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Affective disturbances in psychometrically defined schizotypy across direct, but not indirect assessment modes

Alex S. Cohen *, Melissa R. Beck, Gina M. Najolia, Laura A. Brown

Department of Psychology, Louisiana State University, United States

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ABSTRACT

Affective disturbances in social domains are characteristic features and potential vulnerability markers of schizophrenia-spectrum pathology. The present study employed a comprehensive and multidimensional approach to understanding affect in individuals with psychometrically defined schizotypy and the controls. Measures were employed assessing trait and state social affective experiences across direct — involving explicit deliberative responses, and indirect domains — involving implicit, behavioral or otherwise non-deliberative responses. The indirect assessments included a modified Implicit Association Test and computerized lexical analysis of natural speech procured during a laboratory speech task. Our affect measures were also unique in that they allowed for separate measurement of pleasant and unpleasant affect. On all direct trait and "in-the-moment" state measures of social affect, individuals with schizotypy reported dramatically decreased pleasant and increased unpleasant affect compared to controls. This was not the case for the indirect measures, which indicated no significant group differences. This pattern was generally consistent regardless of positive, negative and disorganized schizotypal trait severity. These data suggest that affective deficits in schizotypy reflect deliberative rather than implicit/automatic processes. Implications of these findings are discussed.

1. Introduction

Disruptions in affective experience are critical components of both schizophrenia-spectrum disorders and "schizotypy" — the personality organization reflective of a putative genetic vulnerability to schizophrenia-spectrum pathology (Meehl, 1962). Of note, early theorists postulated that anhedonia, reflecting a neurobiological deficit in the ability to experience pleasure, was a core feature of schizotypy (Lenzenweger, 2006; Meehl, 1962). Likewise, an abnormally high frequency and severity of unpleasant emotions was also considered a hallmark of schizotypy (Meehl, 1962). While the importance of affective disturbances across the schizophrenia-spectrum has been established, our understanding of the fundamental nature of these disturbances remains relatively superficial. This is an important issue because these disturbances are associated with a host of social and occupational impairments in individuals with schizophrenia (Blanchard and Panzarella, 1998) and schizotypy (Cohen and Davis, 2009). The present project employed a multi-dimensional assessment strategy to understand affective disturbances in individuals with psychometrically defined schizotypy.

Individuals with schizotypy report disruptions in affective experience on "direct" self-report measures of affect. For example, abnormally high levels of trait negative and low levels of trait positive affectivity on self-report questionnaires typify individuals with psychometrically defined schizotypy (Gooding and Tallent, 2003; Horan et al., 2006; Kerns, 2006). Laboratory mood induction studies that allow for assessment of experience under highly controlled conditions have also found that individuals with schizotypy report less intense pleasant experiences compared to control subjects using likert-type mood assessments (Ferguson and Katkin, 1996; Fiorito and Simons, 1994; Fitzgibbons and Simons, 1992; Gooding et al., 2002; Mathews and Barch, 2006, but see also Berenbaum et al., 1987; Germans and Kring, 2000). Finally, decreased experience of pleasure is also observed in studies assessing affective processes during daily living using experience sampling methods (Brown et al., 2007; Kwapil et al., 2009) and autobiographical memory analysis in individuals with social anhedonia (negative schizotypal traits) but not positive schizotypy (Kerns et al., 2008).

Our understanding of affective disturbances in schizotypy becomes more complicated when we consider the results of studies employing more indirect measures; measures not dependent on direct appraisals of affect. Findings from studies examining how facilitation and interference effects of affectively valenced stimuli influence behavioral or physiological responses in schizotypy are mixed. For example, a study examining the effects of pleasant and unpleasant stimuli on startle response found that individuals with social anhedonia were normal in terms of startle modulation (Gooding et al., 2002). Similarly, individuals with social/physical anhedonia

* Corresponding author at: Department of Psychology, Louisiana State University, 224 Audubon Hall, Baton Rouge, LA 70808, United States. Tel.: +1 225 578 7017.
E-mail address: acohen@lsu.edu (A.S. Cohen).

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showed normal performance on an incidental learning task involving pleasant and unpleasant stimuli (Mathews and Barch, 2006). Interestingly, however, interference effects from emotional stroop tests have been observed in individuals with positive schizotypy in some (e.g., Mohanty et al., 2008; Van Strien and Van Kampen, 2009; Kerns and Berenbaum, 2000), but not all (Mohanty et al., 2005; van 't Wout et al., 2004) prior studies. In sum, the results of this literature suggest that affective stimuli do not hold abnormal salience at a basic information processing level for schizotypy as a group (individuals with primarily positive schizotypy, however, may be different). Anchoring this notion are findings from several recent studies that patients with schizophrenia show deficits on certain direct but not indirect affective processing measures (van 't Wout et al., 2007; Roux et al., 2010).

Understanding the potential disjunction between affective processes measured using direct versus indirect methods in schizotypy is important for elucidating the nature of the affective disruptions more generally. While it is far from clear exactly how appraisals from direct and indirect methodologies differ in underlying cognitive or neuroanatomical processes, direct, often referred to as "explicit," appraisals are thought to reflect effortful and motivated evaluative or memory retrieval processes (so called "propositional" processes; Gawronski et al., 2008). Conversely, indirect processes lack this "controlled" component and reflect more "automatic" processes that, to varying degrees, are independent of higher level evaluations (Gawronski et al., 2008). Indirect processes are considered subordinate in terms of cognitive schematics and less influenced by demand characteristics, higher order cognitive beliefs and recent experiences than direct processes (Gawronski et al., 2008; Hofmann et al., 2005). If direct, but not indirect affective disturbances are associated with schizophrenia-spectrum pathology, this would suggest that the disturbances reflect the influence of "higher-order" cognitive biases involved in deliberate affective processing. Especially important is that these processes may be more amendable to cognitive treatment approaches than if they were automatic processes.

Unfortunately, four major methodological issues limit the conclusions that can be drawn from the literature regarding direct/indirect affective disturbances in schizotypy. First, the majority of indirect measures employed to date have been based primarily on the influence of attentional interference/contrast and facilitation/congruence effects and do not directly test the indirect pleasant and unpleasant affective associations that individuals have (see Gooding et al., 2002 for an exception). This is important since individuals with schizophrenia and schizotypy demonstrate cognitive deficits which potentially serve to diminish interference effects (e.g., see Barch et al., 2004). Second, there is considerable variability in stimuli across studies. Most of the evocative events in the laboratory and ESM/retrospective experiences studies had a social theme whereas most of the stimuli in the indirect studies involved lexical stimuli which were not overtly social in nature. This is a critical point to consider given that social functioning, in terms of both objective behavior and subjective satisfaction, reflects one of the most compromised functional domains in individuals with schizophrenia-spectrum disorders (Addington and Addington, 2000; Blanchard et al., 1998; Cohen et al., 2009). Third, affect is a more complicated construct than conceptualized in many prior studies. Most prior studies have considered pleasant and unpleasant affective states as occurring on opposing ends of a single continuum. Many events evoke simultaneous pleasant and unpleasant reactions in healthy adults, for example, viewing bittersweet movies and graduating from school (Larsen et al., 2001). It is also clear that separate neurobiological systems underlie these disparate affective processes (Cacioppo et al., 1997). Finally, samples employed in prior schizotypy studies have a limited representation of schizotypal traits. Schizotypy is a heterogeneous construct and is composed, at the trait level, of separate but highly inter-correlated positive, negative and disorganization dimensions (Raine and Benishay, 1995). To our knowledge, no investigation of affect in schizotypy to date has employed a sample with the full spectrum of schizotypy traits represented.

The present study examined affective disturbances across a range of direct and indirect domains in individuals with psychometrically defined schizotypy and controls. We sought to redress methodological limitations of prior studies by 1) including measures on a range of direct and indirect affect measures, 2) focusing solely on social domains — those that are most important to schizophrenia-spectrum pathology and most likely to be disrupted, 3) conceptualizing affect as having separate pleasant and unpleasant domains for each measure employed, and 4) employing a schizotypy group with a wide range of positive, negative and disorganized traits. Indirect measures included a modified Implicit Association Test (IAT; Greenwald et al., 2003; Lane et al., 2007), a measure of implicit processing used in hundreds of studies to date, and lexical analysis of affective words used in free speech while discussing social relationships (e.g., see Pennebaker, 2001). Two confounding variables, social desirability (presumably affecting direct report) and depressive symptoms (which can mimic negative schizotypy traits), were controlled for in this study.

2. Methods

2.1. Screening phase

Participants were undergraduate freshmen and sophomores enrolled at Louisiana State University. Students (N = 8993) were approached by email to participate in an on-line survey and offered a chance to win monetary prizes. Embedded within this survey were a consent form, basic demographic questions, the Schizotypal Personality Questionnaire — Brief (Raine and Benishay, 1995), the Brief Symptom Inventory (Derogatis and Melisaratos, 1983) and validity items (Chapman and Chapman, 1983). Response rate was approximately 17% (n = 1499). Of these responses, 128 of the questionnaires were discarded because they were incomplete (n = 105) or of questionable validity (n = 23; detailed below; final n = 1371). This study was approved by the LSU Human Subjects Review Board, and all subjects offered informed consent prior to completing the surveys.

2.2. Laboratory phase

There is reasonable support for the notion that schizotypy is a categorical phenomenon reflecting a population incidence of approximately 10% (Lenzenweger, 2006; Meehl, 1962). Accordingly, we examined schizotypy as a categorical rather than a dimensional construct. A relatively conservative strategy was adopted where we included the top 5% of scorers in the schizotypy group. Individuals scoring in the 95th percentile (1.65 SD from the ethnicity and gender determined means) on the positive (i.e., cognitive-perceptual)/disorganization (n = 35) and/or negative (i.e., interpersonal) (n = 36) subscales were invited to participate in the laboratory study phase of the study. Thus, a total of 71 subjects were recruited for the schizotypy group. To address concerns that depressive symptoms can give "false positives" on negative schizotypy scales, we adopted a strategy where individuals scoring high on the negative scale were considered for the study if they also showed elevation on the positive or disorganization scales or had a depression scale score from the Brief Symptom Inventory (Derogatis and Melisaratos, 1983) below gender and ethnicity determined means. A sample of individuals that, based on scoring, were unlikely to have schizotypy were also recruited. Control subjects were identified and included based on scores below the ethnicity and gender determined means for each of the positive, negative and disorganization SPQ factors. Three hundred and eighty seven individuals met these criteria, of which 32 were randomly selected.