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Schizotypy—Do Not Worry, It Is Not All Worrisome

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A long-standing tradition in personality research in psychology, and nowadays increasingly in psychiatry, is that psychotic and psychotic-like thoughts are considered common experiences in the general population. Given their widespread occurrence, such experiences cannot merely reflect pathological functioning. Moreover, reflecting the multi-dimensionality of schizotypy, some dimensions might be informative for healthy functioning while others less so. Here, we explored these possibilities by reviewing research that links schizotypy to favorable functioning such as subjective wellbeing, cognitive functioning (major focus on creativity), and personality correlates. This research highlights the existence of healthy people with psychotic-like traits who mainly experience positive schizotypy (but also affective features mapping onto bipolar disorder). These individuals seem to benefit from a healthy way to organize their thoughts and experiences, that is, they employ an adaptive cognitive framework to explain and integrate their unusual experiences. We conclude that, instead of focusing only on the pathological, future studies should explore the behavioral, genetic, imaging, and psychopharmacological correlates that define the healthy expression of psychotic-like traits. Such studies would inform on protective or compensatory mechanisms of psychosis-risk and could usefully inform us on the evolutionary advantages of the psychosis dimension.

Key words: health/creativity/reasoning/psychoticism/bipolar/personality traits

Introduction

Schizotypy, in particular in a clinical context, is treated as a pathological condition. It is commonly assessed via self-report questionnaires comprising symptom dimensions known from schizophrenia, that is, positive, negative, and disorganized symptoms.[1–3] Individuals who score very high in such self-report questionnaires were found to have an enhanced risk for psychosis.[4,5] It is thus assumed that knowledge acquired from schizotypy research will also enlighten our knowledge of schizophrenia. Within this taxonomic tradition, it is no surprise that deficits and similarities with schizophrenia are highlighted.[6] Sticking to a purely pathological perspective, however, seems one-sided when considering that scores in such self-report questionnaires vary widely in the general population.[4,7] Moreover, in longitudinal studies, the large majority of so-called "psychosis-prone" individuals (high in self-reported schizotypy), will never experience a psychiatric illness.[4,5] Thus, it is possible that individuals who score high in schizotypy might have some advantages, guaranteeing its persistence over generations and contributing to the richness of human experience and performance. Indeed, when taking that dimensional perspective, grounded in individual differences research, one can account for both the psychopathological and healthy personality potential of schizotypy.[7] Our contribution to this special issue is, therefore, to provide a selective and brief overview on study domains in which schizotypy has been considered advantageous. In particular, we review studies on health/social wellbeing, flexible and unconventional thinking (in particular creativity) and psychological styles, and personality features. To also account for the likely important role of the multidimensionality of schizotypy, we report on results as a function of schizotypy subdimensions where possible. Alongside, we discuss the potential implications of these advantages and how they could influence and shape future studies on schizotypy, including its psychopathological expression.

Healthy Schizotypy

The years preceding the introduction of the new DSM, now in its fifth revision, has seen numerous contributions to the debate as to whether dimensional models of mental illnesses (including psychosis) should be included.[8] Decades of research within a clinical and personality tradition

have focused on markers (eg, cognitive and behavioral) that are present in both patients with schizophrenia and healthy schizotypal individuals from the general population.[6,9–11] In most studies, the link between schizotypy and the clinical condition is key. Markers are treated as indicators of psychopathology rather than as indicators of mental health. Yet, one could argue that these markers are simple by-products of the psychosis dimension devoid of any clinical relevance. In the end, these markers are present in completely healthy, fully functioning individuals from the general population without a past, current, and future history of a psychotic or related psychiatric history.[4,5] We obviously appreciate the possibility that these markers could be clinically relevant, in particular when of a certain magnitude. There is, however, a major caveat with this possibility; we lack information as to the necessary magnitude of cognitive deficits for those to be clinically predictive or selective. Commonly, we observe that deficits for given cognitive domains are evident in patients with schizophrenia as well as in the respective populations along the schizophrenia spectrum (including schizotypy). When taking a dimensional personality research perspective, we do not need to focus on impairments and disadvantages. We can focus on both potential psychopathological *and* beneficial markers. This approach equally facilitates the discussion of evolutionary advantages of the schizophrenia spectrum including schizotypy.[12–14]

Schizotypy and Health/Wellbeing

Several studies have reported on comparisons in health and wellbeing between schizophrenia and schizotypy. For instance, patients with schizophrenia as compared to controls report a lower quality of life and life satisfaction.[15] In the healthy population, schizotypal traits are often accompanied by lower life satisfaction and higher negative affect. Even when negative affect is accounted for, lower life satisfaction was most importantly associated with negative and disorganized schizotypy, but not with positive schizotypy.[16–18] Moreover, while all schizotypy dimensions (positive, negative, disorganization) related to lowered life quality, the relationship was most relevant to negative schizotypy, in particular when related to social activity.[16] In another study, 3 groups were carefully selected, that is, they scored high only in negative schizotypy, positive schizotypy, or scored low in both dimensions.[19] Results revealed negative health implications for the group that scored high in negative schizotypy. This study also showed that the group high in negative schizotypy was particularly stress susceptible (eg, perceived stress, avoidant coping). These studies indicate that negative schizotypy seems linked to lowered life quality, functioning, and wellbeing.

As indicated above, negative schizotypy is only part of the larger schizotypy concept, with positive schizotypy and cognitive disorganization representing frequently reported subdimensions.[1–3] In the case of positive schizotypy, studies link this subdimension to pleasant and enriching mental experiences. In a context in which participants were exposed to experimental settings facilitating altered states of consciousness, those scoring high as compared to low on positive schizotypy reported higher and more intense levels of altered perceptual experiences and visual imagery.[20] Importantly, these authors hinted that such settings (eg, shamanism) were associated with enhanced self-healing, raising the notion that positive schizotypy in the right context would be beneficial.

Several additional examples support this position, as shown by some recent studies on new religious movements (NRM). Positive schizotypal traits in members of NRM (eg, Hare Krishnas, Druids) were higher than those in both Christians and nonreligious control groups.[21] In another study, higher delusional ideations were observed in members of NRM when compared with controls.[22] This study also showed that NRM members had comparable delusional ideations to deluded patients.[22] Importantly, however, NRM members seemed less distressed and preoccupied by their experiences than were patients.[23] Yet another study showed that individuals holding peculiar beliefs (eg, faith healing, angels, ESP) and who perceive them as being important to their lives consider these beliefs to have a positive impact enhancing their understanding of the world and themselves.[24] The more this relationship was observed, the less individuals experienced psychological distress. Finally, Farias et al[25] reported significant relationships between NRM and magical thinking (but not with paranoid ideation and perceptual ideation). NRM individuals reported a sense of connectedness and holistic experiences and showed an associative thinking style and emotional hypersensitivity. These authors suggested that such features offer a healthy way to cognitively organize thoughts and experiences, that is, reflect on a cognitive framework within which magical ideation and unusual experiences are given meaning.

Being able to cognitively organize thought and experiences might indeed reflect a crucial factor in how schizotypal features impact on mental health. Positive schizotypal features themselves, especially when accompanied by low negative schizotypy and/or low cognitive disorganization, might represent the healthy schizotype who can profit from positive schizotypal experiences by integrating positive schizotypal experiences into a coherent cognitive framework.[12,26–29] For instance, high positive schizotypy and low cognitive disorganization associated with the subjective evaluation of paranormal experiences being pleasant.[27] On the other hand, high negative schizotypy and high cognitive disorganization associated with the subjective evaluation of paranormal experiences being distressing.[27] In another study, schizotypy, psychological and subjective well-being as well as substance use was assessed in over 400 students.[28] Using a latent profile

analysis, these authors reported that a group of individuals high in positive schizotypy (with average or below average scores on negative schizotypy and cognitive disorganization) showed favorable subjective and psychological wellbeing comparable to that of individuals with low schizotypy.

All in all, these studies indicate that negative schizotypy might link to lower overall wellbeing and mental health, while high positive schizotypy in itself might reflect healthy schizotypy which in the relative absence of negative schizotypy and cognitive disorganization is able to constructively integrate positive schizotypal beliefs and experiences into a meaningful and coherent cognitive belief framework. Very likely, this cognitive capacity is important to previous notions that schizotypy (in particular positive schizotypy) associates with enhanced openness to experience, fantasy-proneness and most importantly to the socially highly valued cognitive ability of creativity.[30–32]

Schizotypy and Creativity

Ongoing debates link creativity with mental illness with most focusing on psychosis and the affective disorders.[33–36] Over many decades, reports mentioned links between "genius and madness" including "psychopathology causing creativity, creativity leading to psychopathology, a third variable causing both, and other plausible models involving multiple factors."[34(p. 7)] While the exact nature and causality of a possible link remains open to debate, cognitive models have long proposed that such psychiatric patients suffer from deficient selective attention mechanisms disabling their ability to inhibit irrelevant information and leading to remote associations and an overgeneralization.[37] The generation of unusual, remote associations has been inferred from the behavior of patients with schizophrenia and mania[37] and has been observed experimentally from individuals showing schizotypal thoughts.[38,39] In the case of patients, few studies used laboratory creativity tests, or otherwise standardized scientific methods.[40,41] Yet, when such methods were applied, results indicated that patients do not show superior creative functioning when compared with controls or other psychiatric patient groups, but perform worse.[42] This observation is not new. For instance, Jacobson questioned in 1926 that "geniuses are geniuses because they are insane"[43(p. 92)] arguing instead "that the great genius must be eminently sane when in action, if the works produced are to rank high."[43(p. 94)] Creative individuals require periods of sane functioning despite potential psychopathological tendencies, conditions more likely being encountered in healthy relatives of patients and individuals high in schizotypy.[31,44,45]

Schizotypy has indeed been instructive in this regard. A link between enhanced creativity and schizotypy has been confirmed in numerous studies using experimental creativity tests.[46–50] These experimental tests are mainly based on divergent and convergent thinking abilities[51]: in order to reach an original idea, a person must be able to diverge, exploring different ways in which a problem can be approached, and then converge upon an appropriate solution for the idea to be valued by others as creative. To test for divergent thinking abilities, researchers frequently apply tests such as the alternate uses task (AUT)[52] in which participants list as many possible uses for common items (eg, tyre). To test for convergent thinking abilities, researchers frequently apply tests in which participants have to focus on a reduced number of possible solutions when given a large variety of stimuli. For instance, in Mednick's[53] remote association task (RAT), participants are presented with 3 concepts (eg, "hair," "stretch," and "time") and asked to find the concept that best fits with the 3 original concepts regarding association, meaning, or abstraction (solution to the current example would be "long").

When such creativity tests are employed, it has been reported that schizotypy (mainly positive schizotypy)[39,54] as well as Eysenck's Psychoticism scores[55] relate to enhanced convergent thinking abilities.[56] Similar conclusions have been drawn for divergent thinking abilities.[56,57] While these findings could now be taken as solid evidence for a link between positive schizotypy and creativity, other studies draw a less obvious picture. For instance, enhanced negative schizotypy was linked to divergent thinking, while no relationship emerged between divergent thinking and positive schizotypy.[50] Some have argued that the link between positive schizotypy and creative activities (eg, divergent thinking) can be explained by individuals' professional choice.[58] Alternatively, factors such as openness, intelligence, and affective temperament might explain enhanced creative potentials in individuals high in positive schizotypy.[59,60] Also, it might be important to look at more varied creative expressions and professions. For instance, a recent study showed that comedians were paradoxically very high in both negative schizotypy (anhedonia) and impulsivity.[61] Also, the creative potential seems important in high functioning autism and Asperger syndrome (notably the autism spectrum has been related to "outsider art,"[62] science,[63] and music).[64] These observations help to rejuvenate ideas on genetic links between the autism and schizophrenia spectrum.[65]

The creative, uncommon associations and solutions involved in creativity are thought to result from a person's ability to browse remote semantic information within semantic networks.[66] Here, semantic concepts are represented as nodes. These nodes are located in proximity to one another with strong interconnections that represent closely related semantic concepts. Nodes that are located remotely to each other with weak interconnections represent weakly and indirectly related semantic concepts. Whenever a given node is activated, the surrounding nodes will be co-activated to a degree

related to their closeness to the initially activated node. Consequently, during the creative process, the spreading activation within this semantic network proceeds along new lines reaching several widespread, remotely interconnected nodes. In schizotypy, individuals are not only found to produce more remote associations they also perceive remote associations to be more closely related to each other.[54,67,68] In neuropsychological terms, this bias for remote associative processing in positive schizotypes is thought to result from a bias toward right hemisphere processing, in particular for language functions,[68–71] probably because of an overall stronger right hemisphere activation[72,73] mediated by dopaminergic mechanisms.[70,74]

It appears that schizotypy (in particular positive schizotypy) links, either directly or indirectly, to thinking styles (eg, divergent, convergent) favoring creativity. In addition, these thinking styles are enhanced in artistic professions.[35,36] By inference, individuals scoring high in (positive) schizotypy should be able to use their creative potential to their and others' advantage, while this ability should be hampered for individuals at the clinical end of the psychosis continuum. Potentially, all populations along the psychosis continuum yield enhanced divergent thinking abilities, without necessarily being all able to again converge their remote associative thinking to a reasonable and usable thought. As Abraham et al[55](p. 531), pointed out "*Psychoticism then appears to only facilitate the ability to produce original, unusual or uncommon responses in a generative task and has little bearing on the usefulness or suitability of these responses*."

Here, previous notions on the role of generativity and consolidation in creativity are relevant,[75] because "*generativity refers to the inspired creation of new forms, genres, or ideas, whereas consolidation refers to the more secondary process activities of refinement, editing, polishing, and communicating*."[76](p.107) Generativity might be as potent in psychiatric populations as it is in healthy schizotypes and/or conventionally trained creative populations, while the process of consolidation might be hampered in clinical populations only. Mapped onto the distinction between divergent and convergent thinking, one could likewise infer that both populations are comparable in their potential for *divergent* thinking, but that the *convergen*t, consolidating process might be hampered in the most severely affected individuals. Thus the convergent facility might be fully functional in individuals such as those high in schizotypy or in individuals along the bipolar dimension.[34] The latter proposition seems indicated, because bipolar disorders might lie on the psychosis dimension between patients with schizophrenia and healthy controls.[77,78]

We suggest that consolidation is intact in the healthy schizotype, while it is increasingly hampered along the psychosis dimension. The extent to which this suggestion might hold true is a topic for future studies accounting for subpopulation along the psychosis dimension; as well as different professions and other psychological dimensions, such as the autism spectrum. Moreover, future studies should more carefully consider the use of established and standardized creativity tasks to make it easier to compare across different studies. Indeed, a recent overview on creativity measures and psychopathology demonstrates how scattered the definitions, methods, and outcomes are.[79]

As a final note here, such studies should also try to explain why patients, relatives, as well as individuals high in positive schizotypy show relative deficits in domains that would argue more or less directly against the notion of enhanced abilities to generate and to diverge along the schizophrenia spectrum. For instance, studies showed deficits in the appreciation of irony along the schizophrenia spectrum, with humor and metaphor processing being relatively intact in schizotypy.[80–85] Likewise, there have been reports on reduced word production along the schizophrenia spectrum such as assessed during conversational speech[86,87] or theory of mind tasks.[88] It is likely that symptom dimensions[80,82,84,85,89] as well as performance levels[90] will at least partially determine how fluent, rigid, or varied thoughts and ideas are.

Problem Solving and Reasoning

Schizotypy studies on problem solving and reasoning are tightly linked to the creativity literature.[91–94] Creative insight might indeed be key to problem solving processes, whether people search individually or in groups. One study tested insight problem solving, in which a problem needs to be restructured (rather than found incrementally) until the solution suddenly arises ("aha experience").[94] Insight (as compared to incremental) problem solving requires loosened associative thinking abilities to successfully restructure the problem. As shown above, individuals high in positive schizotypy show loose and unconventional associative thinking styles.[39,67,95] Thus, it does not come as a surprise that pre-selected high as compared to low scoring schizotypal individuals performed more correct solutions for insight problems with no group difference being observed for incremental problems.[94] Unfortunately, this study did not distinguish between different schizotypy dimensions. In another study, enhancing the ecological validity, individuals of varying schizotypy (total low, medium, high) scores performed a group-solving task.[91] The low schizotypy group applied fewer strategies than the other 2 groups, with the latter 2 groups applying twice the number of problem solving strategies, with high schizotypy individuals being also efficient in speed.[91]

Concerning reasoning tasks, college students had to decide on the validity of logical reasoning statements.[93] While all schizotypy dimensions were associated with deficient reasoning abilities, it seemed that enhanced negative schizotypy caused these deficits. Using a different set of causal conditional statements, Sellen et al[92] did

not find reasoning deficits as a function of any schizotypy subdimension. The only relevant result to the present report was that slightly enhanced positive schizotypy was associated with less logic-like responses (ie, a lower logic index as calculated from performance in a conditional inference task). A final example used conditional reasoning about neutral and personally relevant statements.[96] Here, negative schizotypy associated with reasoning deficits. It was noted on page 128 of the author's article that "it is interesting that neither the present results nor the evidence found by Sellen et al. implicates positive schizotypy." Based on the presented literature, we agree with this conclusion: that positive schizotypy does not seem to be related to inferior or superior logical reasoning abilities, but propose intact or typical reasoning abilities with regards to healthy positive schizotypy.

Schizotypy and Creativity?

In line with independent reports in this special issue,[2,3] we have repeatedly noted the multidimensional nature of schizotypy and how acknowledging this helps us to disentangle associations with proneness to psychopathology, on the one hand, and the relationship to creativity (or lack of it), on the other. In constructing the debate we followed what has become the most widely accepted view of the structure of schizotypy: as 3 dimensions of positive schizotypy, negative schizotypy, and cognitive disorganization. However, it should be mentioned that this model can be challenged, on 2 grounds. Firstly, there is increasing evidence that the schizophrenias and bipolar disorder are overlapping clinical conditions, both descriptively and genetically, probably lying on a continuum,[77,78,97] although independent studies question the notion of a continuum idea.[98,99] Secondly, at the trait level, the domain of individual differences we have been accustomed to label "schizotypy" can also yield a 4 dimensions solution. This pattern of factor structure emerges when a sufficiently comprehensive set of psychotic trait scales is included in statistical analyses; as represented in the self-report *O-LIFE* schizotypy questionnaire.[100] Significantly, the fourth factor to emerge—impulsive nonconformity—unambiguously maps on to bipolar disorder; as evidenced by loadings both within the *O-LIFE* itself and in correlations between the impulsive nonconformity and bipolar symptoms.[101]

The current reasoning is highly relevant to the particular topic of this article: as discussed elsewhere[102] and indeed as mentioned in passing here, in our own discussion of the role of psychotic traits in creativity. Both schizophrenic and bipolar (manic-depressive) traits are relevant to creativity.[103] This proposition was first debated in the "creativity/madness" literature as an either/or debate between Sass[104] and Jamison.[105] The latter argued that the creativity connection was mediated entirely by bipolar traits, while Sass disagreed and opted for the schizophrenia connection. As it turned out, both were partly right and interesting; Nettle[106] writing at the trait level, coined the term "thymotypy" to parallel "schizotypy" as the second of 2 routes to different forms or aspects of creativity.

Schizotypy and Thinking Style

A series of studies showed that certain subdimensions of schizotypy link to inner experiences and behavioral traits that give rise to individuals prone to unconventional (including creative) thinking and behavioral expression. Located within this domain are studies demonstrating that positive schizotypy links to enhanced dissociation, openness to experience, absorption, false memories, and fantasy-proneness as well as to reduced agreeableness.[30–32] All in all, it seems that positive schizotypy and hypomania, but less so negative schizotypy or cognitive disorganization seem related to the ability and ease with which one manipulates mental images and inner concepts.[47]

Conclusions

The reviewed studies, while numerous but not exhaustive, support the notion that schizotypy is multidimensional.[1–3] This view has been supported by the reviewed literature showing that some psychotic trait features and their interaction might be disadvantageous while others are advantageous to an individual's functioning. Thus, being high in positive schizotypy seems more likely to be beneficial, that is, associated with personal wellbeing, flexible and unconventional thinking (including creativity), and favorable personality traits and psychological features (eg, openness to experience, fantasy-proneness). On the other hand, studies that are concerned with the psychopathological markers of schizophrenia and psychosis more widely, seem to show that negative schizotypy and/or cognitive disorganization might be linked to psychopathological functioning.[107–110]

To further our understanding of what might distinguish a healthy from a worrisome schizotypal profile we need studies that select individuals high in specific schizotypy dimensions,[19,28] examining their interactions in relation to individuals' mental health and illness. In addition to considering variables of subjective wellbeing, cognitive functioning and personality, we would also profit considerably from distinguishing between healthy and worrisome schizotypy by (1) considering genetic and psychopharmacological correlates[70,111,112] and (2) searching for more variables that show a superior performance in high as compared to low scorers on schizotypy.[113–115] Knowing about behavioral, genetic, neuroimaging, and psychopharmacological correlates that differentiate healthy and worrisome schizotypy might shed light on potential protective or compensatory mechanisms at the healthy end of the schizophrenia spectrum.[70] Knowing about such correlates would also enrich the continuing

discussions on evolutionary advantages of the schizophrenia spectrum including schizotypy.[12–14]

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References

1. Raine A. The SPQ: a scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophr Bull*. 1991;17:555–564.
2. Kwapil TR, Barrantes-Vidal N. Schizotypy: looking back and moving forward. *Schizophr Bull*. (this issue).
3. Mason OJ. The assessment of schizotypy and its clinical relevance. *Schizophr Bull*. (this issue).
4. Chapman LJ, Chapman JP, Kwapil TR, Eckblad M, Zinser MC. Putatively psychosis-prone subjects 10 years later. *J Abnorm Psychol*. 1994;103:171–183.
5. Gooding DC, Tallent KA, Matts CW. Clinical status of at-risk individuals 5 years later: further validation of the psychometric high-risk strategy. *J Abnorm Psychol*. 2005;114:170–175.
6. Ettinger U, Meyhöfer I, Steffens M, Wagner M, Koutsouleris N. Genetics, cognition, and neurobiology of schizotypal personality: a review of the overlap with schizophrenia. *Front Psychiatry*. 2014;5:18.
7. Claridge G. Single indicator of risk for schizophrenia: probable fact or likely myth? *Schizophr Bull*. 1994;20:151–168.
8. Esterberg ML, Compton MT. The psychosis continuum and categorical versus dimensional diagnostic approaches. *Curr Psychiatry Rep*. 2009;11:179–184.
9. Chun CA, Minor KS, Cohen AS. Neurocognition in psychometrically defined college Schizotypy samples: we are not measuring the "right stuff." *J Int Neuropsychol Soc*. 2013;19:324–337.
10. Cohen AS, Park S, Ettinger U, Chan RCK, Mohr C. Schizotypy as an organizing framework for social and affective sciences. *Schizophr Bull*. (this issue).
11. Ettinger U, Mohr C, Gooding DC, et al. Cognition and brain function in schizotypy: a selective review. *Schizophr Bull*. (this issue).
12. Nettle D, Clegg H. Schizotypy, creativity and mating success in humans. *Proc Biol Sci*. 2006;273:611–615.
13. Price JS, Stevens A. The human male socialization strategy set. *Evol Hum Behav*. 1998;19:57–70.
14. Ian K, Jenner JA, Cannon M. Psychotic symptoms in the general population—an evolutionary perspective. *Br J Psychiatry*. 2010;197:167–169.
15. Pinikahana J, Happell B, Hope J, Keks NA. Quality of life in schizophrenia: a review of the literature from 1995 to 2000. *Int J Ment Health Nurs*. 2002;11:103–111.
16. Cohen AS, Davis TE III. Quality of life across the schizotypy spectrum: findings from a large nonclinical adult sample. *Compr Psychiatry*. 2009;50:408–414.
17. Abbott GR, Byrne LK. Schizotypy and subjective well-being in university students. *Psychiatry Res*. 2012;196:154–156.
18. Abbott GR, Do M, Byrne LK. Diminished subjective wellbeing in schizotypy is more than just negative affect. *Pers Individ Dif*. 2012;52:914–918.
19. Horan WP, Brown SA, Blanchard JJ. Social anhedonia and schizotypy: the contribution of individual differences in affective traits, stress, and coping. *Psychiatry Res*. 2007;149:147–156.
20. Rock AJ, Abbott GR, Childargushi H, Kiehne ML. The effect of shamanic-like stimulus conditions and the cognitive-perceptual factor of schizotypy on phenomenology. *N Am J Psychol*. 2008;10:79–98.
21. Day S, Peters E. The incidence of schizotypy in new religious movements. *Pers Individ Dif*. 1999;27:55–67.
22. Peters E, Day S, McKenna J, Orbach G. Delusional ideation in religious and psychotic populations. *Br J Clin Psychol*. 1999;38(pt 1):83–96.
23. Smith L, Riley S, Peters ER. Schizotypy, delusional ideation and well-being in an American new religious movement population. *Clin Psychol Psychother*. 2009;16:479–484.
24. Tyler Boden M, Berenbaum H. The potentially adaptive features of peculiar beliefs. *Pers Individ Dif*. 2004;37:707–719.
25. Farias M, Claridge G, Lalljee M. Personality and cognitive predictors of new age practices and beliefs. *Pers Individ Dif*. 2005;39:979–989.
26. McCreery C, Claridge G. Healthy schizotypy: the case of out-of-the-body experiences. *Pers Individ Dif*. 2002;32:141–154.
27. Schofield K, Claridge G. Paranormal experiences and mental health: schizotypy as an underlying factor. *Pers Individ Dif*. 2007;43:1908–1916.
28. Tabak NT, Weisman de Mamani AG. Latent profile analysis of healthy schizotypy within the extended psychosis phenotype. *Psychiatry Res*. 2013;210:1008–1013.
29. Goulding A. Schizotypy models in relation to subjective health and paranormal beliefs and experiences. *Pers Individ Dif*. 2004;37:157–167.
30. Ross SR, Lutz CJ, Bailley SE. Positive and negative symptoms of schizotypy and the five-factor model: a domain and facet level analysis. *J Pers Assess*. 2002;79:53–72.
31. Nelson B, Rawlings D. Relating schizotypy and personality to the phenomenology of creativity. *Schizophr Bull*. 2010;36:388–399.
32. Merckelbach H, Rassin E, Muris P. Dissociation, schizotypy, and fantasy proneness in undergraduate students. *J Nerv Ment Dis*. 2000;188:428–431.
33. Sass LA. Schizophrenia, modernism, and the "creative imagination": on creativity and psychopathology. *Creat Res J*. 2001;13:55–74.
34. Schuldberg D. Six subclinical spectrum traits in normal creativity. *Creat Res J*. 2001;13:5–16.
35. Fink A, Slamar-Halbedl M, Unterrainer HF, Weiss EM. Creativity: genius, madness, or a combination of both? *Psychol Aesthet Creat Arts*. 2012;6:11–18.
36. Claridge G. Preamble. *Pers Individ Dif*. 2009;46:753–754.
37. Andreasen NJ, Powers PS. Overinclusive thinking in mania and schizophrenia. *Br J Psychiatry*. 1974;125:452–456.
38. Miller EN, Chapman LJ. Continued word association in hypothetically psychosis-prone college students. *J Abnorm Psychol*. 1983;92:468–478.
39. Mohr C, Graves RE, Gianotti LR, Pizzagalli D, Brugger P. Loose but normal: a semantic association study. *J Psycholinguist Res*. 2001;30:475–483.
40. Waddell C. Creativity and mental illness: is there a link? *Can J Psychiatry*. 1998;43:166–172.
41. Rubinstein G. Are schizophrenic patients necessarily creative? A comparative study between three groups of psychiatric inpatients. *Pers Individ Dif*. 2008;45:806–810.
42. Dietrich A. The mythconception of the mad genius. *Front Psychol*. 2014;5:79.

43. Jacobson AC. *Genius—Some Revelations*. London: John Hamilton LTD; 1926.
44. Kinney DK, Richards R, Lowing PA, LeBlanc D, Zimbalist ME, Harlan P. Creativity in offspring of schizophrenic and control parents: an adoption study. *Creat Res J*. 2001;13:17–25.
45. Abraham A. Is there an inverted-U relationship between creativity and psychopathology? *Front Psychol*. 2014;5:750.
46. Barrantes-Vidal N. Creativity & madness revisited from current psychological perspectives. *J Conscious Stud*. 2004;11:58–78.
47. Batey M, Furnham A. The relationship between measures of creativity and schizotypy. *Pers Individ Dif*. 2008;45:816–821.
48. Glazer E. Rephrasing the madness and creativity debate: what is the nature of the creativity construct? *Pers Individ Dif*. 2009;46:755–764.
49. Weinstein S, Graves RE. Creativity, schizotypy, and laterality. *Cogn Neuropsychiatry*. 2001;6:131–146.
50. Claridge G, McDonald A. An investigation into the relationships between convergent and divergent thinking, schizotypy, and autistic traits. *Pers Individ Dif*. 2009;46:794–799.
51. Guilford JP. Traits of creativity. In: Anderson HH, ed. *Creativity and Its Cultivation*. New York: Harper; 1959.
52. Wallach MA, Kogan N. *Modes of Thinking in Young Children: A Study of the Creativity-Intelligence Distinction*. New York: Holt, Rinehart and Winston; 1965.
53. Mednick SA. The associative basis of the creative process. *Psychol Rev*. 1962;69:220–232.
54. Gianotti LR, Mohr C, Pizzagalli D, Lehmann D, Brugger P. Associative processing and paranormal belief. *Psychiatry Clin Neurosci*. 2001;55:595–603.
55. Abraham A, Windmann S, Daum I, Güntürkün O. Conceptual expansion and creative imagery as a function of psychoticism. *Conscious Cogn*. 2005;14:520–534.
56. Jones T, Caulfield L, Wilkinson D, Weller L. The relationship between nonclinical schizotypy and handedness on divergent and convergent creative problem-solving tasks. *Creat Res J*. 2011;23:222–228.
57. Folley BS, Park S. Verbal creativity and schizotypal personality in relation to prefrontal hemispheric laterality: a behavioral and near-infrared optical imaging study. *Schizophr Res*. 2005;80:271–282.
58. O'Reilly T, Dunbar R, Bentall R. Schizotypy and creativity: an evolutionary connection? *Pers Individ Dif*. 2001;31:1067–1078.
59. Miller GF, Tal IR. Schizotypy versus openness and intelligence as predictors of creativity. *Schizophr Res*. 2007;93:317–324.
60. Claridge G, Blakey S. Schizotypy and affective temperament: relationships with divergent thinking and creativity styles. *Pers Individ Dif*. 2009;46:820–826.
61. Ando V, Claridge G, Clark K. Psychotic traits in comedians. *Br J Psychiatry*. 2014;204:341–345.
62. Cardinal R. Outsider Art and the autistic creator. *Philos Trans R Soc Lond B Biol Sci*. 2009;364:1459–1466.
63. Lidbetter H. Henry Cavendish and Asperger's syndrome: a new understanding of the scientist. *Pers Individ Dif*. 2009;46:784–793.
64. Fung CHM. Asperger's and musical creativity: the case of Erik Satie. *Pers Individ Dif*. 2009;46:775–783.
65. Crespi B, Badcock C. Psychosis and autism as diametrical disorders of the social brain. *Behav Brain Sci*. 2008;31:241–261; discussion 261.
66. Collins A, Loftus E. A spreading activation theory of semantic processing. *Psychol Rev*. 1975;82:407–428.
67. Duchêne A, Graves RE, Brugger P. Schizotypal thinking and associative processing: a response commonality analysis of verbal fluency. *J Psychiatry Neurosci*. 1998;23:56–60.
68. Weinstein S, Graves RE. Are creativity and schizotypy products of a right hemisphere bias? *Brain Cogn*. 2002;49:138–151.
69. Folley BS, Park S. Verbal creativity and schizotypal personality in relation to prefrontal hemispheric laterality: a behavioral and near-infrared optical imaging study. *Schizophr Res*. 2005;80:271–282.
70. Mohr C, Krummenacher P, Landis T, Sandor PS, Fathi M, Brugger P. Psychometric schizotypy modulates levodopa effects on lateralized lexical decision performance. *J Psychiatr Res*. 2005;39:241–250.
71. Lindell AK. On the interrelation between reduced lateralization, schizotypy, and creativity. *Front Psychol*. 2014;5:813.
72. Rominger C, Papousek I, Fink A, Weiss EM. Enhancement of figural creativity by motor activation: effects of unilateral hand contractions on creativity are moderated by positive schizotypy. *Laterality*. 2014;19:424–438.
73. Mohr C, Bracha HS, Brugger P. Magical ideation modulates spatial behavior. *J Neuropsychiatry Clin Neurosci*. 2003;15:168–174.
74. Drago V, Foster PS, Skidmore FM, Heilman KM. Creativity in Parkinson's disease as a function of right versus left hemibody onset. *J Neurol Sci*. 2009;276:179–183.
75. Ludwig AM. *The Price of Greatness: Resolving the Creativity and Madness Controversy*. New York: Guilford; 1995.
76. Schuldberg D. Creativity and psychopathology: categories, dimensions, and dynamics. *Creat Res J*. 2001;13:105–110.
77. Belli S. A psychobiographical analysis of Brian Douglas Wilson: creativity, drugs, and models of schizophrenic and affective disorders. *Pers Individ Dif*. 2009;46:809–819.
78. Schretlen DJ, Cascella NG, Meyer SM, et al. Neuropsychological functioning in bipolar disorder and schizophrenia. *Biol Psychiatry*. 2007;62:179–186.
79. Thys E, Sabbe B, De Hert M. The assessment of creativity in creativity/psychopathology research—a systematic review. *Cogn Neuropsychiatry*. 2014;19:359–377.
80. Rapp AM, Mutschler DE, Wild B, et al. Neural correlates of irony comprehension: the role of schizotypal personality traits. *Brain Lang*. 2010;113:1–12.
81. Rapp AM, Langohr K, Mutschler DE, Klingberg S, Wild B, Erb M. Isn't it ironic? Neural correlates of irony comprehension in schizophrenia. *PLoS One*. 2013;8:e74224.
82. de Bonis M, Epelbaum C, Deffez V, Féline A. The comprehension of metaphors in schizophrenia. *Psychopathology*. 1997;30:149–154.
83. Langdon R, Coltheart M. Recognition of metaphor and irony in young adults: the impact of schizotypal personality traits. *Psychiatry Res*. 2004;125:9–20.
84. Polimeni J, Reiss JP. Humor perception deficits in schizophrenia. *Psychiatry Res*. 2006;141:229–232.
85. Rawlings D. Relating humor preference to schizotypy and autism scores in a student sample. *Humor-Int J Humor Res*. 2008;21:197–219.
86. Elvevåg B, Foltz P, Rosenstein M, Delisi L. An automated method to analyze language use in patients with schizophrenia and their first-degree relatives. *J Neurolinguistics*. 2010;23:270–284.

87. St-Hilaire A, Cohen A, Docherty N. Emotion word use in the conversational speech of schizophrenia patients. *Cogn Neuropsychiatry*. 2008;13:343–356.
88. Binz B, Brüne B. Pragmatic language abilities, mentalising skills and executive functioning in schizophrenia spectrum disorders. *Clin Neuropsychiatry*. 2010;7:91–99.
89. Langdon R, Coltheart M. Recognition of metaphor and irony in young adults: the impact of schizotypal personality traits. *Psychiatry Res*. 2004;125:9–20.
90. Langdon R, Michie PT, Ward PB, McConaghy N, Catts SV, Coltheart M. Defective self and/or other mentalising in schizophrenia: a cognitive neuropsychological approach. *Cogn Neuropsychiatry*. 1997;2:167–193.
91. Coughtrey AE, Stoneham ACS. The role of schizotypy and creativity in a group problem-solving task. *Pers Individ Dif*. 2009;46:827–831.
92. Sellen JL, Oaksford M, Gray NS. Schizotypy and conditional reasoning. *Schizophr Bull*. 2005;31:105–116.
93. Tsakanikos E. Logical reasoning in schizotypal personality. *Pers Individ Dif*. 2004;37:1717–1726.
94. Karimi Z, Windmann S, Güntürkün O, Abraham A. Insight problem solving in individuals with high versus low schizotypy. *J Res Pers*. 2007;41:473–480.
95. Grimshaw GM, Bryson FM, Atchley RA, Humphrey MK. Semantic ambiguity resolution in positive schizotypy: a right hemisphere interpretation. *Neuropsychology*. 2010;24:130–138.
96. Young E, Mason O. Psychosis-proneness and socially relevant reasoning. *Psychiatry Res*. 2007;150:123–129.
97. Marneros A, Akiskal HS. *The Overlap of Affective and Schizophrenic Spectra*. Cambridge University Press; 2006.
98. Lewandowski KE, Cohen BM, Ongur D. Evolution of neuropsychological dysfunction during the course of schizophrenia and bipolar disorder. *Psychol Med*. 2011;41:225–241.
99. Hill SK, Harris MS, Herbener ES, Pavuluri M, Sweeney JA. Neurocognitive allied phenotypes for schizophrenia and bipolar disorder. *Schizophr Bull*. 2008;34:743–759.
100. Mason O, Claridge G. The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE): further description and extended norms. *Schizophr Res*. 2006;82:203–211.
101. Nettle D. Schizotypy and mental health amongst poets, visual artists, and mathematicians. *J Res Pers*. 2006;40:876–890.
102. Claridge G, Barrantes-Vidal N. Creativity: a healthy side of madness. In: Kirkcaldy BD, ed. *Chimes of Time*. Leiden: Sidestone Press; 2013:115–132.
103. Barrantes-Vidal N. Creativity and the spectrum of affective and schizophrenic psychoses. In: Kaufman JC, ed. *Creativity and Mental Illness*. New York: Cambridge University Press; 2014:169–204.
104. Sass LA. Romanticism, creativity, and the ambiguities of psychiatric diagnosis: rejoinder to Kay Redfield Jamison. *Creat Res J*. 2001;13:77–85.
105. Jamison KR. *Touched with Fire*. New York: Free Press; 1993.
106. Nettle D. *Strong Imagination*. New York: Oxford University Press; 2001.
107. Cappe C, Herzog MH, Herzig DA, Brand A, Mohr C. Cognitive disorganisation in schizotypy is associated with deterioration in visual backward masking. *Psychiatry Res*. 2012;200:652–659.
108. Feigenson KA, Gara MA, Roché MW, Silverstein SM. Is disorganization a feature of schizophrenia or a modifying influence: evidence of covariation of perceptual and cognitive organization in a non-patient sample. *Psychiatry Res*. 2014;217:1–8.
109. Debbané M, Badoud D, Balanzin D, Eliez S. Broadly defined risk mental states during adolescence: disorganization mediates positive schizotypal expression. *Schizophr Res*. 2013;147:153–156.
110. Gooding DC, Tallent KA, Hegyi JV. Cognitive slippage in schizotypic individuals. *J Nerv Ment Dis*. 2001;189:750–756.
111. Schmechtig A, Lees J, Grayson L, et al. Effects of risperidone, amisulpride and nicotine on eye movement control and their modulation by schizotypy. *Psychopharmacology (Berl)*. 2013;227:331–345.
112. Grant P, Kuepper Y, Mueller EA, Wielpuetz C, Mason O, Hennig J. Dopaminergic foundations of schizotypy as measured by the German version of the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE)—a suitable endophenotype of schizophrenia. *Front Hum Neurosci*. 2013;7:1.
113. Sack AT, van de Ven VG, Etschenberg S, Schatz D, Linden DE. Enhanced vividness of mental imagery as a trait marker of schizophrenia? *Schizophr Bull*. 2005;31:97–104.
114. Benson TL, Park S. Exceptional visuospatial imagery in schizophrenia; implications for madness and creativity. *Front Hum Neurosci*. 2013;7:756.
115. Matthews NL, Collins KP, Thakkar KN, Park S. Visuospatial imagery and working memory in schizophrenia. *Cogn Neuropsychiatry*. 2014;19:17–35.