kernberg, 1994). The malignant narcissist thus represents a less extreme form of pathological narcissism than psychopathy.

While narcissists are common, malignant narcissists are less common. A notable difference between the two is the feature of sadism, or the gratuitous enjoyment of the pain of others. A narcissist will deliberately damage other people in pursuit of their own selfish desires, but may regret and will in some circumstances show remorse for doing so, while a malignant narcissist will harm others and enjoy doing so, showing little empathy or regret for the damage they have caused. People who are high in this trait fail to help others unless there is immediate gain or recognition to themselves for doing so; often think they are above the law and therefore violate it; and readily trample over others in their efforts to rise to the "top," which is where they think they belong. They are generally incapable of forming the kinds of deep, meaningful, lasting relationships with others that we all need in order to live happy, emotionally secure lives.

Current Social Trends

Within popular media there has been a massive upsurge in interest over the issue of narcissism and whether its prevalence rates are trending upward. For example, the cover story for the May 20, 2013 issue of *Time* magazine entitled "Millennials: The Me Me Me Generation" depicted so-called millennials (a generation spanning the 1980s to 2000) as typical narcissists. The alarmist message of the article contains statements such as, "Millennials are lazy, entitled narcissists, who still live with their parents" (Stein, 2013, p. 20). Ironically, this use of data to support claims of superiority in the expressed values, valuations, lifestyles and general beliefs of the generation that precedes millennials not only smacks of generationism but also comes across as somewhat narcissistic.

The national dialogue on generational narcissism was sparked by a 2008 meta-analytic study that analyzed college students' NPI scores from 1982 to 2006 and found an upward trend nationwide (Twenge et al., 2008a). When an attempt was made to replicate the study, a different group of researchers found that NPI scores remained unchanged over that time period in samples from the University of California (UC) campuses (Trzesniewski et al., 2008). Twenge countered that increasing numbers of Asian-Americans at the UC campuses over time may have masked changes in narcissism, because Asians and Asian-Americans score lower on the NPI when compared to Whites, Blacks, and Hispanics (Twenge et al., 2008b).

Sampling from a younger age group, that should not be impacted by Asians entering into the UC system, researchers Trzesniewski and Donnellan (2010) collected data from a large national sample of high-school seniors, from 1976 to 2006 (Total N = 477,380). The results produced *little evidence of meaningful change* in egotism, self-enhancement, individualism, self-esteem, locus of control, hopelessness, happiness, life satisfaction, loneliness, antisocial behavior, time spent working or watching television, political activity, the importance of religion, and the importance of social status, over the last 30 years. Trzesniewski concludes that, "Kids today are remarkably similar to previous generations; at least in terms of their traits and behaviors…they are just as narcissistic as we were at their age" (Dingfelder, 2011, p. 64). Given the conflicting results, the issue of generational differences in personality traits remains an open debate. As stated by Arnett (2013), "There is no persuasive evidence that scores on the Narcissistic Personality Inventory (NPI) have risen among college students in recent decades. In any case, the NPI is a dubious measure of narcissism, and college students are a dubious sample of emerging adults" (p. 5). Looking back in time, when we read historical statements from researchers, such as, "Although the 1970s were characterized as the 'me generation,' interest in narcissism shows no signs of abatement in the 1980s" (Emmons, 1987, p. 11), it causes us to question whether the concern over narcissism in emerging youth is anything new.

What researchers do agree upon is that NPD is more prevalent in males than females for unknown reasons, with about 18% of males presenting with NPD, compared to 6% of females in clinical samples (Ronningstam & Weinberg, 2013). When studying the general population, researchers have reported a lower lifetime prevalence rate, but still greater rates for men, at 7.7%, versus 4.8% for women (Stinson, et.al., 2008). In addition, many romantic partners of narcissists, as well as their parents, children, family members, co-workers and friends are thought to be directly affected by this disorder as well.

Clinical Methods in Narcissism Research

Contemporary Tools for Identifying Narcissism

There are varying levels of narcissism and it exists to some extent in everyone. It is in fact the extent and not the mere presence of narcissism that determines healthy versus pathological. Thus there is a clear need to differentiate pathological narcissism from normal narcissism. This has traditionally been addressed using three methods of assessment: semi-structured interviews, self-report inventories, and projective techniques

(Hilsenroth, Handler & Blais, 1996). One of the first structured interviews developed from and applied to clinically diagnosed narcissistic patients is the Diagnostic Interview for Narcissism (DIN) (Gunderson, Ronningstam & Bodkin, 1990). In addition to smaller scales that were developed exclusively for measuring narcissism, preexistent, standardized psychometric tests of personality and psychopathology, such as the Minnesota Multiphasic Personality Inventory (MMPI), have also been used to identify narcissism. For example, Ashby, Lee, and Duke (1979) reported the development of an MMPI Narcissistic Personality Disorder Scale (NPD), consisting of 19 items from the MMPI. Most of these approaches to assessment were developed in part by referencing standardized criteria found in diagnostic manuals (e.g., DSM-III) that have defined the clinical population upon which subsequent structured interviews and self-report measures are based. For this reason, this brief review of contemporary tools to identify narcissism begins with a look at the evolution of this construct within diagnostic manuals, then highlights some of the most frequently used self-report measures.

Diagnostic Manuals

The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM), which was introduced in 1952, was intended to give psychiatrists and other mental health professionals in the U.S. a way to provide diagnoses based on common definitions. However, it was not until 1980 (with the introduction of DSM-III) that specific criteria were enumerated. The purpose of the newer DSM was to aid both diagnosis and statistics, assuming that with clearer labels, clinicians would be able to better estimate the prevalence of major psychiatric disorders.

It is in the DSM-III that the diagnostic category of NPD was first introduced, giving it formal psychiatric recognition as an important concept within the clinical setting. While it did offer some treatment recommendations, there was no description of the disorder beyond identifying these individuals as "self-aggrandizing." In 1984, Kernberg proposed adding malignant narcissism as a psychiatric diagnosis but this never materialized.

In 1987, the DSM-III-R signified a paradigm shift by introducing empirically based, atheoretical and agnostic diagnostic criteria (Surís, Holliday & North, 2016). In this version, NPD was described using three essential features: *grandiosity*, *hypersensitivity to the evaluation of others*, and *lack of empathy*. These ideas were further clarified with statements such as, "These people are preoccupied with fantasies of unlimited success, power, brilliance, beauty, or ideal love, and with chronic feelings of envy for those whom they perceive as being more successful than they are" (DSM-III-R, p. 350). This general description was then followed by nine diagnostic criteria that helped establish diagnostic thresholds.

The fourth edition (DSM-IV-TR) was published in 1994 and replaced "hypersensitivity to evaluation" with *need for admiration*. Essentially, the same nine diagnostic criteria were retained. Summarized here in abbreviated form, those items are: 1) grandiose self-importance, 2) fantasies of unlimited success, 3) believes he/she is "special" and unique and can only be understood by special or high status people, 4) requires excessive admiration, 5) has a sense of entitlement, 6) is interpersonally exploitive, 7) lacks empathy, 8) often envious or believes that others are envious of him/her, 9) shows arrogant, haughty behaviors or attitudes. It is only the 9th criterion that differs from DSM-III-R, which replaced the older criterion of: "reacts to criticism with feelings of rage, shame, or humiliation."

The fifth edition (DSM-5) was published in 2013 and like its predecessor, characterized NPD by two core phenotypic personality traits: *grandiosity* and *attention seeking*. In addition to these, there must be problems with "self functioning" and "interpersonal functioning". The dimension of self-functioning, in particular, is used to introduce criteria from research on personality. Statements such as, "exaggerated self-appraisal may be inflated or deflated" provide a more sophisticated view of problems with *identity*. Statements such as, "often unaware of own motivations" or "personal standards are unreasonably high in order to see oneself as exceptional" provide a more complex view of problems with *self-direction*.

Within the dimension of interpersonal functioning, we find most of the descriptors originally included in DSM-III-R, though with slightly different wording. Descriptors such as "little genuine interest in others" (i.e., exploitive) and "relationships largely superficial and exist to serve self-esteem regulation" (i.e., believes he/she is "special") are used to the depict problems with *intimacy*. Descriptors such as "excessively attuned to reactions of others" (i.e., overreacts to criticism) and "impaired ability to recognize or identify with the feelings and needs of others" (i.e., lacks empathy) are used to depict problems with *empathy*. The older criteria of grandiose self-importance, sense of entitlement, and arrogant/haughty attitudes are now grouped together under *grandiosity*. The older criterion of "requires excessive admiration" is listed under *attention seeking*.

The only item to be omitted from the new nosology is "often envious of others". In addition to a more highly organized format, a dimensional set of criteria with diagnostic thresholds based on empirical data (Skodol, 2012; Skodol, Bender & Morey, 2014) can be found in DSM-5 Section III: *Emerging Measures and Models*. Given the flexibility and comprehensiveness of this new diagnostic system, the DSM-5 functions as an important resource for identifying pathological narcissism.

Self-report Questionnaires

Although researchers have been using self-report measures to assess trait narcissism for nearly five decades, there remain some differences surrounding the conceptualization of pathological narcissism, stemming in part from sampling that is drawn from the general population for social-personality research and from clinical settings for diagnostic instrumentation. What each of these has in common is the conceptualization of narcissism primarily in terms of an antagonistic interpersonal style that values self-pride above all else. This point of commonality is most keenly reflected in the Single-Item Narcissism Scale (SINS), which has only one question: *"To what extent do you agree with this statement: "I am a narcissist." (Note: The word "narcissist" means egotistical, self-focused, and vain.)."* It is extraordinary that this single question correlates positively with other traditional measures of narcissism and has good discriminant validity from common measures of self-esteem (Konrath, Meier & Bushman, 2014; van der Linden & Rosenthal, 2016).

Narcissistic Personality Inventory

The most widely used and most researched measure of narcissism is the *Narcissistic Personality Inventory* (NPI) (Raskin & Hall, 1979; Raskin & Terry, 1988; Wetzel et al., 2016). The NPI is based on the DSM-III clinical criteria for NPD, although it was designed to measure these features in the general population and is therefore sensitive to subclinical features of narcissism. Raskin and Terry (1988) originally identified seven factors in the NPI: authority, superiority, exhibitionism, entitlement, vanity, exploitativeness and self-sufficiency.

Personality Diagnostic Questionaire-4

The Personality Diagnostic Questionnaire (PDQ-4) (Hyler, 1994) was designed for application in clinical settings. When compared to the NPI, the PDQ-4 is more likely to capture an emotionally unstable, negative-affect-laden, and introverted variant of narcissism. In contrast, the narcissism captured by the NPI is an emotionally resilient, extraverted form (Miller & Campbell, 2008).

Pathological Narcissism Inventory

The Pathological Narcissism Inventory (PNI) (Pincus et al., 2009) is a recent self-report questionnaire designed to tease out vulnerability and grandiosity aspects of pathological narcissism. Its' trait profile correlates highly with expert rating on these dimensions (Miller, Lynam & Campbell, 2016).

Core Dimensions of Narcissists

The inventories described above make clear that there are certain general personality characteristics contained within the pathological narcissist. One question is the extent to which these characteristics are all part of a single trait group.

Previous research has often portrayed narcissism as a unitary construct, however more recent research suggests it may be multidimensional. Some studies have identified as many as eight dimensions (Clarke, Karlov, & Neale, 2015), others have identified three: grandiosity, seeking excessive admiration and a lack of empathy (Ronningstam & Weinberg, 2013), and other studies emphasize just two general factors (Rohmann et al., 2012) grandiose (overt) and vulnerable (covert) narcissism.

For the purpose of this discussion, it is clear that overall NPD includes an extreme sense of grandiosity and self-confidence, an excessive need for admiration and a reduced or non-existent capability for empathy. It is this last characteristic, a lack of empathy, that has generated much interest within the neuroscience community over the past several years.

Grandiosity

People with NPD tend to exaggerate their skills and accomplishments as well as their level of relationship with people they consider to be important. Their sense of superiority may cause them to monopolize conversations and to become impatient when others talk about themselves. They typically will disparage or devalue the other person by overemphasizing their own success. When they are aware that their statements have hurt someone else, they tend to react with contempt and to view it as a sign of weakness. When their own ego is wounded by a real or perceived criticism, their anger can be disproportionate to the situation, but typically, their actions and responses are deliberate and calculated.

Despite occasional instances of insecurity, the self-image they display is usually stable albeit overinflated.

Excessive Need for Admiration

Those who score high in narcissism have been found to overrate their own abilities, to lash out angrily in response to criticism, and to commit white-collar crimes at higher rates than the general population (Ronningstam, 2011). This constant desire for admiration and excessive response when it does not occur often has severe consequences, e.g., an inability to maintain relationships as they constantly seek something better, or when their lack of empathy becomes apparent to their partners (Ronningstam & Weinberg, 2013).

Low Empathy

One characteristic that clearly distinguishes non-narcissists from narcissists is empathy. Empathy refers to a capacity and tendency to experience life not just from one's own point of view but also from that of others, to feel others' joy and sorrow, and to care about others' wellbeing. Specialists in moral development consider empathy to be the foundation for human compassion and morality. Empathy means understanding another person's situation from their point of view. Often described as seeing through the eyes of another and feeling with the heart of another, empathetic people are much more aware of the world outside of their own ego. For the NPD sufferer, on the other hand, there is little need for empathy since others' points of view are not relevant to them.

Because of their lack of empathy, patients with NPD may exhibit an unforgiving nature and showcase anger and aggression in close relationships (Ronningstam & Weinberg, 2013). This can also affect work relationships or any close group activities, where consequences to others are not a part of the narcissist's concerns.

Cognitive Neuroscience and Narcissism

Biopsychosocial Models

Psychologists have for some time emphasized a multi-tiered approach to psychological research in what has become known as the Biopsychosocial Model of Behavior (Engel, 1977). This has become more the case over the past few decades as the area of Cognitive Neuroscience has grown to become one of the most dynamic fields of Psychological study (Mandler, 2002). Recognition that our place in the world can be viewed from perspectives, or levels, ranging from sub-atomic, through organismic to cosmic is a unique feature of the behavioral sciences. The ability as well as the necessity to explore these many levels is required for progress in understanding the nature of brain and behavior (George, 2017).

Incorporation of the Biopsychosocial Model and working to understand the links between brain, behavior and society is found throughout Psychology. The human brain is life's most complex living organ. It is made up of nerve cells and many of them. Most estimates are that there may be over one hundred billion individual nerve cells, or neurons, in the human brain. Each of them can make up to several thousand connections with other neurons to form what can practically be considered an nearly infinite network of nerve cell activity. These neurons are organized into very specific regions with very specific functions and these regions are also highly interconnected to form an extraordinarily complex series of integrated functional groups.

Neuroanatomical Features Associated With Components of Narcissism

We know that the front part of the brain, the frontal cortex, regulates much of our thinking and reasoning abilities. Similarly, around the lower sides of the brain are areas called the temporal lobes, where we find the keys to controlling many emotional states including fear and anger. We have a growing understanding of how these features relate to NPD, but because those suffering from NPD believe they do not have any behavioral or mental health problems it is difficult to recruit large numbers of these persons for clinical studies. Regardless, there have been some neuroscience studies done with NPD that provide us with a picture of how the brains of these individuals differ from healthy people.

In recent years neuroscience has made great progress in uncovering the brain mechanisms related to how we are able to feel what another person is feeling. It is intriguing to note that consistent evidence shows that sharing the emotions of others is associated with activation of neural areas that are also active during the first-hand experience of that emotion. For example, one recent study showed that patients with lesions caused by removing brain tumors in the anterior insular cortex (AIC) had deficits in explicit and implicit empathetic pain processing (Gu, et. al., 2013). This study provides evidence suggesting that the empathy deficits in patients with brain damage to the AIC are surprisingly similar to the empathy deficits found in several psychiatric diseases, including autism spectrum disorders, borderline personality disorder, NPD and others, suggesting

potentially common neural deficits in those psychiatric populations.

The insular cortex is comprised of a complex network of neurons coming into and exiting this brain region and is divided into subsections. It receives input from several sensory systems associated with emotion and empathy and receives projections from the glossopharyngeal nerve involved in the sensation of pain as well as tasting, swallowing and salivary secretions (Yamamoto and Kawamura, 1975). Insular neurons also respond to stimulation of the vagus nerve (Radna and MacLean, 1981) that also has important autonomic nervous system functions. Some of these may be related to changes in heart rate associated with emotional events.

In humans, the insular cortex has critical afferent and efferent connections with other regions of the cortex, including the frontal, parietal, and temporal lobes; the cingulate gyrus; and subcortical structures such as the amygdala, brainstem, thalamus, and basal ganglia (Flynn, et al., 1999). In this way, the insular cortex is able to receive, process and transmit signals regulating important emotional functions related to our sensory, motor and autonomic systems.

The insular cortex has been commonly associated with somatotopic representations of bodily states such as itch, pain, temperature, and touch (Damasio et al., 2000; Craig, 2002, 2009; Harrison et al., 2010). In addition, neuroimaging studies consistently show that AIC activation is associated with disgust (Phillips et al., 1997; Wicker et al., 2003; Calder et al., 2007), interoceptive awareness (Critchley et al., 2004; Zaki et al., 2012), general emotional processing (Davidson and Irwin, 1999; Zaki et al., 2012; 2009; Ebisch et al., 2011), intuition (Kuo et al., 2009), unfairness (Sanfey et al., 2003; Kirk et al., 2011), risk and uncertainty (Preuschoff et al., 2008; Bossaerts, 2010; Ullsperger et al., 2010; trust and cooperation (King-Casas et al., 2008), and norm violations (Montague and Lohrenz, 2007; Xiang et al., 2013). It has also been observed that patients with focal epileptic seizures that arise from the AIC report heightened emotional awareness and enhanced wellbeing (Picard, 2013). The insular cortex overall appears to form an internal image of the physiological state of the person and to relay these states and needs for one's awareness of feelings (Craig, 2002; Harrison et al., 2010; Seth et al., 2011).

Magnetic Resonance Imaging

Using MRI to measure brain structural volume, Schulze and colleagues demonstrated a consistent structural deficit in the insular cortex. For the NPD group, this region of the cerebral cortex was markedly reduced in thickness compared to the control group. The amount of empathy was directly correlated to the volume of gray matter in the insular region. Overall, patients with narcissism exhibited a significant reduction of gray matter in the insular cortex (Schulze, et. al., 2013).

Functional Magnetic Resonance Imaging

In the past decade scientists have used fMRI to identify several regions in the brain associated with empathy for pain.

Fan, et. al. combined assessments of non-clinical subjects on Narcissism inventories with fMRI measurements of empathy. High narcissistic subjects showed higher scores on the Symptom Checklist-90 – Revised (SCL-90-R) and the 20-item Toronto Alexithymia Scale (TAS-20) when compared to low narcissistic subjects. High narcissistic subjects also showed significantly decreased deactivation during empathy, especially in the right anterior insula. The neuroimaging data indicates lower activity in the insula in high narcissistic subjects. (Fan, et. al., 2010; Fan, et. al., 2011).

Another recent study firmly establishes that the AIC is where the feeling of empathy originates (Gu, et. al., 2012). A unique cell type -- the von Economo neuron (VEN) -- is located there. These rare neurons appear to be linked to empathy and self-awareness (Evrard, et. al., 2012; von Economo, 1926; Seeley et al., 2012). It is intriguing that VENs have been found to exist only in humans and great apes (Nimchinsky et al., 1995, 1999; Allman et al., 2010), macaque monkeys (Evrard et al., 2012), elephants (Hakeem et al., 2009), cetaceans and a number of their related terrestrial herbivore species (Butti et al., 2009, 2013; Butti and Hof, 2010). VENs are very large projection neurons well-suited for rapid, long-distance integration of information (Allman et al., 2005, 2010).

Diffusion Tensor Imaging

One characteristic of narcissists is that they exude a sense of confidence. However, the brain activity of these persons is inconsistent with their appearance. At a neural level, narcissists appear needy and insecure. Chester, et. al. (2015) used a method of measuring brain activity called diffusion tensor imaging, that measures the amount of connected activity between different brain areas. Such scans produce more accurate wiring diagrams of the brain, in contrast to structural magnetic resonance imaging (MRI) scans that show the brain's gray matter, and functional MRI scans (fMRI) that

measure overall neural activity. Higher narcissism scores were associated with lower connectivity between certain brain areas, including the prefrontal cortex and ventral striatum. These areas are associated with the ability to think positively about oneself and thus low activity in these areas may prompt NPD individuals to repeatedly seek out affirmation from others. This is consistent with theories that state these people have difficulty understanding their own self-concept, and may have low implicit self-esteem underneath their confident and arrogant exterior.

Brain mechanisms of emotional awareness

Empathy is one factor that makes up the large cluster of human emotions. Emotion is usually considered to consist of a physiological–biological component, an experiential–psychological component, and an expressive–social component (Lane and Schwartz, 1987; Dolan, 2002). One way to simplify this is to think of the dimensions combined into an overall sense of "feelings." It has been shown that emotional awareness typically occurs during the conscious processing of affective, or "incoming" stimuli (Pessoa, 2005). We also know that the capacity to experience emotions fully significantly increases the likelihood to make an appropriate action or decision (Lane and Schwartz, 1987).

Although several other brain regions are involved in processing and regulating emotions and the insula works closely with other regions, the insula has been singled out as the critical neural substrate for interoceptive and emotional awareness (Craig, 2009, 2010, 2011; Singer et al., 2009; Fan et al., 2011; Denny et al., 2012; Lindquist et al., 2012),

A clinical deficit in emotional awareness is called alexithymia (Taylor, 2000). It is commonly seen in conditions associated with functional deficits of the AIC (Seeley et al., 2006; Seeley, 2010; Kim et al., 2012), (Kaufman et al., 2008), Santos et al., 2011; Butti et al., 2013).

A self-report questionnaire, the 20-item Toronto Alexithymia Scale (TAS-20), was designed to assesse three aspects of emotional deficits: difficulty in identifying emotions, difficulty in describing emotions, and externally oriented thinking style (Taylor et al., 2003). As assessed by the TAS-20, the prevalence of alexithymia is approximately 10% in the general population (Kokkonen et al., 2001) and is remarkably high in patients with autism spectrum disorders (85%; Hill et al., 2004). In autism, lower AIC activations are correlated with higher TAS-20 scores (Bird et al., 2010).

Alexithymia is also observed in individuals with depersonalization syndrome (Simeon et al., 2009). This suggests that impaired emotional awareness interferes with normal social function in both clinical and nonclinical populations. Diminished ability to integrate information rapidly among spatially distinct regions may underlie functional deficits in these conditions and, ultimately, in the inability to make quick and intuitive judgments regarding uncertain and rapidly changing social contexts (Allman et al., 2005).

Conclusions

NPD is a personality disorder in which there is a long-term pattern of abnormal behavior characterized by exaggerated feelings of self-importance, an excessive need for admiration, and a lack of understanding of others' feelings. Our recognition of hubris has been around for many centuries, but only in the past sixty years has this become classified as a mental disorder that requires treatment. While not perfectly clear, there is a growing concern in popular media and among some researchers that the general population may be trending toward higher levels of narcissism but this position remains controversial.

Affected individuals typically spend large amounts of time thinking about achieving and maintaining power or success, or about their appearance. They excessively distort reality to confirm their grandiose feelings about themselves and they routinely take advantage of the people around them, knowingly or unknowingly. NPD typically begins by early adulthood, and occurs across a variety of situations and populations.

At the psychological level NPD is usually diagnosed or studied using some type of self-report diagnostic instrument. While results vary, it is clear there are some key dimensions required for NPD including grandiosity, need for attention and lack of empathy. Sadism is an additional factor observed in the most severe type of NPD, malignant narcissism.

While there is not a large body of research on the neuroscience of NPD, there are consistencies pointing to abnormalities in certain brain areas, in particular the insular cortex, that are associated with features of NPD, especially lack of empathy.

Due to the high-functionality associated with narcissism, some people may not view it as an impairment in their lives. Indeed, many successful and powerful individuals, whether good or bad, share some degree of narcissism considered to be above the norm.

Although overconfidence tends to make individuals with NPD ambitious, it does not necessarily lead to success and high achievement professionally. These individuals may be unwilling to compete or may refuse to take any risks in order to avoid appearing like a failure. In addition, their inability to tolerate setbacks, disagreements or criticism, along with lack of empathy, make it difficult for such individuals to work cooperatively with others or to maintain long-term professional relationships with superiors and colleagues.

Taken together, this work shows that NPD is a serious disorder characterized by lack of empathy, grandiosity and impaired emotional regulation. It is associated, at least in part, with brain irregularities primarily within the insular cortex and also in the frontal lobes of the brain. These are critical areas associated with the ability for empathy and higher level processing, judgment and decision making.

As shown in this review, while the origins of narcissistic personality disorder remain unknown, biological, psychological and social factors all play important roles in the etiology of this disorder. Indeed, additional clinical and neuroscience investigations of empathy disorders, especially NPD and malignant narcissism, are vital in order to clearly ascertain the environmental, genetic, and biological factors that contribute to these impactful but often overlooked disorders.

Acknowledgement

The authors would like to acknowledge Kayla Moore and Kate Heiber for research assistance.

Funding Information

Funding was provided by the Center For Cognitive & Behavioral Wellness, Denver, CO USA

Author's Contributions

Each author contributed substantively to the preparation, development and publication of this manuscript.

Ethics

There are no ethical or other conflict issues that would arise after the publication of this manuscript.

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