Creativity and psychopathology: Two sides of the same coin?

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INTRODUCTION

The idea that creativity and psychopathology are somehow linked goes way back to antiquity to the time of Aristotle, who famously stated that "No great mind has existed without a touch of madness."[1] Centuries later, this belief has been expanded by various psychiatrists. Lombroso, a renowned forensic psychiatrist, argued toward the end of the 19th century that genius and madness were closely connected manifestations of an underlying degenerative neurological disorder.[2] This is synonymous with the common observation that though creativity is most sought-after trait in fields as varied as business, the arts, science, and sports, and still, there is a long list of eminent creative achievers who have suffered from psychopathology. The list includes prominent comedian Robin Williams, artistic creators like Vincent Van Gogh, Robert Schumann, Mozart, Beethoven, Sylvia Plath, Virginia Woolf, Anne Sexton, Ernest Hemingway, Edgar Allan Poe, Michelangelo, Georgia O'Keefe, and Jackson Pollock.[3] Even when John Nash, who suffered from schizophrenia was asked "Why did you believe that you were appointed by aliens to save the world??" he answered "Because the ideas about supernatural things came to me the same way as did the mathematical solutions! So I took them seriously!!" Despite all the associations, there is a debate whether the two are linked and has divided the scientific community for decades. The prevailing view tends to tilt toward that psychopathology and creativity are probably positively associated.[4] But what is the scientific evidence supporting this association? How common is psychopathology in creative persons? What are its implications in clinical practice? It is to these questions that we now turn.

Key words: Creativity, mad genius, psychopathology

How to cite this article: Reddy IR, Ukrani J, India V, Ukrani V. Creativity and psychopathology: Two sides of the same coin?. Indian J Psychiatry 2018;60:168-74.
DEFINING CREATIVITY

Creativity may be simply defined as the act of turning new and imaginative ideas into reality.\[^{[9]}\] However, more than 60 definitions exist for creativity in psychology, literature, and no single definition has uniform acceptance.\[^{[6]}\] Dietrich identifies the four different types of creativity with corresponding different brain activities.\[^{[7]}\]

- Deliberate and cognitive: Kind of creativity that comes from sustained work in a discipline. For example, Thomas Edison, the inventor of the electric light bulb, was a deliberate and cognitive creator. He ran experiment after experiment before he would come up with an invention
- Deliberate and emotional: A personal crisis leading to a realization about yourself and what bad choices or decisions you might have made that contributed to the problem is deliberate, emotional creativity, for example, a relationship breakup, losing a job, going through bankruptcy, and then realizing what was your mistake that lead to the problem
- Spontaneous and cognitive: A sudden realization about how to staff the project, for example, Isaac Newton and Discovery of gravity after apple fell on his head from tree
- Spontaneous and emotional: The kind of creativity exhibited by great artists and musicians who can produce great work of arts within minutes.

In addition, the componential model of creativity stated that four components are necessary for any creative response: three components within the individual – knowledge (domain relevant skills), creative thinking (how people approach problems/personality traits), and motivation (intrinsic passion or interest in the work itself) and one component outside the individual – the social environment in which the individual is working.\[^{[8]}\] What it essentially means is that environment may also influence creativity in a similar way it influences psychopathology.

INTELLIGENCE AND CREATIVITY

The relationship between intelligence and creativity has been subject to scientific research for decades. The most important notion linking intelligence and creativity is the threshold hypothesis, which presumes that above average intelligence is a necessity for high-level creativity. According to this hypothesis, there is a correlation between intelligence and creativity up to 120 intelligence quotient (IQ) points, and after that, the association fades off gradually.\[^{[9]}\] Earlier research seemed to have supported this hypothesis;\[^{[10,11]}\] however, recent research is discrediting it by further examining creativity at different conceptual levels. One of the most general conceptual distinctions delineated by modern creativity research is the one between creative potential and creative achievement.\[^{[12]}\] Creative potential refers to the individual’s ability to generate something novel and useful\[^{[13]}\] whereas creative achievement refers to the actual realization of this potential regarding real-life accomplishments (such as having made a scientific discovery and written a novel).\[^{[14]}\] Recent research has shown that creative potential may be dependent on IQ; however, creative achievement is independent of IQ. Hence, even people with low IQ may perform and achieve something creatively.\[^{[15]}\]

TRUTH OR MYTH: THE EMPIRICAL FINDINGS

Scientific evidence linking the two comes from three types of research: (a) historiometric studies of prominent creators from our past; (b) psychiatric studies of the present-day creators based on clinical diagnoses; and (c) psychometric studies of modern creators by application of established assessment methods.

Historiometric research
In this type of research, biographies of prominent creators were systematically analyzed to observe the presence of symptoms similar with various psychopathological syndromes and came to four main conclusions:

- The rate and intensity of psychopathological symptoms usually appear to be higher among prominent creators than in the general population,\[^{[16,17]}\] and estimation is that highly creative artists are about two times as likely to experience some psychiatric disorder as compared to noncreative individuals.\[^{[18]}\] Depression is the most common problem faced by these creative individuals, along with the correlates of alcoholism and suicide.\[^{[19-21]}\]
- Ludwig suggested that on the average, the more eminent the creator, the higher is the expected rate, and intensity.\[^{[19]}\]
- The rate and intensity of symptoms may vary according to the specific domain of creativity, i.e., it may be different for scientists and writers.\[^{[22]}\] For example, studies suggest that almost 87% of famous poets experienced some form of psychopathology as compared to only 28% of the eminent scientists which is closer to the rates in general population.\[^{[17,18,22]}\]
- The family lines which produce the most prominent creators also tend to be characterized by a higher rate and intensity of psychopathological symptoms.\[^{[23,24]}\]

Psychiatric research
Research focuses on the incidence of clinical diagnosis and therapeutic treatment in samples of present-day creators. Akin to historiometric studies, psychiatric research also suggests a higher rate and intensity of symptoms among distinguished creators especially those engaged in artistic creativity.\[^{[25,26]}\] Depression, alcoholism, and suicide again appear to be the most common psychopathological problems faced by these creators. Furthermore, the evidence points that creativity and mental illness runs in the same family lines further consolidating the evidence from historiometric research.\[^{[27,28]}\]
Psychometric research
In these types of studies, standard assessment instruments are applied to modern-day creative individuals. The psychometric measures include the Minnesota Multiphasic Personality Inventory and the Eysenck Personality Questionnaire. In general, highly creative individuals scored above normal on several dimensions associated with psychopathology,[29] but following two main findings stand out.
• Although highly creative individuals have a tendency to show elevated scores on some psychopathological symptoms, their scores are seldom so high as to represent clear-cut and steriling psychopathology. Instead, their scores may lie somewhere between the normal and abnormal ranges.[12,29]
• Creative individuals score high on many other characteristics that may dampen the effects of psychopathological symptoms. In particular, creators may display high levels of ego-strength and self-sufficiency.[29,30] In addition, they can exert metacognitive control over their psychopathological symptoms, taking advantage of bizarre thoughts to create rather than having the bizarre thoughts take advantage of them.

Psychometric research emphasizes that eminent creators may lie on the same spectrum of psychopathological syndromes, but may display a less severe form of it, and hence, using it to their benefit; this finding is different from psychiatric and historiometric studies and forces us to understand the link further through neuroscience of creativity.

NEUROSCIENCE OF CREATIVITY AND PSYCHOPATHOLOGY
Neuroscience can approach this study in two ways: first, through brain imaging to study the cognitive mechanisms that may be commonly shared between creativity and psychopathology. Second, through molecular biology to identify the genetic variations that may underlie both creativity and psychopathology.

Brain imaging studies
Conventional research and overly simplistic notions surrounding the neuroscience of creativity have stated that the right side of the brain is responsible for creativity, passion, sensuality, and being poetic whereas left side of the brain is responsible for logical associations; however, recent literature has contradicted these findings. While creative cognition is in the process, three large-scale brain networks from both hemispheres are utilized and this is critical to understanding the neuroscience of creativity. Depending on the stage of the creative process, and what you’re actually attempting to create, networks from different brain regions are recruited to handle the task.[31]
• Network 1: The Executive Attention Network (outer prefrontal cortex + parietal lobe)
• Network 2: The Imagination Network (deep PFC + temporal lobe + parietal lobe)
• Network 3: The Salience Network (dorsal anterior cingulate cortices [dACC] + anterior insula [AI]).

For creativity, it is good to reduce the activation of the Executive Attention Network (a bit, but not completely) and to increase the activation of the Imagination and Salience Networks.[31] While this explains the origins of creativity in the brain, it does not emphasize how psychopathology may underlie or overlap with creativity.

More interesting phenomenon is the link between creativity and latent inhibition. Carson et al. pointed out that latent inhibition is a filtering mechanism to screen irrelevant stimuli[28] that we share with other animals, and it is tied to the neurotransmitter dopamine.[32] Research has consistently shown that low-latent inhibition was associated with high creative achievement, creative personality, and originality facet of divergent thinking. It is probably latent inhibition that makes a person creative while the above networks are recruited to generate novel ideas.

To help us understand this let us consider the following examples:
• Normal people with average latent inhibition will concentrate only on task at hand
• Attention-deficit hyperactivity disorder will concentrate on all the irrelevant stimuli rather than the task at hand
• People and artists with low-latent inhibition can concentrate on relevant and irrelevant tasks together and become more creative associating the two.

Carson et al.[32] pointed out that the most eminent creative achievers were seven times more likely to have reduced latent inhibition as shown in Figure 1, but research by Kaufman and Paul et al. and Lubow et al. also show a link between reduced latent inhibition and psychopathological syndrome of acute-phase schizophrenia.[34,35] This overlap of reduced latent inhibition between eminent creators and acute phase schizophrenia may help us understand the results of psychometric research in better light which keeps them on the same spectrum.

Genetic studies
The molecular genetics approach in this domain is already undergoing and studies by Reuter et al., Mayseless et al. and Kéri indicate polymorphisms of the DRD2 and DRD4 genes[36,37] involvement of the 5HT2a gene[38] and the NRG1 gene[39] that have been found linked to both creativity and some forms of psychopathology. Potential areas of further research are suggested by shared vulnerability framework of creativity and psychopathology as discussed by Carson.[40,41] The shared vulnerability model implies that creativity and psychopathology may have common genetically influenced factors that may be expressed as either psychopathology or...
creativity depending on the presence or absence of other protective factors such as high IQ, cognitive flexibility, good working memory, and risk factors such as low IQ and working memory deficits. The shared vulnerability factors that have been recognized include novelty salience, neural hyperconnectivity, and emotional lability in addition to cognitive disinhibition as shown in Figure 2.[40,41] Of these, research into novelty salience has shown some link between creativity and psychopathology. Novelty salience is associated with the motivation to explore new and distinct aspects of ideas or objects by leveraging the dopamine reward system. Research by McCrae, Reuter et al., and Flaherty has shown that novelty-seeking is associated with creative personality,[42,43] creative drive[44] but also addiction. Other vulnerability attributes such as emotional lability and neural hyperconnectivity have been linked to creativity in mood disorders and schizophrenia, respectively, but their association is poorly understood and needs more research.

**PSYCHIATRIC DISORDERS AND CREATIVITY**

Until now, we have discussed how psychopathology and creativity are linked in general and the mechanisms that may be involved in their association. Now, we move on to see how this association fares for various distinct psychopathological syndromes individually.

**Mood disorders**

There is widespread belief that mania is a source of creativity and is vividly exemplified by the worldwide release of many fashion products ranging from perfumes to goggles, which may be named “Mania.” Though popular beliefs are not always supported by empirical findings; however, this one’s an exception with there being a strong connection between mood disorders and artistic creativity. Research into this area has suggested that subjects with cyclothymia and first-degree relatives of subjects with manic depression had higher creativity scores than controls. Goodwin and Jamison, who studied biographical materials reported that bipolar disorder may have afflicted many eminent creators like John Berryman, Robert Lowell, Anne Sexton, Vincent van Gogh, and Robert Schumann, among others.[45,46] Akin to this several other biographical studies like one by Ludwig of over 1000 creators have provided consistent evidence for elevated rates of bipolar disorder in samples of famous individuals.[47] Studies by Andreasen using structured diagnostic interviews to assess creative writers attending the highly prestigious University of Iowa Writer’s Workshop showed that 43% of 30 participants were found to meet criteria for bipolar spectrum disorders, as compared to 10% of a noncreative control group of persons matched for age, gender, and education.[27] While the link is consistent, several studies suggest that creativity is particularly likely among those with either mild forms of bipolar disorder[26,48,49] or family histories of bipolar disorder[23] as opposed to full-blown bipolar I disorder, a finding consistent with historiometric studies discussed previously.

**Schizophrenia spectrum disorders**

The link between schizophrenia spectrum disorders and creativity is glorified by the Noble Winning genius John Nash and his struggles with schizophrenia. However, evidence suggests two important findings: one that he might be an exception as only elevated level of schizotypy and psychosis-proneness found in divergent thinkers or possessing some indicators of schizotypy promotes creative achievement but not full-blown schizophrenia and two that overlapping processes may be implicated in both creativity and proneness toward psychosis. As discussed earlier, one important feature of creativity is its novelty or originality and schizophrenic thoughts are more likely to be different, original or novel. Hence, schizophrenia by its very nature predisposes toward satisfying one important prerequisite for creative thinking, namely originality. What may distinguish the creative person is that they will be able to organize better the flood of novel ideas, choosing ones with more utility and develop them efficiently while disposing others which may not be the case for schizophrenics. This corresponds to the oft-quoted remark by two-time Nobel laureate Linus Pauling who said that: “The way to get good ideas is to get lots of ideas and throw the bad ones away.” Research into this association by Karksson and Kinney et al. suggests that psychologically healthy biological relatives of schizophrenics have unusually creative jobs or hobbies and may show higher levels of schizotypal personality traits in comparison to the general population[24,50] and Sass suggests that Creative achievement more likely with 1-2 indicators of Schizotypy as shown in Figure 3 which is consistent with similar findings for mood disorders. Discussing it further requires us to understand that schizotypal traits can be divided into two types “Positive” schizotypy traits which are unusual perceptual experiences, thin mental boundaries between self and other, impulsive nonconformity, magical beliefs, and “Negative” schizotypal traits which are cognitive disorganization, physical, and social anhedonia (difficulty experiencing pleasure from social interactions and activities that are usually enjoyable for majority of people). Of the two types[51] Batey and Furnham[52] found that the positive dimension of schizotypy consisting of unusual experiences and impulsive nonconformity, but not the negative disorganization dimension, were significantly correlated to rating self as creative and a creative personality. A look into the neuroscience aspect of this link reveals that the more creative the person, the more difficulty they had in suppressing the prefrontal while performing an effortful working memory task or activity. The prefrontal is the area of the default network[53,55] that is active during rest (when a person is not performing or focusing on an external task). Whitfield-Gabrieli et al.[56] found a similar difficulty to deactivate the prefrontal among schizophrenics and their
close relatives. This suggests that the key to creative thinking in such individuals may be unlocking the floodgates of their mind and letting as much information in as possible because sometimes the most bizarre and distant associations can turn into the most brilliant creative ideas in our mind. This idea is consistent with recent research on latent inhibition which has been discussed earlier and that schizotypy is associated with verbal and artistic creativity.\[57,58\]

Substance use disorders
While medical literature generally takes a negative view on drug use, Beveridge and Yorston suggest that the opposite is true for the lay public and artists.\[59\] They prize drugs such as alcohol for its ability to make new creative insights, and courageous drinking has long been associated with artistic personality. Rather than being a sign of personal failing, using drugs, and alcoholism is taken as evidence of artistic integrity. While studies on alcohol intoxication suggest positive benefits on the creative process,\[60\] studies on excessive alcohol intake in the long run provide more mixed results similar to studies linking other psychiatric disorders with creativity. Ludwig’s study on 1000 outstanding individuals who had their biographies published in the New York Times Book Review from 1960 to 1990 found a general increase in alcohol abuse in artists and especially writers.\[18,20\] Similar results were suggested by Post in his study of 291 world famous men and 100 well-known prose and playwrights.\[21,22\] When Ludwig investigated the writers in his previous cohort specifically, alcohol use proved detrimental to productivity in over 75% of the sample, especially in the latter phases of their drinking careers and Ernest Hemingway may be a good example of this phenomenon who managed to win a Nobel prize for literature during his days of intoxication, but later on in his life committed suicide.

Apart from alcohol many writers have also been addicted to drugs like opium of which Charles Dickens is a great example who lost his life partially because of being addicted to this drug.

Neurodevelopmental disorders
Although far fewer studies have examined neurodevelopmental disorders than psychotic, substance use, and mood disorders in relation to creativity, there has been substantial interest in whether young patients with these disorders have creative abilities surpassing their peers. The Savant phenomenon is interesting evidence for link between autism spectrum disorders (ASD) and creativity as usually they are exceptional in one or more areas such as mathematics, memory or musical skills. Many studies by Pring et al.\[61\] have demonstrated this and one study by Campbell and Wang also reports increased incidence of sibling with ASD\[62\] in children choosing a technical major. However, the research in this area is limited.

INDIAN STUDIES ON CREATIVITY AND MENTAL HEALTH

Indian literature has reported depiction of link between Creativity and mental health in Movies like Rockstar which emphasizes the popular cultural belief in India – a belief that deep pain enhances creativity and creative acts may actually help in healing the wounds.\[63\] Somasundaram studied the seeds of creativity in popular Indian poets Kannadasan and Poet Bharti who suffered from substance abuse and addiction.\[64,65\] There have been a handful of methodologically sound studies to clearly establish the relationship between creativity and mental health in India. The most prominent study by Pavitra et al. examined the psychiatric morbidity stress profile, coping skills, and personality profile in creative versus noncreative populations. It corroborated the findings of earlier studies in 70s and 80s that there was no difference between creative and noncreative groups regarding mental illness and stress profile.\[66\] This may not be true when comparing the findings to western literature, which lead us to believe that more research is needed to study the link between two in Indian population.

TREATMENT AND CREATIVITY

No matter who begets the illness, it needs to be treated. This is important because those creative individuals may not seek treatment for their condition as commonly as regular individuals because of many reasons. A study of profile of musicians and writers by Pavitra et al.\[66\] found that very few of experimental creative group had sought treatment because of the stigma of a famous artist contacting a psychiatrist would make them unpopular, the fear that taking neurotropic medicines would hinder their overall creativity, the popular notion that one has to be “little mad” to be creative and idea that the creative people are better equipped than general population to cope with stressors. While most reasons may seem unimportant to the overall management of the creative client it is important to understand that pharmacotherapy may alter, preserve, foster, or damage creativity in ways that significantly influence the quality of life and personal recovery in these creative clients. Carson suggested that creative patients may prefer to tolerate higher levels of mental symptoms in exchange for lower dosages of creativity-killing pharmaceuticals.\[49\] Kyaga et al. pointed out that patients with bipolar disorders and schizophrenia may commonly discontinue medication due to complaints of creativity diminution and cognitive impairments caused by drug treatment.\[87\] While agents such as bupropion may increase creativity in a depressed but creative individual, agents such as Lithium may flatten out creativity in bipolar artists and antipsychotics may not relieve negative symptoms in such patients.\[48\] Choosing a treatment line may be challenging in such cases but cues from the shared genetic vulnerability model of creativity and mental disorders discussed earlier suggest that
mental disorders in creative individuals maybe reduced by treating symptoms associated with vulnerability factors and enhancing protective factors associated with creativity and enhancing overall creativity.\cite{40} In general, treatments can be roughly divided into ones that are creativity promoting and creativity killing. Thus, nonpharmacological approaches such as cognitive-behavioral therapy, art, creative writing, drama, or music therapy may, along with redirecting patients interest into creative fields, reduce patients sufferings, and may yield a better outcome than not treating the client completely. Not treating an artist may also be dangerous as nontreatment may lead to fatalities, for example, Ernest Hemingway left hospital against advice and shot himself to death.

**CONCLUSION**

The mad genius debate is a polarizing and divisive issue in the field of creativity research but with the neuroscientific, psychometric, psychiatric, and historiometric evidence reviewed here, it is likely that psychopathology and creativity are closely related; sharing many traits and antecedents but outright psychopathology may be negatively associated with creativity. Therefore, persons with full-blown schizophrenia or alcohol dependence may not be creative but only milder forms of all illnesses may be conducive to creativity. Family members of psychiatric patients may display higher levels of creativity, findings that are consistent in studies across all psychiatric disorders. Another important finding from these studies is that persons with low IQ may perform and achieve something creatively and that IQ only determines the potential but not the possibility of creative achievement. This finding challenges common belief that low IQ individuals may not be capable of any achievements. While many creative individuals may feel stigmatized and ignore their psychological condition, it is important to treat them to prevent adverse outcomes and overall reduction in their creativity during their lifespan. Decision-making for their treatment should be individualized and tailor made rather than one size fits all approach.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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