Published in final edited form as:

Personal Disord. 2014 October ; 5(4): 413–418. doi:10.1037/per0000080.

Illusory Superiority and Schizotypal Personality: Explaining the Discrepancy Between Subjective/Objective Psychopathology

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Abstract

An interesting paradox has emerged from the literature regarding schizotypy – defined as the personality organization reflecting a putative liability for schizophrenia-spectrum disorders. Across certain cognitive, emotional, quality of life and other functional variables, individuals with schizotypy report experiencing relatively severe levels of pathology. However, on objective tests of these same variables, individuals with schizotypy perform largely in the healthy range. These subjective impairments are paradoxical in that individuals with schizotypy, typically recruited from undergraduate college populations, should be healthier in virtually every conceivable measure compared to chronic, older outpatients with severe mental illness. The present study evaluated the idea that the subjective deficits associated with schizotypy largely reflect a lack of illusory superiority bias – a normally occurring bias associated with an overestimation of self-reported positive qualities and underestimation of negative qualities compared to others. In the present study, both state – measured using laboratory emotion-induction methods – and trait positive and negative emotion was assessed across self (e.g., “how do you feel at this moment”) and other (e.g., “how do most people feel at this moment”) domains in 39 individuals with self-reported schizotypy and 39 matched controls. Controls demonstrated an illusory superiority effect across both state and trait measures whereas individuals with schizotypy did not. These results were not explained by severity of mental health symptoms. These results suggest that a cognitive bias, or lack thereof, is a marker of schizotypy and a potential target for further research and therapy.

Keywords

schizotypy; schizophrenia; superiority bias; affect; emotion

Introduction

Schizophrenia-like traits, collectively referred to as “schizotypy,” constitute a critical component of personality pathology, notably DSM-5 paranoid, schizoid and schizotypal disorders (American Psychiatric Association, 2013) and their subclinical variants (Lenzenweger, 2006). To date, a relatively large number of empirical studies have attempted to clarify genetic, biological, cognitive, affective and other features associated with

schizotypy. The consistency of many, but not all, of these features across studies as well as the magnitude of effects has been modest. However, an interesting paradox regarding schizotypy has been identified in the literature recently; a paradox that reveals findings that are both consistent across studies and, generally, of large effect sizes (Auster, Cohen, Callaway, & Brown, 2014; Chun, Minor, & Cohen, 2013; Cohen, Callaway, Najolia, Larsen, & Strauss, 2012). The paradox in question concerns how individuals with self-reported schizotypy, typically recruited from undergraduate college populations, endorse levels of pathology similar to older chronic outpatients with schizophrenia in key variables yet fail to show evidence of this pathology during objective assessment. The present study sought to evaluate the social-cognitive underpinnings of this paradox, and hence, shed light on a potentially important feature of schizotypal personality traits.

There is evidence to suggest that individuals with schizotypal personality traits resemble chronic outpatients with chronic severe mental illness in at least four key domains. College students with schizotypy report experiencing greater levels of: 1) subjective cognitive complaints (Chun et al., 2013), 2) “in-the-moment” anhedonia (i.e., reduced experience of pleasant emotion) during laboratory emotion-induction procedures (Cohen et al., 2012), 3) diminished olfactory experiences (Auster et al., 2014), and 4) quality of life deficits (Cohen, Auster, MacAulay, & McGovern, in press), that are as severe, if not more severe than older patients with schizophrenia, bipolar disorder, depression and other debilitating conditions. At the same time, college students with schizotypy fail to show comparable deficits using objective assessments of these same domains. For example, cognitive performance (for meta-analysis of 33 studies, see Chun et al., 2013), emotional functioning based on psychophysiological (Gooding, Davidson, Putnam, & Tallent, 2002) and implicit performance measures (Cohen, Beck, Najolia, & Brown, 2011), olfactory identification performance (Auster et al., 2014), and objective quality of life (e.g., number of friends, income; Cohen et al., in press) are all domains that people with schizotypal personality traits have been comparable to peers, and substantially better than patients with chronic severe mental illnesses.

As yet, there has been limited acknowledgement or empirical examination of this dysjunction between subjective and objective domains in schizotypy. Insofar as individuals with schizotypy have grossly intact reality-testing skills, are neurocognitively healthy (at least, without demonstrative deficits), and are reasonably well-functioning (at least, enough to successfully navigate academic and social college environments without major dysfunction), there is no obvious reason why they would misinterpret or misreport their objective environment in such a dramatic and systematic way. It stands to reason that this dysjunction reflects an abnormal cognitive bias. Cognitive biases involve the use of attention, beliefs, heuristics and other higher-order cognitive systems to organize information and to form novel appraisals and beliefs. In the present study, we evaluate schizotypy in its relationship to the illusory superiority bias – involving the tendency for individuals to overestimate their positive qualities and underestimate their negative qualities. Research investigating the illusory superiority bias in healthy adults has demonstrated a relatively consistent bias in over-predicting cognitive abilities (Kruger & Dunning, 1999), popularity (Zuckerman & Jost, 2001), relationship satisfaction (Buunk, 2001) and a range of other abilities and attributes. In this manner, a diminished illusory superiority bias could

explain why schizotypal personality features are associated with subjective ratings that are abnormally low relative to their peers. In the present study, we focused on state and trait emotional experience – appropriate given that positive affect is largely considered a desirable quality and negative affect is largely considered an undesired quality (Watson, Clark, & Tellegen, 1988) and because diminished positive emotional experience (i.e., anhedonia) is a critical component of schizotypy related to a wide range of clinical and functional pathologies (American Psychiatric Association, 2013). Moreover, diminished positive experience is particularly emblematic of the subjective-objective dysjunction in that college students with schizotypal features have shown more severe anhedonia than chronic outpatients with depression and schizophrenia (Cohen, Callaway, et al., 2012) - yet have failed to show concomitant reductions in implicit, physiological and biological processes related to pleasure (Gooding et al., 2002; Cohen et al., 2011). In the present study, we evaluated the following hypotheses:

- a. In accordance with the illusory superiority bias (Kruger & Dunning, 1999), we hypothesized that individuals without schizotypy would rate themselves as having significantly higher positive affect and lower negative affect compared to what they estimate their peers experience would be.
- b. In accordance with prior studies of emotion experience in schizotypy (e.g., Cohen et al., 2012), we hypothesized that individuals with schizotypy would rate themselves as having significantly lower positive affect and higher negative affect levels than individuals without schizotypy.
- c. Accordingly, we hypothesized that individuals with schizotypy would show a reduced illusory superiority bias, characterized by less divergence between self versus peer affect ratings, compared to non-schizotypal individuals.
- d. Additionally, we evaluated the relationship between illusory superiority bias levels and positive, negative and disorganized schizotypal traits and symptoms of mental health within the schizotypy group. These analyses were included for exploratory purposes, and we had no *a priori* predictions about their outcome.

Method

Participants

College freshmen and sophomores ($N = 10,258$) were emailed links to an online survey, which included a consent form, demographic questions, the Schizotypal Personality Questionnaire – Brief Revised (SPQ-BR; Callaway, Cohen, Matthews, & Dinzeo, 2014; Cohen, Matthews, Najolia, & Brown, 2010), the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983), assessment of family history of schizophrenia (i.e., “Has a family member of yours ever been diagnosed or treated for schizophrenia?”), and infrequency items. Response was modest ($n = 2,303$). Our recruitment strategy, employed in many published studies from our lab (e.g., Cohen, Callaway, et al., 2012; Cohen, Morrison, Brown, & Minor, 2012), focused on individuals scoring in the 95th percentile ($+1.65$ SD from gender determined means) on the positive ($n = 20$), disorganization ($n = 14$) and/or negative ($n = 18$) subscales from the SPQ-BR (Callaway et al., 2014; Cohen et al., 2010)

Due to overlap between subscales, these samples were not mutually exclusive. This approach, as opposed to using total schizotypy scores, was employed to ensure that subjects were extreme in at least one facet of schizotypy. We did not employ distinct positive and negative schizotypy groups, as done in some schizotypy studies, based on evidence that positive, negative and disorganized dimensions of schizotypy often co-occur within individuals, and are highly correlated in the population (Callaway et al., 2014; Cohen et al., 2010). Because of overlap between negative schizotypy and depression, individuals high in depression (BSI score $> +1$ SD) were also required to have extreme positive or disorganized SPQ subscale scores as well (see Cohen, Callaway, et al., 2012). Thirty-nine individuals with schizotypy completed the laboratory phase of the study. Thirty-nine control subjects, randomly selected from participants scoring below the gender-determined means for each of the positive, disorganization, and negative SPQ-BR factors and depression subscale from the BSI, and from reporting a lack of family history of schizophrenia (but not necessarily biological in nature) were also recruited (as in Cohen, Morrison, et al., 2012) (total available $n = 470$). This study was approved by the appropriate Human Subject Review Boards and subjects were offered informed consent prior to completing the surveys.

Measures

Schizotypal symptoms—The SPQ-BR (Callaway et al., 2014; Cohen et al., 2010) was used. The SPQ-BR comprises 32 items reflecting seven subordinate (i.e., odd/eccentric behavior, odd speech, constricted affect/no close friends, excessive social anxiety, unusual perceptual experiences, odd beliefs, ideas of reference/suspiciousness) and three superordinate (i.e., positive, negative and disorganization) factors (see Callaway et al., 2014; Cohen et al., 2010 for psychometric details). Internal consistency was acceptable for the superordinate ($\alpha s > .83$) and subordinate ($\alpha s > .66$) scales.

Self-reported symptoms—The BSI (Derogatis & Melisaratos, 1983), a commonly used measure of psychiatric symptomatology, was employed. Symptoms, including somatization, obsessive compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobias, paranoia and psychoticism, are based on a 5-point Likert scale reflecting the prior month epoch. Increasing scores reflect increasing symptom severity. The Global Severity Index (GSI; $\alpha = .93$ for this study), a measure of total negative affectivity, was also used in this study. The BSI has been used in hundreds of published studies research, and has demonstrated good reliability ($\alpha s > .93$ for this study) and convergent validity (see Derogatis & Melisaratos, 1983).

Trait emotion: Self and others—Trait affectivity was measured using the 20-item Positive and Negative Affect Schedule (Watson et al., 1988). Participants were asked to indicate how they “generally feel” in terms of 10 positive affect labels and 10 negative affect labels. Participants were also asked to indicate how they believed others “generally feel” in terms of these same 20 labels. Trait positive and negative scores for self ($\alpha s = .88$ & $.88$ respectively) and others ($\alpha s = .89$ & $.88$ respectively).

State emotion: Self and others—Participants were asked to provide three separate autobiographical memory narratives each for 90 seconds. Topics included positive valence/

high arousal (e.g., “times you felt really good and energized”), negative valence/high arousal (e.g., “times you felt really bad but energized”) and neutral (e.g., “times you felt neither good nor bad, but just neutral”). Participants were encouraged to speak for the duration of the task, and research assistants were instructed not to talk during the task. Following each narrative, participants evaluated their affective state “at this exact moment” using separate pleasant and unpleasant-based Self-Assessment Manikins (Bradley & Lang, 1994) ranging from 1 (neutral emotion) to 9 (extreme pleasant or unpleasant emotion for each scale respectively). They were then asked how they thought other people feel “at this exact moment after doing this task” using the same scale. In order to reduce carryover effects, conditions were separated by a 30-second interval during which subjects were instructed to “relax and breathe deeply”. The ratings were aggregated across the three valence conditions for data reduction purposes based on findings from our prior study using the same methodology that abnormal report in schizotypy does not appear to be specific to one emotional valence (Cohen, Callaway, et al., 2012). “Superiority bias” scores were computed by subtracting self-ratings from the other-ratings.

Analyses

The analyses were conducted in four steps. First, we examined potential demographic and cognitive performance differences between the schizotypy and control groups that might inform subsequent analyses. Second, we compared the groups on subjective trait and state report. Group (schizotypy vs. control) by condition (self vs. others) ANOVAs were computed separately for the trait and state tasks, and examined separately for the positive and negative ratings. We predicted significant interaction effects such that the control group would show a superiority bias (i.e., statistically higher positive/lower negative self vs. other ratings) whereas the schizotypy group would show a less pronounced superiority bias. Third, we evaluated the degree to which individual schizotypal traits (i.e., positive, negative, disorganized) were associated with state and trait “superiority bias” scores using bivariate correlations to help determine if a bias, if it occurred, primarily reflected a particular dimension of schizotypy. Fourth, we evaluated the degree to which symptoms of mental health, using the BSI, were associated with state and trait “superiority bias” scores using bivariate correlations. The third and fourth sets of analyses were conducted within the schizotypy group only, and were exploratory with respect to *a priori* hypotheses. All analyses in this study were two-tailed and all variables were normally distributed (skew < 1.5).

Results

Demographic and Descriptive Variables

Descriptive statistics were computed and compared between the schizotypy and control groups (see Table 1). There were no significant group differences in age, gender, or ethnic composition ($ps > .10$). None of the dependent measures examined in this study were significantly different between men versus women, or between ethnic groups, or were significantly related to age ($ps > .10$). As expected, the schizotypy and control groups were statistically different for the measures of schizotypy traits (SPQ) and mental health symptoms (BSI). The schizotypy group was high in self-reported family history of

schizophrenia, though comparison to the control group is inappropriate given that controls with a family history of schizophrenia were excluded from the study.

Group Comparisons on Self-report Ratings

Data for the self-report measures are presented in Table 2 and Figure 1. Four separate group-by-condition ANOVAs were computed. For the ANOVAs examining state positive emotion, trait positive emotion and trait negative emotion, statistically significant condition and interaction effects were observed. For the state positive and trait negative emotion ratings, significant group effects were also observed. Post-hoc analysis of the interaction effects supported our hypotheses for three of the four ratings. For the state positive, trait positive and trait negative ratings, the schizotypy and control groups were similar in how they predicted others would report their emotions, $ts(76) < 1.32$, $ps > .19$, $ds < .30$, but they were statistically different in their self-ratings, $ts(76) > 2.52$, $ps < .01$, $ds > .57$. Moreover, for each rating, the control group was statistically different in their self-report compared to their prediction of others report, paired $ts(37) > 3.94$, $ps < .001$, $ds > .89$. On the other hand, the schizotypy group was not statistically different in self versus other report; their self-ratings were largely consistent with their predictions of others' experience, paired $ts(38) < 1.57$, $ps > .13$, $ds < .36$. In sum, individuals in the control group showed a superiority bias whereas individuals in the schizotypy group did not. The magnitude of effect sizes suggests that the null findings did not reflect limited power. When these ANOVAs were recomputed controlling for mental health symptom severity (i.e., GSI), each of the group and interaction effects remained statistically significant, suggesting that the significant results were not a result of global mental health symptom severity.

Biases as a Function of Positive, Negative and Disorganized Schizotypal Traits and Mental Health Symptoms

None of the correlations computed between the SPQ-BR positive, negative and disorganization subscale scores and the "superiority bias" scores, within the schizotypy group, were statistically significant, $rs(38) < .20$, $ps > .23$. Similarly, none of the correlations computed between the BSI and the "superiority bias" scores were statistically significant, $rs(38) < -.19$, $ps > .27$. Thus, the lack of superiority bias demonstrated in the group comparisons did not appear to manifest as a function of specific schizotypy trait dimensions or mental health symptoms. For the sake of brevity, these results were omitted from the text, but are available in an online appendix.

Discussion

The present study evaluated the illusory superiority bias as an explanation for why individuals with self-reported schizotypal personality traits report experiencing pronounced subjective deficits in a range of activities despite not showing concomitant objective dysfunctions. Replicating prior findings, individuals with schizotypy showed abnormal responses concerning their own emotional experiences across both state and trait domains. However, they were similar to controls in their predictions of how others would report their emotional experiences. In other words, controls reported enhanced positive emotion and, in the case of trait emotions, attenuated negative emotion in themselves relative to their peers.

Individuals with schizotypy were not abnormal in self-report compared to their peer predictions. The intensity of this effect was not associated with other mental health symptoms in the schizotypy group, and did not appear to be driven by any particular facet of schizotypy (e.g., positive, negative or disorganization). An illusory superiority bias was evident in the control but not in the schizotypal group.

It is interesting to note that both the schizotypy and control groups were similarly inaccurate in their peer-predictions of emotional report. That is, if we take the control self-ratings as the “veridical” subjective response of a non-schizotypal individual, both the schizotypy and control groups similarly underestimated what others experience. In this manner, it would appear that the ability to estimate peer experiences is not abnormal in individuals with schizotypy, and relatedly, that they are no more accurate in this regard than their normative peers. Put simply, non-schizotypal individuals underestimate others whereas schizotypal individuals underestimate others as well as themselves. In a series of experiments examining the illusory superiority bias, Kruger and Dunning (1999) concluded that “egocentrism” lies at its root, at least in that peer ratings are largely made based on a preoccupation with self-oriented variables, such as one’s own abilities and experiences, at the expense of an objective assessment of peers. In this regard, it would appear that individuals with schizotypy suffer from a lack of “egocentrism”, or at least, an abnormal kind of egocentrism. It is unclear from the extant literature how this may take form; whether individuals with schizotypy focus are less preoccupied with themselves or whether they are preoccupied with different facets of themselves than controls. In regards to the latter idea, it stands to reason that low self-esteem, low self-efficacy and other self-focused beliefs may be at play in schizotypal individuals (e.g., (Bentall, Kinderman, & Kaney, 1994). There is distal support for this notion insofar as patients with schizophrenia are found to have elevated defeatist beliefs and low self-esteem independent of depression levels (Grant & Beck, 2009; Smith et al., 2006). Moreover, those at ultra-high risk of developing psychosis have also shown elevated defeatist performance beliefs (Perivoliotis, Morrison, Grant, French, & Beck, 2009). To our knowledge, these variables have not been directly examined in schizotypy.

The notion that schizotypal personality traits reflect an abnormality in belief formation and reasoning is not new. Hemsley and Garety (1986) argue that delusional beliefs can be explained in terms of deviations from Bayesian logic – that is, delusions arise when people make errors in evaluating their beliefs, in particular, when generating hypotheses about the world and overestimating the probability that their hypotheses are true. Subtle deviations in this logic are thought to serve as a vulnerability marker for delusional-proneness. Relatedly, Morrison, Haddock, and Tarrier (1995) have proposed that hallucinations reflect intrusive thoughts that are misattributed to the external world, and that this misattribution is guided largely by aberrant meta-cognitive processes. A relatively large literature has explored meta-cognitive and belief-formation abnormalities in the context of schizophrenia, and found that patients with schizophrenia reliably demonstrate a broad range of biases and deficits in reasoning abilities (e.g., “jumping to conclusions bias”, a bias against disconfirmatory evidence; (Woodward, Mizrahi, Menon, & Christensen, 2009). The question of whether reasoning deficits/biases serve as the basis for the subjective-objective dysfunction is interesting for future research.

Several limitations warrant mention. The present study did not measure emotion “objectively,” so it is unclear whether behavioral or physiological processes underlying emotion were normal in the schizotypal subjects. Prior literature would suggest that it was (Cohen et al., 2011; Gooding et al., 2002). The present study could not resolve whether the lack of “illusory superiority” bias is specific to schizotypy, as it may reflect a general marker of pathology: anxiety, depression or negative affect. Mental health symptoms were not correlated with change in the schizotypy group, and controlling for general symptom severity did not change the results of the study, suggesting that they were not demonstrably responsible for the results in this study.

Consistent with prior research (e.g., Cohen, Callaway, et al., 2012), college students with schizotypal personality traits demonstrated “in the moment” anhedonia during a laboratory manipulation – a finding remarkable in that patients with schizophrenia, many of whom experience clinical levels of comorbid depression and anxiety, don’t show abnormal “in the moment” anhedonia (Cohen & Minor, 2010). It seems unlikely that college students with schizotypal traits have more severe comorbid symptomatology than patients with schizophrenia, and that this in turn is responsible for the observed state anhedonia. Thus, it would appear that there is something unique about schizotypy that is related to an overly negative self-evaluation. The present findings suggest that this dysfunction reflects, to at least some degree, abnormal cognitive biases. In this regard, investigating these cognitive biases in the context of schizotypal personality traits and pathology seems an important line of research.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Comparison of positive and negative self-report for state and trait measures focused on self (black bar) and others (grey bar) report for the schizotypy and control groups.

Table 1

Descriptive Statistics for Demographic and Clinical Variables for the Control and Schizotypy Groups

	Controls (<i>n</i> = 39)	Schizotypy (<i>n</i> = 39)
% Female	62	59
Ethnicity		
% Caucasian	80	77
% African American	13	5
% Other	7	18
Age (<i>SD</i>)	19.05 (2.33)	18.64 (1.22)
% Family history of schizophrenia ^a	0%	19%
Schizotypal Traits		
Mean Positive (<i>SD</i>)	8.38 (5.07)	30.87 (9.28)
Mean Negative (<i>SD</i>)	3.08 (2.32)	11.92 (6.12)
Mean Disorganization (<i>SD</i>)	8.03 (4.73)	25.64 (4.87)
Brief Symptom Inventory		
Somatic Symptoms	8.76 (2.16)	16.78 (6.89)
Obsessive Compulsions	11.35 (5.38)	18.86 (6.21)
Interpersonal Sensitivity	5.74 (2.40)	12.16 (4.72)
Depression	7.41 (1.58)	16.41 (6.89)
Anxiety	7.91 (2.57)	15.51 (6.09)
Hostility	6.32 (1.55)	10.19 (4.22)
Phobia	5.94 (1.48)	11.43 (5.05)
Paranoia	6.59 (2.52)	12.70 (4.78)
Psychoticism	5.94 (1.25)	12.54 (4.02)

^aPercent of participants reporting at least one family member with schizophrenia

ANOVAs with Mean (SD) Group Comparisons of Positive and Negative Emotion Ratings Focused on Self Versus Others

Table 2

Affectivity Characteristic	Controls		Schizotypy	Condition F		Group F		Interaction F
	Focus	M (SD)	M (SD)	(η^2_{Partial})	(η^2_{Partial})	(η^2_{Partial})	(η^2_{Partial})	
Positive Emotion	State Measures							
	Self ^a	5.56 (1.69) ^b	4.73 (1.19)	15.23 ^{**}	4.48 [*]	5.43 [*]		
	Others	4.84 (1.24) ^b	4.54 (0.98)	(.17)	(.06)	(.07)		
Negative Emotion	Self	2.02 (0.98)	2.40 (1.13)	3.52 [†]	1.72	.84		
	Others	2.33 (1.07)	2.51 (1.10)	(.04)	(.02)	(.01)		
	Trait Measures							
Positive Emotion	Self ^a	6.21 (1.26) ^b	5.40 (1.26)	4.17 [*]	2.24	9.45 ^{**}		
	Others	5.44 (1.22) ^b	5.56 (1.10)	(.05)	(.03)	(.11)		
	Self ^a	2.58 (1.01) ^b	3.59 (1.42)	20.93 ^{**}	6.94 [*]	6.88 [*]		
Negative Emotion	Others	3.61 (1.32) ^b	3.87 (1.12)	(.22)	(.08)	(.08)		

[†] $p < .10$.

^{*} $p < .05$.

^{**} $p < .01$.

^a = self and other ratings are significantly different from each other.

^b = ratings significantly differ between schizotypy and control groups.

^a = statistically significant group difference.

^b = statistically significant condition difference