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Creativity and the Spectrum of Affective and Schizophrenic Psychoses

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The possible connection between madness and creativity is a highly controversial issue. This is barely surprising, as it touches upon fundamental, human nature, issues that resonate beyond the scientific arena. In a sense, the subject borders on themes that can be regarded as distributive justice (does one need to “pay a price” for having superior gifts?), “poetic” justice (are those cursed with mental suffering at least compensated with an easier access to the muse?), and ethics (if we could eradicate the genetics of psychosis, would we actually be removing the genetic reservoir of unique human qualities such as creativity?).

Some would consider that the question itself is fundamentally wrong for various reasons. Humanistic and positive psychology schools view it as an attempt to pathologize what is essentially a positive feature that arises in healthy and self-actualized individuals (e.g., Fromm, 1980). Others claim that the whole theme survives as a cultural myth derived from inaccurate historical reinterpretations of the association between melancholia and creativity established by Greek philosophers (e.g., Schlesinger, 2009). Finally, many have criticized the lack of “strong” methods to prove the connection, which has relied on anecdotal descriptions of mad geniuses for a long time. All of these criticisms contain grains of truth and not surprisingly are brought up when the issue is presented in terms of madness being a necessary condition for creativity or creativity leading to madness. However, as will be elaborated, the recognition of *multiple* ingredients in both creativity and madness and the addition of more sound methods challenge the simple dismissal of this topic.

Another issue is whether considering the link between creativity and madness is scientifically important or useful at all. Most would acknowledge that supporting such a

connection can help to fight the stigma associated with such terribly misunderstood disorders. Indeed, this connection is positively regarded by many patients, as indicated by recent surveys reporting that, despite the strong association of bipolar disorder with social stigma and negative personal, health, and professional consequences, a large percentage of sufferers describe that the disorder provides positive associated facets such as increased creativity, sensitivity, self-awareness and a heightened appreciation of life (Galvez, Thommi, & Ghaemi, 2011; Parker, Paterson, Fletcher, Blanch, & Graham, 2012). Though this is relevant enough by itself, the importance of this issue expands far beyond the desirable effects on sufferers' self-esteem and public acceptance of mental disorders. Gaining understanding of this possible connection forces us to reflect upon preconceived notions regarding the very nature of mental disorders, their relationship with normal individual variation, and models of the etiology of psychopathology.

Many authors have previously reviewed the subject from different perspectives (e.g., Barrantes-Vidal, 2004; Brod, 1997; Kaufman, 2009; Kottler, 2005; Nettle, 2002; Sawyer, 2006; Silvia & Kaufman, 2010; Simonton, 2010; Weisberg, 2006), interpreting the evidence as indicative of a strong, mild, or non-existent connection between creativity and mental disorders. The present chapter will focus specifically on the implications of our conceptualization of mental disorders for making progress in this complex area of research and will offer a selected review on studies exploring the connection with the variety of psychoses.

Conceptual Issues

Temperament, Personality and Mental Disorder

The possible connection between creativity and mental disorder raises the paradox of assembling symptoms causing impairment with the superior mental processes and

effective production necessary for creativity. This perplexing association, which has generated much of the controversy on the matter, can be satisfactorily resolved if we consider mental disorders as dimensional phenomena (Claridge & Barrantes-Vidal, in press); that is, that they are continuously connected with ‘normality’ or healthy functioning, as suggested by the wide margins of intermediate shades that surround the dichotomous and often artificial border between illness and health (Eysenck & Eysenck, 1976).

Psychotic disorders, characterized in their extreme by delusions, hallucinations, and loss of touch with reality, have often been linked to creativity. The *fully dimensional* view of psychoses argues that these disorders are extreme or pathological variants of otherwise *normal* personality dispositions and, as such, they can be associated with both dysfunctional and adaptive traits (Claridge, 1997). The difference between clinical psychosis and its temperamental basis, called by Eysenck ‘psychoticism’ (in parallel to the construct of ‘neuroticism’), is argued to be quantitative and not qualitative, although its expression appears discontinuous in clinical populations and seems to produce qualitative changes, an observation that is considered by some to prove that psychoticism defines a discrete category or taxon and thus used to discard any connection with superior processes such as creative thinking (Claridge, 2009).

This fully dimensional view is widely accepted in pathologies such as anxiety disorders, which are readily understood as the extreme manifestations of a personality dimension (anxiety or harm avoidance) present in all people to differing degrees. Furthermore, within normal limits, anxiety has a *necessary* and *adaptive* function, such as being a vigilance mechanism that signals potential dangers and activates for a fight or flight response. However, it has been conceptually much harder for many researchers to

accept that there is a personality dimension, psychoticism, that, analogous to anxiety, may have advantageous features (Claridge, 1997).

The Schizophrenia and Bipolar Spectrums

The medical framework in which psychiatry was born imprinted the assumption that mental disorders are distinct disease entities in nature. Not surprisingly, thus, the main question in psychiatric research has been *which* disorder has a relationship to creativity, non-affective (schizophrenia) or affective psychosis (bipolar disorder)—even though the very distinction between the two families of disorders is controversial and officially bipolar disorder is outside the psychosis realm and listed as an affective disorder.

The concept of schizophrenia and bipolar *spectrums* imply that these disorders encompass a wide range of phenomenological expressions (varying in terms of severity, chronicity and impairment) that reflect variation in levels of environmental and genetic etiological load. The fields of schizophrenia and bipolar disorders have paid increasing attention to the ‘soft ends’ of the spectrum, which consist of lesser clinical forms (e.g., bipolar II and cyclothymia), personality disorders (mostly schizotypal), and personality traits such as schizotypy and the affective temperaments. The latter are considered to be nonclinical behavioral expressions of the genetic vulnerability towards, respectively, schizophrenia and bipolar disorders (Akiskal & Akiskal, 2007; Barrantes-Vidal, Colom, & Claridge, 2002; Kwapil & Barrantes-Vidal, 2012). Schizotypy and the affective temperaments present the same heterogeneity as clinical phenotypes, but at trait level, and thus are multidimensional constructs. Both would be subsumed under the broad concept of psychoticism.

Claridge (1997) noted that the spectrum model, derived from psychiatry and not the individual differences tradition, differs conceptually from the fully-dimensional

model referred to above in ways relevant for the connection with creativity. He described the spectrum notion as ‘*quasi*’ dimensional, as dimensionality refers to quantitative variation in *severity* within the illness domain, that is, qualitatively distinct from *normal* individual variation and thus not easily reconcilable with advantageous features such as creativity. The issue of spectrum versus fully dimensional models influences not only what phenotypes are investigated, but also what theories and research paradigms are considered to account for a possible link between creativity and mental illness.

Theories about the Connection between Creativity and Psychosis

The acceptance of the fully dimensional view of psychosis makes it possible to understand the connection between creativity and mental disorder. Logically, it is not the extreme variants of psychoticism (or schizotypy and affective temperaments), the psychotic *states*, that mediate the connection with creativity, but it is possible that the personality *traits* that underlie psychosis share some genetic, biological, emotional, motivational, and cognitive features with creativity. Additionally, it allows us to understand that creativity will not be related to a *single* psychological profile since, as referred to above, dimensionality also operates within the pathological realm as exemplified by the schizophrenia and bipolar spectrums (Claridge, 1998).

The notion of a common factor underlying the connection between creativity and psychopathology assumes that this common factor is causative, even if it is not a sufficient condition, and has overcome two alternative models (Richards, 2000-2001). One model claims that psychopathology causes creativity, either directly or indirectly. A direct relation would be for example that strange thoughts and bizarre perceptual processes may be vital for the creative process. For example, so-called overinclusive thinking (Cameron, 1938), defined by the loss of the capacity to limit associative

processes, is thought to contribute to creative insights when it does not reach severe forms that lead to complete incoherence. An indirect relation would be that pathology leads to cathartic writing, which, in turn, enhances the creative quality of a given work. The other model poses that creativity causes psychopathology. A direct relation would be, especially in the arts, that creativity implies facing high levels of psychic tension, leading to psychological imbalance. Rothenberg (1990) has argued that the creative thought processes employed by eminent creators and geniuses may stress mental capacities to their limits and inflict such emotional and mental strain that they result in the experience of psychosis. Various eminent writers (e.g., Virginia Woolf, Sylvia Plath) have recorded how overwhelming creative activity is and explicitly connected it to the triggering of psychotic episodes; at the same time, many have also viewed creative endeavor as a helpful media to keep madness “at bay.” Finally, an indirect relation would be that the conflicts created by creativity might result in maladaptive coping strategies such as drug abuse. Naturally, these possibilities are not mutually exclusive and most likely contribute in different degrees to the association between specific types of creativity and certain psychopathological traits.

Review of Empirical Studies

The empirical study of the creativity-mental disorder link suffers from methodological flaws as many authors have thoroughly described (e.g., Schlesinger 2009, this volume). Many studies are limited by small sample sizes (though some recent reports draw on population-whole designs), there are inconsistencies in diagnostic methods, and wide disparities in creativity definitions, levels, and measurements, with few studies assessing various aspects of creativity at once. However, as described below, several approaches have been developed that complement each other and help to compensate for the limitations inherent to each specific method.

Studies on Psychopathology in Eminent Creative People

The empirical examination of a link between creativity and mental disorder was first conducted by means of the psychobiographical method over one century ago. This approach consists of the systematic analysis of eminent creative individuals' biographies, auto-biographies, and available clinical records in order to study the presence of psychopathology. In historiometric research (reviewed by Simonton in this volume), the historical data drawn from biographical material are subjected to objective and quantitative analyses. Obviously, these methods present numerous limitations, such as a clear selection bias imposed by the choice of the creators studied, the fact that fame is not necessarily synonymous with being highly creative and depends heavily on contextual factors such as culture (e.g., barely any women are included in such studies!), the retrospective and thus partial nature of the data, or the impossibility of contrasting the author's diagnostic judgment. However, this approach constitutes an important source of information that inspires theories for further data-driven research. Another avenue is the study of psychopathology in contemporary eminent creators, in which case standardized diagnostic measures and criteria can be applied.

This line of enquiry started with Lombroso (1895), who studied biographies of eminent creators and concluded that most suffered from what nowadays would be labeled as affective and schizophrenic psychosis, psychopathy, and alcoholism. The review by Becker (1978, this volume) of the psychobiographic studies published prior to 1950 suggested that the vast majority validated the anecdotal observation of an excess of psychopathology in eminently creative people, with two main exceptions: the work by Ellis (1904) and Bowerman (1947). Of note, Claridge, Pryor and Watkins (1990) pointed out that, even though both Ellis and Bowerman confirmed their *a priori* hypothesis that there was not an excess of pathology in geniuses, they acknowledged

the presence of characteristic temperamental traits such as hypersensitivity, irritability, and a tendency towards melancholy and affective instability; that is, traits currently considered part of the 'affective temperaments'. Andreasen and Canter (1974) also noted that the selection of subjects in these studies was based upon their appearance in the Dictionary of National Biography, which ensures public notability but not necessarily truly eminent creativity. Lange-Eichenbaum (1932) first focused on studying the temporal relation between creativity and psychosis, reporting that creative work is not performed during the active psychotic periods but in periods of remission, and that often psychosis follows intensely creative phases.

Andreasen (1987) compared 30 eminent American writers attending the prestigious Iowa writing workshop to 30 matched control subjects. There was an overall higher rate of affective disorders in the writers, especially bipolar forms, as well as alcoholism. Consistent with the notion of an association due to soft forms of the bipolar spectrum, bipolar II disorder (characterized by alternating episodes of hypomania and depression) was more common than the more severe bipolar I disorder (characterized by alternating episodes of mania and depression). Jamison (1989) also found a significantly higher percentage of psychopathology, especially affective disorders, in 47 contemporary British artists and writers compared to population estimates. More than one-third had received psychiatric treatment due to affective disorders. Of note, only poets had required treatment due to hypomanic or manic episodes, whereas artists and the other type of writers did so for depressive phases. She also found a strikingly high rate of affective disorders, suicides, and institutionalization in the analysis of the most important British and Irish poets of the 18th century (Jamison, 1993). Claridge et al. (1990) examined the biographical and medical records of ten authors (spanning from the Middle Ages to present day, such as Margery Kempe or Sylvia Plath) who claimed to

have suffered from some form of psychotic disorder. Claridge (1998) applied several sets of operationalized diagnostic criteria to address the issue discussed earlier about the association between creativity and specific diagnoses. The results suggested that most would be diagnosable as schizophrenic or schizoaffective, with some variation depending on the diagnostic criteria used (as they vary considerably in their definition of the boundaries of schizophrenia and affective psychosis), and it was concluded that the 'schizophrenic' components of psychosis were especially common in such eminent writers, with often accompanying affective features.

Some studies have examined possible differences in psychopathology based upon different *domains* of creative endeavor. The majority of the literature suggests a stronger association between psychopathology and artistic creativity, especially creative writing, with a weaker or less consistent association with scientific areas. However, this remains highly debatable, as there is a scarcity of studies that investigated multiple domains of creativity at once and most have focused specifically on writers.

Juda (1949) studied a sample of 294 highly gifted scientists and artists. It was concluded that geniuses presented a much higher incidence of psychosis and neurosis than the average population, and that schizophrenia occurred exclusively in the artists, whereas manic-depressive insanity only in the scientists, in a frequency 10 times the incidence of the average population.

Post (1994) selected 291 eminent and recognized creative men (visual artists, philosophers, scientists, politicians, composers, novelists, and playwrights) and found that 54% presented with personality disorder traits and 69% with at least one mental disorder. Scientists were the least affected group, a result consistent with findings from Simonton (2004). A significant proportion of novelists and playwrights had a florid history of familial psychopathology, problematic family environments during

childhood, depressive episodes, drug abuse, and marital problems. Artists and intellectuals had significant psychosexual difficulties and a greater presence of alcoholism. In a replication study, Post (1996) reported that schizophrenia was less prevalent in this sample than in the general population, whereas affective disorders and alcoholism were strikingly high among writers. Poets had especially high rates of bipolar disorder.

Ludwig's (1995) study of 1,005 biographies written between 1960 and 1990 indicated a positive correlation between the presence of severe psychopathology and the magnitude of creative achievements. Overall, the study portrayed a higher incidence of mental disorders in artistic than in non-artistic professions (e.g., politics, business). Again, poets had the highest rate of mental disorders (87%), including more suicide and psychosis, whereas scientists presented with fewer problems. In another study, Ludwig (1994) again reported an increased rate of suicidal behavior in poets (18% versus 1% in the general population). He studied 59 female writers and 59 female control subjects matched on education and socioeconomic level (although not on intelligence) and found higher rates of affective, anxiety, substance use, and eating disorders.

The striking overrepresentation of psychopathology in poets has been found in other studies. In the historiometric study of 1,629 writers (including poets, novelists, playwrights, and nonfiction authors) Kaufman (2001a) paid attention to gender differences and reported that *female* poets were more likely to suffer from mental disorder (as indexed by depression, suicide attempts, hospitalizations) than other types of writers (both male and female). In a second study with 520 eminent women (poets, fiction and non-fiction writers, visual artists, politicians, and actresses), poets were again found to present an excess of mental disorders. Of note, Kaufman (2005) provided evidence for the universality of such excess in poets by examining 826 Eastern

European writers (fiction, nonfiction, poets, playwrights) spanning from the 4th century to current day and replicating the increased rate of disorder in poets compared to other types of writers. In view of such consistent pattern, Kaufman and Baer (2002) and Kaufman (2005) suggested that individuals with highly introspective, emotional profiles, and who are possibly more prone to negative moods, rumination and depression, might feel more attracted to poetry than other forms of writing. Also, they suggested that the process of constructing a narrative is instrumental to benefitting from the possible therapeutic effects of writing (Kaufman & Sexton, 2006). Many authors have pointed out that the act of writing in verbally talented individuals can be contemplated as a way of objectifying negative emotions, organizing their experience within a narrative structure and, thus, enabling the writer to gain control over despair in a disordered milieu (e.g., Ludwig, 1994; Storr, 2000).

The study of other artistic areas is more limited. Schildkraut, Hirschfeld, and Murphy (1994) analyzed 15 Abstract Expressionist painters from the New York School (e.g., Pollock, Rothko), a group that used the technique of psychic automatism (based on free association) in order to reveal unconscious material. Affective disorders were 10 times more prevalent and suicidal behavior was three times greater than in the general population. In a study of 137 well-known visual artists, Ludwig (1998) reported that those with a more emotive style presented higher rates of depression and other mental disorders than those artists with more formal styles. As for musicians, Wills (2003) applied DSM-IV (American Psychiatric Organization, 1994) diagnoses to biographical material of 40 eminent American modern jazz musicians and found an excess of psychopathology comparable to that of other creative groups.

Family studies. The notion that both creativity and mental disorder have heritable components and might be cosegregated, that is, inherited together and thus

expressed in the same individual, has prompted the investigation of family trees of creative individuals.

In her study of eminent writers, Andreasen (1987) found that writers' first-degree relatives also exceeded the relatives of the control group in their rate of affective disorders and also had more creative professions. Likewise, Jamison (1993) reported an excess of affective pathology in the family trees of the geniuses she studied (e.g., Schumann, Woolf, van Gogh, Hemingway, James). Ludwig (1994) also established the presence of high levels of psychopathology and creativity in the family members of the female writers. Of note, both personal and maternal psychopathology were significant predictors of creative performance. Furthermore, the exposure to sexual or physical abuse during childhood was also a significant predictor of creativity, suggesting a complex interaction between hereditary and environmental factors.

Studies on Creativity in the Schizophrenia and Bipolar Spectrums

Population studies. Recent work has complemented the traditional study of clinical samples and their relatives with population cohorts, in which the association between hospital diagnostic records and creativity indicators based on professional occupations avoids selection bias. However, it is important to note that these studies necessarily fail to include mild spectrum cases (which either do not require treatment or are attended to in outpatient facilities), which are hypothesized to be more likely to manifest the association.

Kyaga et al. (2011) conducted a nested case-control study with 300,000 individuals who had received in-patient treatment for schizophrenia, bipolar disorder, or depressive disorders and their relatives based on Swedish registries. Bipolar disorder patients, and even more so their siblings (as well as those of schizophrenia patients),

were overrepresented in creative professions (defined as scientific or artistic occupations), and this was not accounted for by IQ (only available for males). Schizophrenia patients were more likely to hold artistic occupations. Relatives of people with schizophrenia were overrepresented in the artistic occupations, whereas relatives of bipolar patients were overrepresented in scientific occupations. Unipolar depression patients and their siblings did not differ from controls. Among relatives, the likelihood of creative occupations was highest among first-degree relatives, and gradually decreased with increasing familial distance. Recently, Kyaga et al. (2013) studied a wider range of diagnoses and used a larger sample ($n=1,173,763$). It was found that, except for bipolar disorder, individuals with creative professions did not show greater levels of psychopathology than controls, except for being a literary author, which was specifically associated with higher levels of schizophrenia, bipolar disorder, unipolar depression, anxiety disorders, substance abuse, and suicide. Again, first-degree relatives of patients with schizophrenia, bipolar disorder, anorexia nervosa, and siblings of patients with autism, had more creative professions. Finally, individuals with bipolar disorder were also disproportionately concentrated in the most creative occupations in the interview data of the Epidemiological Catchment Area study (a US representative sample) (Tremblay, Grosskopf, & Yang, 2010).

MacCabe et al. (2010) conducted a prospective whole-population cohort study of all individuals in the Swedish national school register ($n=713,876$). Those with excellent school performance (particularly in humanities) had a nearly fourfold increased risk of hospital admission for bipolar disorder compared to those with average grades (the association seemed to be confined to males, although the formal test for interaction between school performance and gender was not statistically significant). In addition, those with the lowest grades had a moderately increased rate for bipolar

disorder. These associations were not attributable to socioeconomic or parental education differences. MacCabe et al. suggest that, since IQ is only one of the factors impacting on success in examinations, the findings may reflect that risk for bipolar disorder is driven by factors related to creativity such as intense emotion and motivation, enhanced access to sustained attention, memory and vocabulary, and possibly social skills. On the contrary, MacCabe et al. (2008) reported that only low grades were associated with hospital admission for schizophrenia and schizoaffective disorder in the same sample.

Family and adoption studies. Karlsson (1970) carried out a retrospective family study in which the professional status of all first-degree relatives of psychiatric patients admitted into hospital (i.e., most likely with severe disorders like psychosis) in Iceland from 1851 to 1940 were recorded. He found that relatives had a creative profession more often than the general population, with twice as many writers than expected. Richards, Kinney, Lunde, Benet, and Merzel (1988) found that non-affected first-degree relatives of bipolar patients obtained the highest scores on an index of lifetime everyday creativity when compared to control participants, and bipolar I and cyclothymic patients. The difference was not explained by the effects of education or intelligence. Heston (1966) showed that half of the children of schizophrenic mothers who were separated early from their biological mother and reared in adoptive families achieved an excellent adaptation, an exceptional talent on different creative fields, and, as expected, a higher risk of developing schizophrenia. Similarly, Kinney et al. (2000-2001) found that the adoptees with a genetic liability for schizophrenia who did not manifest the disorder were rated as more creative by blind independent researchers than demographically matched control adoptees with no family history of psychiatric

hospitalization. Moreover, adoptees who showed signs of schizotypic personality were rated as even more creative.

Clinical studies. Most research has focused on either bipolar or schizophrenia spectrum populations, with fewer studies studying both of them simultaneously.

As referred to above, Richards et al. (1988) reported higher interview ratings of lifetime creativity in unaffected relatives of bipolar patients. Interestingly, they also found that cyclothymic patients obtained higher scores than bipolar I patients (who did not differ from controls). Also, Akiskal and Akiskal (1988) found that artistic occupations were present in 8% of those diagnosed with *soft* bipolar diagnoses compared to less than 1% in those receiving diagnoses of bipolar I, unipolar depression, or schizophrenia disorders. Studies focusing on severely ill populations have reported negative findings. Ghadirian, Gregorie, and Kosmidis (2001) did not find differences in creative abilities comparing psychiatric inpatients, 20 with bipolar disorder and 24 with other disorders, although level of clinical severity was inversely associated with creativity scores. Eisenman (1990) also found that psychotic patients were less creative than a control group.

One line of inquiry has been to investigate possible similarities in terms of affective temperaments between bipolar spectrum patients and creative individuals. Akiskal, Savino, and Akiskal (2005) reported that among psychiatric outpatients, artists and architects presented higher levels of cyclothymic temperament than physicians, lawyers, managers and executives, industrialists, and journalists. Nowakowska, Strong, Santosa, Wang, and Ketter (2005) reported a significant overlap between euthymic (i.e., in a normal mood) bipolar patients and graduate students in creative disciplines,

characterized by higher cyclothymic temperament, openness, neuroticism, novelty seeking, and lower conscientiousness compared to healthy controls.

Most literature examining bipolar spectrum patients have used as a creativity measure the Barron Welsh Art Scale (BWAS; Barron, 1963), where individuals express levels of like and dislike for different figures. Preference for asymmetrical and complex over symmetrical and simple figures is used as a proxy for creativity; BWAS scores have been found to be higher in visual artists and creative individuals in other disciplines (Barron, 1972) and associated with faculty and peer ratings of creativity (Gough, Hall, & Bradley, 1996). Simeonova, Chang, Strong, and Ketter (2005) reported increased creativity in patients with bipolar disorder and their offspring compared to healthy controls (adults and children). Also, Strong et al. (2007) found that a factor composed of neuroticism/cyclothymia/dysthymia was related to dislike of simple figures, probably due to increased access to a wider range and greater changeability of affective experience, whereas an openness factor related to both creative perception and self-rated creative personality. However, none of the temperament-personality factors related to the Torrance Tests of Creative Thinking. Also, Santosa et al. (2007) found that creative students and euthymic bipolar, but not unipolar, patients shared a dislike of simple figures compared to controls. Again, groups did not differ on divergent thinking. On the contrary, Rybakowsky and Klonowska (2011) found that 40 bipolar patients in remission outperformed controls on a verbal 'inventiveness' scale, but not on a modified version of the BWAS. Finally, Srivastava et al. (2010) replicated the link between the 'affective' factor (cyclothymic temperament) and the BWAS-Dislike scores and also reported a differential association between a 'cognitive' factor, composed of self-reported intuition and openness, to the BWAS preference for complex figures

(shown to be less related to negative emotionality than dislike of simple figures) and self-rated components of creativity.

Soeiro-de-Souza, Dias, Bio, Post, and Moreno (2011) investigated the impact of symptoms and executive functioning on the BWAS and found that patients in manic and mixed states had higher creativity scores than those in depressed episodes (independent of intelligence). Better executive functioning was associated with higher creativity only in manic patients, even if levels of executive functioning were worse for these patients. The authors interpreted that these findings point out that, in addition to temperament traits, the association between creativity and bipolarity is also state dependent, possibly related to levels of dopaminergic functioning known to be associated with mania, creativity and executive functioning.

Research examining clinical samples from the schizophrenia spectrum initially focused on measures of creative cognition given the similarity between schizophrenic thought disorder and divergent thinking. The hypothesis leading this research was that there is a continuum ranging from normality through creative thinking, e.g., divergent thinking (Guilford, 1950), to pathological overinclusive thinking (Cameron, 1938) and thought disorder (Hasenpus & Magaro, 1976) (but see Rothenberg (1990) for a criticism on the analogy between creative and psychotic thinking).

Keefe and Magaro (1980) compared divergent thinking among small samples of paranoid schizophrenics, nonparanoid schizophrenics, nonpsychotic psychiatric patients and controls. Nonparanoid schizophrenic patients obtained higher divergent thinking scores than the remaining groups. Rubenstein (2008) compared divergent thinking scores among schizophrenia, depression, anxiety, a mix of personality disordered inpatients. As expected, chronic schizophrenia inpatients showed the poorest level of conceptual fluency, and no differences emerged on originality levels. As the author

discussed, negative symptoms of schizophrenia (which involve a diminution of thought and affect and are highly prevalent among hospitalized patients), are most likely negatively related to verbal fluency.

Rodrigue and Perkins (2012) reported that 22 outpatient schizophrenia patients had lower divergent thinking scores than university students with either normal or elevated schizotypal personality traits according to the Millon Personality Inventory. However, the “schizotypal group” was actually restricted to hyper-normals with no Axis I deviance, which suggests that the group did not actually represent an intermediate level of the schizophrenia spectrum to test the hypothesized advantage of this mild condition compared to full-blown schizophrenia and controls on creative thinking. Furthermore, patients differed greatly on education and age. Of note, Millon’s mania scale was related with creative scores among controls. Similarly, and not surprisingly, schizophrenia inpatients in remission obtained lower creativity scores than matched controls, a finding partially explained by deficits in executive functions (Jaracz, Patrzala, & Rybakowski, 2012). Finally, Abraham, Windmann, McKenna, and Güntürkün (2007) compared 28 patients with chronic schizophrenia and 18 controls and showed that patients’ impairment on most executive functions accounted for deficits on specific facets of creative cognition, such as fluency and relevance (which require functional goal-directed thinking), although not for originality. The authors suggested that executive and creative function is probably well represented as an inverted-U, where too much executive dysfunction impairs creative cognition (also see Abraham, this volume). Thus, individuals with schizotypic traits in nonclinical populations should be able to make better use of a soft level of lower of executive inhibitory control and loose associational thinking.

Psychometric Studies in Non-Eminent Creators and Nonselected Populations

This approach consists in investigating the presence of psychotic traits in non-eminent creators or applying both personality/symptom and creativity questionnaires to nonselected populations (usually college students). A relevant aspect of the studies with nonselected populations is that, despite a narrower range of variability in psychopathology and creativity, they overcome the possible bias introduced by the role expectation of manifesting mental suffering when belonging to a creative profession (Becker, 2000-2001).

Barron (1969) described that creative individuals from a wide range of professions tended to combine elevated levels of self-reported psychological deviance on various MMPI dimensions with high scores on the positive dimension of 'ego strength', which usually tends to be inversely related with psychopathology.

Pretti and Vellante (2007) found that artists reported more positive psychotic-like experiences compared to controls, which was not explained by their elevated use of substances and general distress. Nelson and Rawlings (2010) also reported elevations on positive schizotypy (other dimensions were not measured) in visual artists compared to norm data, as well as elevated openness to experience, neuroticism, and depressive but not bipolar propensity. Of note, positive schizotypy was the strongest predictor of a range of subjective experiences pertaining to creativity that overlap considerably with the central features of the "flow" type of experience, such as deep absorption, distinct shift in phenomenological experience, focus on present experience, and sense of pleasure mixed with some anxiety, suggesting a strong overlap of schizotypal and creative experience. Folley and Park (2005) also found that individuals with high global schizotypy (n=17) had enhanced divergent thinking compared to 17 outpatients with schizophrenia and 17 controls.

Nettle (2006) compared schizotypy profiles among poets, artists, mathematicians, the general population, and psychiatric patients, and found that poets and artists had higher levels of unusual experiences (positive schizotypy) than controls, but similar levels to patients with schizophrenia. Artistic creators and psychiatric patients shared a tendency to produce unusual ideas and experiences, but creative groups were distinguished by the absence of anhedonia and avolition (low scores on negative schizotypy). On the other hand, mathematicians presented the opposite pattern, with very low levels positive schizotypy and cognitive disorganization but high levels of negative schizotypy. Nettle hypothesized the existence of a cluster of arts, unusual experiences, and affective and psychotic disorders characterized by schizotypal thought, that is, by metaphorical leaps from domain to domain, remote associations, and broad attentional set. He posited that this cluster would, in many aspects, represent the opposite tail of the features described by Baron-Cohen, Richler, Bisarya, Gurunathan, & Wheelwright (2003) as characteristic of high-functioning autism spectrum disorders: a systematizing cognitive style, defined by a drive for order and regularity, convergent thinking, and literalness, which are likely found in scientists, mathematicians and engineers. These findings were supported by Rawlings and Locarnini (2008), who found that creativity was linked to schizotypy and hypomania among artists, but this association did not emerge among scientists, for whom a mild connection was found between creativity and autistic traits.

A similar pattern has been found in college students. Weinstein and Graves (2002) found that positive but not negative schizotypy correlated with divergent thinking tasks. Claridge and McDonald (2009) reported that both negative schizotypy and autistic traits were related to convergent, but not divergent, thinking, although the connection between positive schizotypy and divergent thinking was not found, even if

did emerge for impulsive non-conformity. Tsakanikos and Claridge (2005) found that decreased verbal fluency was associated with negative schizotypy, whereas increased verbal fluency was associated with positive schizotypy, which seemed to support the claim that schizophrenic-like unusual experiences, such as hallucinations, may be the product of a higher automatic spreading activation among stored lexical units. Burch, Pavelis, Hemsley, and Corr (2006) reported that visual art students scored higher on positive schizotypy and impulsive nonconformity, as well as openness and divergent thinking, compared to a non-artist group, but not on negative schizotypy.

Schuldberg, French, Stone, and Heberle (1988) found a positive relationship among several measures of positive schizotypy and creativity tests, although a significant relationship between divergent thinking and positive schizotypy was not found. When scales of hypomanic and impulsive personality traits were added in a later study, results pointed to a stronger link between creativity and the affective/motivational sphere than with the schizotypy (Schuldberg, 1990). O'Reilly et al. (2001) also failed to find an association between schizotypy and divergent thinking, although schizotypy was related to engagement in creative pursuits. Miller and Tal (2007) also reported that openness and intelligence, but not schizotypy, predicted creativity in students. As authors discuss, findings on a lack of a direct association between schizotypy and creativity may indicate that the association is due to openness to experience, which has been repeatedly associated with creativity (and with positive schizotypy), although schizotypy does not seem to be analogous to extreme openness. This issue remains controversial and, for the moment, findings are mixed.

A number of studies suggest that diminished inhibition and some asociality, as tapped by psychoticism and impulsive nonconformity scales, may facilitate the production of original responses in divergent thinking tasks. It has been suggested that

impulsive or nonconformist respondents are more likely to venture responses that other people would inhibit or regard as irrelevant, which would increase the likelihood of originality of responses. Claridge and Blakey (2009) found that positive schizotypy was related to self-perceived use of creative styles, but unrelated to divergent thinking, and affective temperaments, especially hyperthymic, was related to both divergent thinking and self-perceived creativity styles in students. Also, impulsive nonconformity was related to divergent thinking, which is consistent with Schuldberg et al. (1988) findings indicating that those students scoring highest on impulsive nonconformity among the group of high positive schizotypy were the most creative. Among bipolar patients, Rybakowsky and Klonowska (2011) reported that the schizotypy dimensions of positive, cognitive disorganization and impulsive nonconformity, but not negative schizotypy, were related to creativity measures. Impulsive nonconformity showed the strongest correlations with creativity indices, including verbal inventiveness, whereas unusual experiences was only associated with the aesthetic preference measure. Batey and Furnham (2008) found that positive schizotypy and impulsive nonconformity were related to creativity, but Batey and Furnham (2009) only found impulsive nonconformity, and not positive schizotypy, to be associated with creativity (negative schizotypy was associated with impaired creativity performance). Schuldberg (2005) found that psychoticism was associated with attitudes and activities related to creativity.

Studies on affective traits are more recent in the literature than work with schizotypy and psychoticism. Furnham, Batey, Anand, & Manfield (2008) reported that higher scores on the hypomanic personality scale were associated with more engagement in creative daily activities, divergent thinking fluency and self-rated creativity in students, being the best predictor when compared to normal personality dimensions. Similarly, Vellante et al. (2011) found that undergraduates in creative fields

scored higher on cyclothymic, hyperthymic and irritable affective temperaments, but not on current psychological distress, and also reported greater involvement in creative activities than those in non-creative disciplines.

Some studies have investigated the association of schizotypy with differential aspects of creative cognition. Karimi, Windmann, Güntürkün, and Abraham (2007) reported that high scorers on a global measure of schizotypy presented better performance in cognitive creation involved in divergent thinking as well as better performance in insight problem solving, which requires changing activated schemas and acquiring new perspectives, but not on problems asking for goal-related thinking. Comparing high versus low scorers on psychoticism, Abraham, Windmann, Daum, & Güntürkün (2005) found that high scorers performed better in measures tapping the originality/novelty dimension, but not in those tapping the practicality/usefulness dimension, lending support to the notion that the association between psychoticism and creativity is based on associative thinking and broader but weak top-down activation patterns rather than on goal-directed thinking. Abraham and Windmann (2008) compared extreme scorers on a global schizotypy measure and found that the high schizotypy group performed better than the low schizotypy group selectively on overcoming the constraining influences of examples when trying to generate original responses, but not on other creative cognition aspects, such as conceptual expansion or creative imagery. Also comparing individuals with high versus low global schizotypy, Jones, Caulfield, Wilkinson, and Weller (2011) found that the high schizotypy group performed better on divergent thinking whereas the low schizotypy performed better on convergent solving-problem tasks. Fink, Slamar-Haldbedl, Unterrainer, and Weiss (2012) reported that, compared to college students, both actors and substance abuse patients had higher originality in creative idea generation, higher psychoticism scores,

and decreased latent inhibition. Also, originality of ideas (but not fluency) was associated with psychoticism in the whole sample. Finally, Fisher, Heller, and Miller (2012) found an association between creative experiences and odd beliefs and offered data suggesting that activation of semantic information (which may influence whether remote associations promote verbal creativity or interfere with verbal information processing and disrupt thought processes) in creativity and schizotypy can be differentiated by executive functioning.

Theoretical Implications

Dimensionality with Temperamental Variation and Within Spectrums

The empirical literature reviewed, drawn from very diverse methods and populations, provides overall support for connections between both the schizophrenia and bipolar spectrums with diverse aspects of creativity. This is not to say, as introduced earlier when considering the possible forms of this link, that mental disorder is necessary for creativity or that creative individuals will necessarily suffer from mental disorders.

There appears to be a strong association between bipolar spectrum disorders and familial risk with lifetime creative accomplishment, engagement in creative pursuits, choice of creative occupations and preference for complex stimuli. Also, subclinical syndromes, affective temperaments and familial risk present a stronger and more consistent association with components of the creative process (divergent thinking, creative personality) than clinical disorder. Schizophrenia spectrum studies have focused much more on the soft end, specifically schizotypy and schizotypal personality. Many of these studies reported a positive association with divergent thinking and other variables thought to be common factors and relevant for creative outcome (e.g.,

openness to experience). However, there are mixed findings that indicate the need to include multiple creativity measures in order to relate specific creativity levels and components with different schizotypal features and dimensions. Studies of clinical schizophrenia are overall more mixed, which is hardly surprising given the huge heterogeneity in terms of clinical picture, chronicity, and treatments, and levels of associated impairment. Overall, studies targeting large samples, which probably allow the inclusion of neurocognitively impaired as well as intact or superior patients, find an association with lifetime creative achievements and creative pursuits; smaller clinical studies, mostly with inpatients, indicate deficits in functions necessary for cognitive cognition (e.g., flexibility). Risk for schizophrenia is positively associated with creative achievement, pursuits, and psychometric measures of creativity. Schizophrenia and schizotypy are multidimensional in nature and studies that have assessed various psychotic dimensions generally indicated that the association is marked for the positive dimension of unusual cognitive and perceptual experiences, whereas, overall, negative schizotypy traits (anhedonia, avolition) were not related to creativity or had a negative correlation with creativity. The association of divergent thinking and noncognitive measures of creativity with impulsive nonconformity, which has been closely related both to psychoticism and hypomanic traits, is also highly consistent across studies.

The pattern of results supports that the association between creativity and psychopathology is not established with outright symptoms or disorders, rather these show a less consistent link, but with the temperamental traits, mild forms of disorder, and familial risk, a pattern summarized by Richards et al. (1988) as an inverted U relationship between creativity and psychopathology. Consistent with the fully dimensional view, widely distributed genetic-temperamental variation in the population, which embeds familial liability for the psychoses, increases the likelihood of *both*

developing psychotic traits (and disorders) as well some psychological positive qualities related to creativity, given the commonality of certain dispositional features between psychoticism and creativity (as we shall return to below). This dual status would help to explain the maintenance of these putative genes in the population despite the low mating and fertility rates of individuals with schizophrenia: the genes that carry the liability for the psychoses would have been retained in human evolution because they also convey the compensatory advantage of enhanced creativity (Kinney & Mathysse, 1978; Kinney & Richards, this volume; Kinney, Richards, Lowing, LeBlanc, Zimblaist, & Harlan, 2000-2001; Richards et al., 1988).

The severity and stability of clinical expression of the underlying vulnerability towards psychosis (contingent upon genetic load and biological and psychosocial risk factors) would greatly impact the possibility of benefiting from the dispositional traits that favor creativity, as high symptom severity would inhibit rather than favor the creative process, although certain symptoms might be beneficial (e.g., outbursts of manic energy) if mild or limited to periods of time, a fact that might also account for some inconsistent findings when assessing diagnosed patients.

As introduced earlier, one of the main debates in psychiatry has been to establish whether creativity is related to *either* the bipolar or schizophrenia spectrum. As Sass and Schulberg (2000-2001) point out, the connection with the schizophrenic psychoses dominated much of the twentieth century, led by the assumption that creative thinking shared features with mild thought disorder and language peculiarities, which then were ascribed to schizophrenia. However, the revival of the affective psychosis diagnoses later in that century shifted the discussion towards almost a denial of any link between creativity and schizophrenia and the assumption of a strong link with bipolar disorders. This followed from the diagnostic broadening of the affective spectrum and narrowing

of the schizophrenia spectrum, the increasing importance given to emotional-motivational aspects linked to bipolarity for creativity, and the focus of recent research on a dementia-like view of schizophrenia (e.g., on neurocognitive deficits and negative symptoms), which make the possible link of schizophrenia with advantageous features even more difficult to conceive.

The literature reviewed here supports that the association between creativity and psychopathology is not exclusive to a single spectrum. This fits well with the fully-dimensional view in which this sharp distinction within the psychoses has always been less obvious and rather embraces the unitary psychosis model, which considers that diagnostic categories reflect the relative predominance of some symptom dimensions derived from the relative weight of shared etiological factors (Claridge, 2009). The unitary psychosis model fits well with the existence of intermediate diagnoses (e.g., schizoaffective disorder), reports of elevated comorbidity rates between bipolar disorder and schizophrenia, frequent diagnostic changes, commonality in treatments, and the increasing recognition of shared common genetic factors along with specific etiological agents (Demjaha, MacCabe, & Murray, 2012; van Os & Kapur, 2009). Also, the fuzziness of the distinction is evidenced at the temperamental level, as positive schizotypy, hypomanic traits and impulsive non-conformity load on a common factor when included together in factor analysis. This seems to indicate that the broader construct 'psychoticism'—leaving aside the validity problems of its homonymous scale—is more accurate in reflecting the wider variety of individual differences in general and in relation to creativity in particular (Claridge, 2009).

Common and Differential Factors between Creativity and the Spectrum of Psychoses

Several possible mediating mechanisms linking psychosis and creativity have been suggested, mostly referring to temperament and personality, cognition, affect and motivation, as well as brain organization, neurobiological and genetic factors. From a psychological perspective, personality, cognition and affect have been the focus of the majority of theories and research.

As previously noted in the description of psychometric studies, there is an overlap between temperament-personality traits that characterize creative individuals and features that define both schizotypy and affective temperaments. Consistent with Barron (1969), a meta-analysis of studies examining the personality traits of individuals in creative professions (Feist, 1998) revealed that impulsivity, low conscientiousness, and openness to experience were significant, all of which have been associated with cyclo/hyperthymic, positive schizotypy and psychoticism as reported earlier. Also, from a motivational viewpoint, the combination of high ambition and drive that characterizes creative individuals has been consistently found in the bipolar spectrum (Johnson, Eisner, & Carver, 2009).

Most of the cognitive models proposed come from the schizophrenia literature and suggest that creative and psychosis-prone individuals share a neurocognitive style characterized by reduced cognitive inhibition, that is, a weak filtering of stimuli previously experienced as irrelevant during early processing (e.g., Eysenck, 1995; Hemsley, 1993; Keefe & Magaro, 1980). Although there are several theoretical models, the general idea is that such greater access to mental material usually processed below the level of conscious awareness would provide greater 'raw material' that probably would be less obviously interconnected, and thus more likely to raise novel associations, as well as favor broader and more flexible associative networks. Other related characteristics that have been suggested are defocused attention (Mendelsohn,

1976) and a “flat” rather than a more common “steep” associative hierarchy, that is, a style characterized by stimuli raising more and broad associations rather than just a few and quite obvious ones (Mednick, 1962; Martindale, 1999). In addition, it is hypothesized that when the filtering mechanisms become too weak and the inhibition of irrelevant stimuli that allows efficient information processing is too sparse, thought becomes progressively overinclusive and ultimately can result in pathological thought disorder.

These hypotheses have received support from several experimental paradigms, of which latent inhibition has received most attention. It refers to a brain gating mechanism that allows the termination of responding to stimuli that hold no apparent emotional or motivational value (Lubow & Gewirtz, 1995). If latent inhibition is reduced, there is a thin “screening out” of stimuli from conscious awareness independent of their significance, and thus greater access to unfiltered stimuli. Reduced latent inhibition has been found in both individuals with high psychosis proneness (e.g., Baruch, Hemsley, & Gray, 1988) and high creativity and openness to experience (e.g., Peterson & Carson, 2000). Of note, dopaminergic dysregulation, which is a central neurobiological abnormality of the schizophrenia spectrum, has been associated with reduced latent inhibition (Cassaday, 1997). Note that the association with psychosis proneness or schizotypy is most likely with the positive symptom dimension, not negative symptoms.

The motivational and affective factors relevant for creativity seem to be closely connected with the bipolar spectrum, as evidenced by the close phenomenological resemblance of certain affective states with characteristics of, mostly, inspirational forms of creativity. The moderate “hyper” side has been suggested to provide the high energy and enthusiasm necessary for sustained effort and effective production, the self-

confidence and impulsivity to pursue and express unconventional ideas, and the increased perception, ideational association, and mental fluency to enhance creative cognition. Additionally, two meta-analyses support that positive affect is associated with an improvement in creative cognition, especially in mood-induction paradigms (Bass et al., 2008; Davis, 2009). Of note, findings mirror the curvilinear association found between severity along the bipolar spectrum and creativity, as moderate levels of positive mood were more beneficial than mild levels, but intense positive mood did not improve creativity in comparison to a moderate level. Baas et al. (2008) reported that it is the combination of positive affect and a certain degree of arousal that enhances creative cognition (i.e., enthusiasm does, but serenity does not). Also, the beneficial effect appeared for idea generation tasks (e.g., divergent thinking), but not for those involving problem-solving (Davis, 2009). Several mechanisms have been proposed to account for the impact of positive affect on creative cognition. There is evidence that positive affect induces defocused attentional states, facilitates access to affectively charged material in memory (which would increase the associative range), decreases inhibitory control, raises awareness to unattended information, enhances the association of cognitively remote concepts that have an emotional resonance, and heightens the perception and processing of stimuli (see Fredrickson & Branigan, 2005; Johnson et al., 2012; Russ, 2000-2001). It has been suggested that some of these effects might derive from an increased cortical activation and arousal, specifically on the prefrontal cortex and thus through executive and working memory functions (see Murray & Jonhson, 2010).

On the other hand, mild depressive traits and symptoms may facilitate introspection and insight, as well as a critical pruning of the productions derived from the “hyper” exuberance (Jamison, 1993)—even though depression and negative affect

do not seem to have positive effects on a variety of creativity measures in the empirical literature (e.g., Baas, De Dreu, & Nijstad, 2008; Davis, 2009). However, the relationship between mood and creativity remains to be clarified. Whereas a large number of studies report that positive mood facilitates creative problem-solving, others indicate that under certain conditions positive mood may actually impair creativity, suggesting that the association is highly complex (Kaufmann, 2003). In this regard, Kaufmann (2003) proposed a model in which different moods are differentially related to various components and aspects of the creative process, such as problem definition, choice of strategy, type of process involved, as well as requirements of task solutions. Positive mood clearly facilitates and negative mood inhibits ideational fluency, a critical component of the initial stages of creative thinking, negative mood may facilitate finding insightful and highly creative solutions to problems through, for instance, a harder strive to search for an “optimizing” rather than “satisficing” problem-solving strategy. Finally, it has been suggested that the cyclic and sometimes even juxtaposed experience of positive and negative moods and their associated cognitive and biological features may give rise to a more complex mental organization and facilitate the usage of certain forms of creative cognition (Jamison, 1993).

Naturally, the mechanisms briefly outlined here interact among themselves, delineating different combinations of both psychological make-up (i.e., the relative weight of the dimensions composing the schizophrenia and bipolar spectrums) and facilitatory effects for some specific types and levels of creativity. Presumably, a combination of these factors is necessary to ensure actual creative output, as very different ingredients are necessary for privately experiencing highly original thoughts (e.g., cognitive disinhibition), engaging in creative activities (e.g., openness to

experience), or persisting and succeeding in a creative occupation (e.g., high drive and motivation).

The other side of the coin is what *differential* factors operate to keep madness at bay and facilitate a healthy outcome of the psychoses temperamental dispositions. The presence of these traits, *per se*, would not guarantee a creative advantage; most likely many other factors need to be favorable, both from an individual (e.g., intelligence, persistence, etc.) and situational perspective (e.g., a stimulating environment, receptive sociocultural milieu, etc.).

Most models have highlighted the importance of normal to superior levels of intelligence, working memory, and cognitive flexibility in order to have control over the mental contents facilitated by cognitive disinhibition; thus, mental speed, ability to hold and process information, and capacity to consciously switch attentional states from one stimuli to another would allow a person to manipulate large and disparate amounts of information and establish novel connections rather than becoming overwhelmed and thought disordered (Carson, 2011; Eysenck, 1995). This notion is consistent with evidence that high IQ is a protective factor for the development of the disorder in the offspring of schizophrenic mothers, and that a substantial proportion of relatives have good neurocognition on the one hand and outstanding creative accomplishments on the other.

Besides the critical role of neurocognitive factors, environmental and personality elements also undoubtedly play a role. Interestingly, both creativity (Goertzel & Goertzel, 1962; Ludwig, 1994; Runco, 1999; Post, 1994) and increased risk for the psychoses (e.g., van Os, Kenis, & Rutten, 2010) have been associated with exposure to stressful environments, especially interpersonal trauma, during childhood. It is attractive to speculate that the existence of some healthy early relationship within the distressing

environment allows for the development of some ego strength (or, as we shall elaborate below, some positive internal working model of the self and others), which would facilitate the channeling of vulnerability into creativity by, among other mechanisms, making the person able to trust the value of his/her own interests, ideas, and products so as to pursue them (as well as input from others), and by buffering the pernicious effects of stress on high emotional dysregulation and risk for a predominance of depressive elements (which would actually inhibit such pursuit).

Current psychological theories of psychosis pose that the appearance of unusual cognitive and perceptual processes does not fully explain the transition into dysfunction and disorder; it is the *appraisal* of symptoms that fuels the development of clinical disorder (e.g., Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001). A matrix that probably shapes these appraisals are cognitive representations or internal working models of the self and others, that is, a template for affective responses, social cognition and relationships that, according to attachment theory, is developed from childhood experiences with caregivers (Bowlby, 1988; Mikulincer & Shaver, 2007). The similarity between positive internal working models of the self and others (i.e., secure attachment) and ego strength (Barron, 1969) are remarkable: resourcefulness, independence, ability to cope with stress, well-being, and a proper sense of control, all of which would contribute to psychological resilience.

As suggested by Simonton (2005) and Nettle (2006), high ego-strength would help to exert meta-cognitive control over symptoms, taking advantage of bizarre thoughts rather than those bizarre ideas overwhelming and controlling the individual. On the other hand, high negative emotionality, determined temperamentally as well as by distressing early interactions, is known to have a negative impact on psychological reactions towards unusual experiences, as it likely triggers an intense cascade of anxiety

and rumination that amplifies their salience and the imperative need to search for an explanation, be it reasonable or delusional. Supporting this notion, Barrantes-Vidal, Ros, and Kwapil (2009) showed that self-reported unusual experiences in nonclinical young adults were more likely to be rated as clinically significant in those individuals with higher levels of neuroticism.

A Complex Association Shaped by Differences in the Link between Creativity Domains and Temperamental Dispositions

As introduced earlier, part of the complexity of the association between creativity and psychopathology is based on the fact that schizophrenia and bipolar vulnerability manifest different creative advantages because of their differential, even if overlapping, personality and cognitive characteristics. Most likely, creativity requires a combination of elements from cognitive, personality and emotional traits pertaining to both spectrums, although this depends on the specificities of different creativity domains. The notion that different creativity domains, usually oversimplified (and restricted to) arts versus sciences, map on to different dispositional psychotic traits is a helpful organizational framework for elucidating differential mechanisms (Claridge, 1998), and helps to understand the heterogeneity that can be misinterpreted as inconsistency across studies. For example, writing has been suggested to be more closely connected with the schizophrenia spectrum due to the affinity of linguistic functions with psychotic-like thought and language (as supported by the population study by Kyaga et al., 2013).

Sass (1992) argued that the affective temperaments fit in with the emotive, inspirational features of the romantic style, and this probably causes an overrepresentation of the affective spectrum in the artistic fields. Other kinds of creativity, such as scientific or philosophical creativity, and artistic styles such as modernism and postmodernism, would be closer to psychological traits defining the

schizophrenia-spectrum. Sass (2000-2001) considered that depressive and manic traits are not a source of radical innovation, but a heightening of psychological states reasonably familiar to most that share a particular culture. On the other hand, schizotypy would be associated with traits that facilitate the development of new perspectives or frameworks, such as eccentricity, an easy engagement in states of detachment from the 'given for granted' natural evidence of the world, and fragmentation of the ego, all of which have a greater affinity with the hyper-self-consciousness and alienation that characterize modernism and postmodernism.

It is also likely that particular temperamental traits relate differentially with specific styles across arts and sciences (e.g., abstract versus impressionistic), and that some traits are relevant for some levels and components of creativity but not for others (e.g., generativity versus consolidation) (Murray & Johnson, 2010; Nettle, 2001; Silvia & Kaufman, 2010). For instance, as referred to earlier when describing some of the hypotheses on common mechanisms, cognitive disinhibition, positive affect, and impulsivity may facilitate divergent thinking and novelty generation; however, these traits might not necessarily be useful for creative accomplishment, which draws upon sustained effort and might benefit, for instance, from bipolar traits of high goal setting and extraversion. Relatedly, Richards (2000-2001) indicated that the bipolar spectrum is more connected with work-related than leisure-related everyday creativity, whereas the opposite is true for the schizophrenia spectrum. She suggested that the extraverted, competitive, driven, gregarious personality roots of bipolarity facilitate the display of a creative advantage in social contexts in which professional activities take place, whereas the traits of introversion, social anxiety, or awkwardness, more common in the schizophrenia spectrum, may enhance creativity that is cultivated in less socially pressured and judged environments such as leisure and avocational activities.

Summary and Conclusions

This chapter focused on the implications that our conceptualization of mental disorders has for understanding the association between the psychoses and creativity. One of the main sources of controversy in this field has been the natural difficulty in reconciling the efficient cognition and production necessary for creativity with the impairing morbid traits of chaotic thinking, disconnection from reality, and erratic behavior that characterize the psychotic states. However, this puzzle can be satisfactorily resolved if we consider mental disorders, including the psychoses, as fully dimensional phenomena; that is, that these disorders are extreme or pathological variants of otherwise *normal* personality dispositions and that, as such, they can be associated with both dysfunctional *and* adaptive traits (Claridge, 1997). Logically, it is not the extreme variants of the underlying temperaments of the psychoses (schizotypy and affective temperaments), the psychotic *states*, that give rise to creativity; in fact, the severe distortion of mental processes and impaired functional capacity inherent to the psychotic states hinder creative outputs. In other words, mental disorders are not necessary for creativity and creative individuals will not necessarily suffer from mental disorders. The hypothesis presented here, which has accrued significant empirical support, is that the temperaments underlying psychosis share genetic-biological, emotional-motivational, and cognitive features with creativity; therefore, individuals with elevated schizotypy or affective temperaments are considered to be *both* more vulnerable to psychopathology and better equipped for creativity if other necessary individual and situational ingredients are also present (e.g., talent, intelligence, a stimulating milieu).

The selected literature review, drawn from diverse methods and populations, provides overall support for a connection of the temperamental traits (affective

temperaments and schizotypy), mild symptoms and familial risk for both schizophrenia and bipolar spectrums with diverse aspects of creativity. As expected, temperament, soft symptoms and risk show a stronger and more consistent association with components of the creative process (e.g., divergent thinking, creative personality) than do full-blown clinical disorder.

Consistent with the model that dimensionality also operates within the psychoses, the literature review supports that the association with creativity is not exclusive to a single spectrum. Thus it is important to move beyond the debate about whether creativity is associated with schizophrenia or bipolarity, and instead consider the conceptual and empirical evidence linking creativity with both spectra. A much more useful approach is to extend the investigation of what aspects of their differential, even if overlapping, personality, emotional, and cognitive characteristics are related to different components, levels, and domains of creativity. In this sense, cognitive components, such as cognitive disinhibition (hypothesized to underlie divergent thinking), have been more closely connected with the schizophrenia spectrum due to the affinity of linguistic functions with psychotic-like thought and language, and consistently associated with creative writing. Affective and motivational components (such as high positive affect and energy), which have a close phenomenological resemblance with affective disturbances, have been associated with increased self-confidence, drive and impulsivity to pursue and express unconventional ideas. On the other hand, some traits, such as cognitive disinhibition, positive affect, and impulsivity may facilitate creativity components such as divergent thinking and novelty generation; however, this may not be useful for creative accomplishment, which requires sustained effort and might benefit, for instance, from bipolar traits of high goal setting and extraversion.

As described in the review, the hypothesized link between creativity and psychosis opens up a wide array of interesting conceptual and empirical possibilities. Certainly, the empirical demonstration of the creativity-psychosis link is difficult and conditioned by methodological limitations. However, it is important to note the progressive increase of hypothesis-driven and methodologically sound studies in recent years. A relevant point is the need to assemble data from diverse populations and methods to overcome the limitations inherent to each approach. Thus, it is important to map more precisely the phenomenological commonalities between certain mental states and creativity (e.g., between hypo/manic and creative cognition), which requires studying clinical and highly creative selected populations, but it is also necessary to examine the association between temperaments and different components and levels of creativity in the general population, free of biasing cultural stereotypes of the psychological profile of selected creative professions. Furthermore, future research should benefit from complementing the comparison of categorically-defined group means (e.g., subtypes of bipolar disorder and schizophrenia spectrum disorders) with dimensional designs in which quantitative dimensions that cut across these categories (e.g. negative affect, impulsivity, unusual perceptual experiences) are related to a wide array of creativity indices. The latter approach should decrease the level of inconsistency across studies because it avoids the noise created by the problematic validity of current categories, allows taking into consideration the existence of high heterogeneity and multidimensionality within categories, and facilitates testing out mediational hypotheses.

Obviously, it will be essential to move beyond statistical associations of creativity with psychotic traits and affective temperaments to identify the underlying mechanisms. This includes elucidating psychosocial, neurobiological, and

developmental processes that give rise to creativity and mental disturbance. Clearly, complex phenotypes such as creativity and psychosis are the result of multiple, interactive biopsychosocial factors that play out across the course of development. Identifying the relevant mediational factors and their complex patterns of interactions should facilitate our understanding of creativity and psychosis, and shed light on differential pathways that lead to adaptive and pathological outcomes. In this sense, current research is identifying relevant neurocognitive factors, such as superior intelligence and working memory, which would allow handling large and unexpected information facilitated by cognitive disinhibition and establishing novel connections rather than being overwhelmed by it and progress into thought disorder. The study of other psychological variables that may facilitate a healthy outcome, such as the impact of positive internal working models of the self and others on stress-regulation and the capacity to have metacognitive control of abnormal processes, is a necessary avenue for future research.

The clinical implications of investigating the association between creativity and psychopathology are highly relevant. The demonstration of potential advantages, and not only deficits, connected to the temperamental roots of some mental disorders is an encouraging message that clearly contrasts with the negative and stigmatizing medical view that society has of these conditions and the demoralization, guilt, and shame felt by sufferers and families. Furthermore, it has been pointed out how important is that clinicians familiarize themselves with the precise nature of these associations. On the one hand, it would be important that they know that symptoms actually decrease rather than favor creativity in order to confront many patients' fear that treatment may diminish creativity, which contributes to non-compliance. On the other hand, being aware of the enhancing effects that some temperamental traits and mild symptoms have

for creativity should facilitate clinicians' understanding of sufferers' genuine complaints about side effects that diminish valued components of creativity (e.g., mental fluency). All of this should help in negotiating the best possible therapeutic relationship for preserving creativity, exploring treatment options, and understanding acceptable levels of symptoms and side effects. Another critical aspect is that a better understanding of how psychotic traits relate to creativity may inform preventive interventions. It is conceivable that reinforcing the engagement into creative endeavors may be an avenue to channel vulnerability traits and subclinical symptoms into adaptive, creative-promoting features, and that this should help to decrease the risk of spiraling into the pathology domain and reducing the severity of psychotic episodes. This is especially relevant in the current zeitgeist of early detection and intervention in psychopathology, in which vulnerable individuals indexed by familial mental illness, odd personality, or subclinical manifestations who begin to show signs of functional decline are being targeted by the mental health system in order to prevent transitioning into overt disorder or quickly minimize the severity and impairment of symptoms if they appear. However, this strategy presents the risk that in our rush to provide early, preventive intervention, we may treat (medicate) people who are not ill, but are unconventional and creative. Furthermore, it is also obvious how dangerous it is to deal with this issue without proper information and caution, as drawing a simplistic, straightforward connection between creativity and madness can induce unrealistic expectations of creative outputs in sufferers and as well as contribute to treatment rejection to protect a creative advantage.

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