

Additional Support for the Cognitive Model of Schizophrenia: Evidence of Elevated
Defeatist Beliefs in Schizotypy

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Abstract

Objectives: The cognitive model of poor functioning in schizophrenia posits that defeatist performance beliefs—overgeneralized negative beliefs about one’s ability to perform tasks—develop prior to the onset of psychosis and contribute to the development and maintenance of negative symptoms and poor functioning. Although several studies with schizophrenia samples have provided support for the model, there is a paucity of research investigating these beliefs in individuals with schizotypy—those exhibiting traits reflecting a putative genetic liability for schizophrenia. This study had two aims: to examine whether defeatist performance beliefs 1) are elevated in schizotypy compared to controls and 2) are associated with decreased quality of life and working memory and increased negative but not positive schizotypy traits in the schizotypy group. *Methods:* Schizotypy ($n = 48$) and control ($n = 53$) groups completed measures of schizotypy traits, defeatist performance beliefs, quality of life, and working memory. *Results:* Analyses revealed that the schizotypy group reported significantly more defeatist performance beliefs than the control group. Within the schizotypy group, increased defeatist performance beliefs were significantly associated with greater negative schizotypy traits and lower quality of life. No associations were observed between defeatist performance beliefs and positive schizotypy traits and working memory. *Conclusions:* Results generally support the theoretical validity of the cognitive model of poor functioning in schizophrenia and suggest that elevated defeatist performance beliefs may contribute to the manifestation of subclinical negative symptom traits and reduced functioning even among those with a latent vulnerability for schizophrenia.

Keywords: cognitive model; schizotypy; defeatist beliefs; negative symptom

1. Introduction

Functional difficulties have long been observed in individuals with schizophrenia-spectrum disorders [1,2] spanning social, occupational, and community living domains [3]. These impairments have been identified in individuals in various phases of their illness, including in individuals with schizotypy, the 10% of the population exhibiting traits reflecting a putative genetic liability for schizophrenia. Specifically, individuals with schizotypy have been found to report impairments in social functioning [4,5] and notable declines in quality of life [6-8]. However, there is recent evidence to suggest that while individuals with schizotypy report subjective declines in quality of life similar to those with diagnoses of schizophrenia or bipolar disorder, they do not demonstrate objective deficits in quality of life [9]. These findings suggest that psychological factors play a role in attenuated self-reported functioning in schizotypy.

The cognitive model of poor functioning in schizophrenia points to a potential psychological mechanism for poor functioning: negative or defeatist beliefs [10]. Specifically, the model posits that individuals with a vulnerability to schizophrenia often experience cognitive impairments that can hinder normal adjustment in social and academic domains, which likely contribute to poor school or work performance or social problems. Consequently, these problems in social or occupational functioning can lead to the formation of defeatist beliefs about one's abilities, which can reduce motivation or engagement in tasks or goal-directed activities in individuals with a vulnerability for schizophrenia. Further, decreased engagement and increased withdrawal from tasks can also serve as a maladaptive technique to avoid expected poor performance or failure, thereby strengthening defeatist performance beliefs by limiting experiences to counter negative beliefs about one's abilities [11,12]. Ultimately, as a result, negative symptoms may develop, and functioning can become further impaired.

Empirical studies have garnered support for the cognitive model of poor functioning by finding associations between defeatist beliefs, cognitive impairments, negative symptoms, and functional impairments in individuals with schizophrenia. To date, defeatist performance beliefs—a specific subtype of defeatist beliefs that focuses on overgeneralized negative beliefs about one’s ability to successfully perform tasks—have received the most empirical support. Indeed, individuals with schizophrenia have been found to report increased defeatist performance beliefs compared to healthy controls [13-15]. Cross-sectional studies have also found that increased defeatist performance beliefs are associated with elevated overall and domain-specific cognitive impairments [13,16] including, for example, deficits in working memory and verbal learning [17]. Increased defeatist performance beliefs have also shown associations with increased negative symptoms, but not positive symptoms, as well as reduced functioning in individuals with schizophrenia [11,13,14,16]. Moreover, some [13,18] but not all [11] studies have found that increased defeatist performance beliefs are associated with greater depressive symptoms; however, importantly, the relationship between defeatist performance beliefs and negative symptoms remains significant even after controlling for depressive symptoms [13, 18]. Taken together, these studies point to defeatist performance beliefs as an important psychological factor with implications specifically for negative symptoms and poor functioning in individuals with schizophrenia.

Defeatist performance beliefs have been assessed in inpatients and outpatients with schizophrenia [13,16], older adults with schizophrenia [19], individuals with deficit syndrome schizophrenia [20], those with recent on-set schizophrenia [15], and veterans with schizophrenia [14]. Despite considerable research in schizophrenia samples, there is a dearth of research investigating defeatist performance beliefs in individuals with schizotypy. To our knowledge,

only one study has assessed defeatist performance beliefs in individuals on the lower end of the schizophrenia-continuum. Specifically, Pervioliotis et al. [12] conducted a pilot study in which they examined defeatist performance beliefs in 38 treatment-seeking individuals who were deemed to be at high risk of developing psychosis and found that compared to 51 controls, those at high risk reported significantly more defeatist performance beliefs. Although Perivoliotis et al. [12] provide important initial evidence in higher functioning individuals on the schizophrenia-continuum, several factors suggest the need for additional research, including the use of an abbreviated defeatist performance beliefs measure, lack of a cognitive performance measure, and nature of the sample (i.e., treatment seeking, already experiencing prominent psychotic symptoms). Given that individuals with schizotypy are generally considered to fall at the “healthier” end of the schizophrenia-spectrum, assessing whether individuals with schizotypy also evidence elevated defeatist performance beliefs will provide an important test of the theoretical validity of the cognitive model of poor functioning in schizophrenia. Moreover, identification of psychological factors like defeatist beliefs that might play a role in functional declines in schizotypy may help to improve prevention and early intervention efforts.

Therefore, this study examined defeatist performance beliefs in individuals with schizotypy outside of a treatment setting. Specifically, because prior research and theoretical work suggest that schizotypy is a categorical construct [21,22], we used a well-established psychometric identification method [23,24] to identify and then compare a college sample with schizotypy (i.e., individuals with scores at the high end of the continuum) to a college sample control group (i.e., individuals with relatively normal scores). The use of college samples is theoretically beneficial because participants are assessed near the peak age of schizophrenia onset [25]. Moreover, schizotypy samples can be examined without confounding factors, such as

medication effects, stigma, and prolonged institutionalization that are usually apparent in individuals with schizophrenia [26]. Psychometrically identified individuals may also be less symptomatic than other schizophrenia-spectrum groups, in part because college samples may have adequate cognitive, social, and fiscal resources to pursue and attend higher education [6]. Consequently, investigation of defeatist performance beliefs in a college sample provides an important test to determine whether defeatist performance beliefs are present at elevated levels in higher-functioning groups on the schizophrenia-spectrum. Specifically, this study had two sets of hypotheses:

1. Compared to the control group, the schizotypy group will report more defeatist performance beliefs, lower quality of life, and, based on findings from Chun et al. [6], greater impairment in working memory.
2. Based on previous research [12], within the schizotypy group, increased defeatist performance beliefs will be significantly correlated with increased negative schizotypy traits and reduced quality of life and working memory but will not be significantly correlated with positive schizotypy traits. Further, the relationship between defeatist performance beliefs and negative schizotypy traits will be independent of positive schizotypy traits and depression. We also explored the relationship between defeatist performance beliefs and disorganized schizotypy traits and depression in the schizotypy group, as well as the aforementioned correlations in the control group.

2. Methods

2.1. Participants

All participants were undergraduate college students from a large mid-western university in the United States. Participants were recruited from psychology and other science courses and

were invited to complete an online survey in exchange for course research credits, extra credit, or a chance to win one of five \$25 gift cards. The online survey consisted of a consent form, basic demographic questions, a measure of schizotypy traits, the Schizotypal Personality Questionnaire (SPQ; [24]), and four infrequency items [27]. Nine hundred and four participants completed the survey, with 783 (87%) providing valid responses (defined as not agreeing or strongly agreeing with any infrequency item; not averaging above a two (Disagree) across the four infrequency items). Following research and theoretical work suggesting that schizotypy is a categorical as opposed to dimensional construct [21,22], we identified schizotypy (z -score > 1.65 above the mean on the positive, negative, or disorganized SPQ subscales) and “control” or non-schizotypy groups (z -score $<$ mean on overall SPQ) using gender and ethnicity-derived means from those that provided valid responses on the SPQ. Consistent with previous studies and due to the relatively high functioning of college students [28-30], we used a relatively conservative approach of including only the top 5% of scorers in the schizotypy group. Eligibility criteria also included being between 18 and 30 years old ($n = 9$ excluded; those over 30 were excluded because they are outside of the highest risk period for schizophrenia onset [31,32]), being fluent in English ($n = 1$ excluded), reporting not being under the influence of substances during testing ($n = 1$ excluded), and having no self-reported diagnosis of a schizophrenia-spectrum disorder ($n = 1$ excluded). Participants meeting criteria were invited to the laboratory phase of the study where they completed measures of defeatist performance beliefs, quality of life, depression, and working memory. Those who completed the laboratory phase were compensated with \$10 per hour and/or course research credit. The final sample consisted of 48 individuals with schizotypy and 53 controls. Procedures were approved by the institution’s Institutional Review Board.

2.2. Instruments

2.2.1. *Schizotypy traits*

To assess for schizotypy traits, the Schizotypal Personality Questionnaire (SPQ; [24]) was administered. The SPQ contains 74 self-report items and has demonstrated high internal reliability, test-retest reliability, and convergent and discriminant validity [24]. We followed prior methods [7,29], to assess for positive schizotypy traits (i.e., ideas of references, odd beliefs or magical thinking, suspiciousness, and unusual perceptual experiences scores) disorganized schizotypy traits (i.e., odd speech and odd or eccentric behavior scores), and negative schizotypy traits (i.e., no close friends and constricted affect scores). To address concerns that the original SPQ dichotomous response scale may lack sensitivity to degrees of symptom severity [33], a modified 5-point response scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) was utilized. The modified version of the SPQ has demonstrated high convergence with the original response scale [34]. Higher scores indicate increased schizotypy traits. A sample item is: “Do you sometimes feel that things you see on the TV or read in the newspaper have a special meaning for you?”

2.2.2. *Defeatist performance beliefs*

Defeatist performance beliefs were assessed by the defeatist performance attitudes subscale [13] of the Dysfunctional Attitude Scale (DAS; [35]). The self-report defeatist performance beliefs subscale consists of 15 statements rated on a 7-point scale ranging from 1 (*Agree Totally*) to 7 (*Disagree Totally*). Items are reverse scored so that higher scores indicate greater defeatist performance beliefs. Participants are instructed to select the option that describes how they think most of the time (e.g., “If I do not do as well as other people, it means I am an inferior human being”). The DAS has demonstrated satisfactory internal consistency and test-retest reliability with various samples, including college students [36].

2.2.3. *Quality of life*

Quality of Life was assessed using the self-report World Health Organization Quality of Life-BREF (WHOQOL-BREF; [37]) scale. The WHOQOL-BREF is an abbreviated 26-item version of the World Health Organization Quality of Life Questionnaire (WHOQOL-100), which was developed and validated in 15 research centers around the world [38]. The WHOQOL-BREF measures perceived quality of life in four domains: physical health, psychological health, social relationships, and the environment. The scale also assesses overall quality of life using a single item: “How would you rate your quality of life?” Items are rated on a five-point Likert scale, and mean domain scores are converted to a 0-100 scale in order for the scores to be comparable to the WHOQOL-100. Higher scores indicate greater quality of life. WHOQOL-BREF domain scores have been shown to strongly correlate ($r = .90$) with the WHOQOL-100 domain scores.

2.2.4. *Depression*

The six-item depression subscale of the self-report Brief Symptom Inventory-18 (BSI; [39]) was used to assess depressive symptoms. Items are rated on a five-point scale ranging from 0 (*Not at all*) to 4 (*Extremely*). A sample item is: “In the past week, how much have you been bothered by feeling blue?” Higher scores suggest greater depressive symptoms. The BSI-18 is a widely used measure that has been validated in various samples, including college students [40].

2.2.5. *Working memory*

Working memory was assessed by the digit sequencing subscale of the Brief Assessment of Cognition in Schizophrenia (BACS; [41]). In this task, participants were presented with up to 28 sets of numbers of increasing length and were asked to report the numbers in order from lowest to highest. Normed scores controlling for gender and age are reported, with higher scores

indicating greater working memory. The reliability and validity of this test have been established in individuals with schizophrenia and healthy controls [41].

2.3. *Data Analyses*

Analyses were conducted in several parts. First, we compared groups on demographic variables using independent samples *t*-tests for continuous variables and chi-square tests for categorical variables to determine whether variables should be controlled in subsequent analyses. We then compared the schizotypy and control groups on defeatist performance beliefs, quality of life, working memory, and depression using independent samples *t*-tests. We calculated Cohen's *d* as a measure of effect size, following Cohen [42] in categorizing effect sizes (0.2 = small, 0.5 = medium, 0.8 = large). To examine relationships within both groups, we conducted Pearson's correlations to examine the relationships between defeatist performance beliefs and negative schizotypy traits, positive schizotypy traits, disorganized schizotypy traits, quality of life variables, working memory, and depression. Fisher's *r*-to-*z* transformations were used to compare the magnitude of the correlations between groups. To test the hypothesis that the proposed relationship between defeatist performance beliefs and negative schizotypy traits was independent of positive schizotypy traits and depression symptoms, we conducted partial correlations controlling for depression or positive schizotypy traits. Based on previous literature [11,13], directional a priori hypotheses, and previous procedures [12], all correlations in the schizotypy group were tested with one-tailed tests.

3. **Results**

3.1. *Descriptive Statistics*

Means, standard deviations, and alphas for all study measures are presented in Table 1.

3.2. *Demographic comparisons*

Groups did not differ in age (Schizotypy, $M = 20.21$, $SD = 2.15$; Control, $M = 19.85$, $SD = 1.76$, $t(99) = -.92$, $p = .36$), gender (Schizotypy, 54% female; Control, 55% female, $\chi^2(1) = 0.00$, $p = 0.96$), or race (Schizotypy, 73% Caucasian; Control, 85% Caucasian, $\chi^2(5) = 6.69$, $p = .25$). Accordingly, no demographic factors were controlled in subsequent analyses.

3.3. Group differences on study measures

As hypothesized, the schizotypy group reported significantly more defeatist performance beliefs and significantly lower quality of life (overall, as well as the domains of physical health, psychological health, social relationships, and the environment) compared to the control group (See Table 2). However, contrary to hypotheses, the groups did not differ in working memory.

3.4. Correlations with defeatist performance beliefs

In the schizotypy group, and consistent with hypotheses, increased defeatist performance beliefs were significantly associated with greater negative schizotypy traits and lower overall quality of life, including the domains of physical health, psychological health, social relationships, and the environment (see Table 3). Also in line with our hypothesis, defeatist performance beliefs were not significantly associated with positive schizotypy traits. However, contrary to our hypothesis, defeatist performance beliefs were not associated with working memory. As hypothesized, the partial correlations between defeatist performance beliefs and negative schizotypy traits were significant when positive schizotypy traits ($r = .39$, $p < .01$) and depressive ($r = .26$, $p = .04$) symptoms were controlled. Exploratory analyses revealed that defeatist performance beliefs were not significantly associated with disorganized schizotypy traits but were significantly associated with depressive symptoms.

Within the control group, exploratory analyses revealed that greater defeatist performance beliefs were significantly associated with increased positive and disorganized

schizotypy traits and depressive symptoms. Defeatist performance beliefs were not significantly related to negative schizotypy traits, working memory, or the physical health quality of life domain. In contrast, greater defeatist performance beliefs were significantly related to reduced overall quality of life, and quality of life in the domains of psychological health, social relationships, and the environment. The only correlation that differed significantly between the schizotypy and control group was positive schizotypy traits, such that positive schizotypy traits were more strongly associated with defeatist performance beliefs in the control group than the schizotypy group.

4. Discussion

Informed by the cognitive model of poor functioning in schizophrenia [10], the primary aim of this study was to examine the presence and correlates of defeatist performance beliefs in individuals with schizotypy. Consistent with our hypothesis, those with schizotypy reported significantly more defeatist performance beliefs compared to a control group, with a large effect size. Further, as hypothesized, defeatist performance beliefs were significantly positively associated with negative (and not positive) schizotypy traits and significantly and inversely associated with all measures of quality of life in the schizotypy group, evidencing moderate to large associations. Importantly, the relationships between defeatist performance beliefs and negative schizotypy traits remained significant when positive schizotypy traits and depressive symptoms were controlled. However, contrary to hypotheses, defeatist performance beliefs were not associated with working memory in the schizotypy group.

These findings extend the work of prior studies that have found elevated defeatist performance beliefs in prolonged schizophrenia compared to a control sample [13,14]. Indeed, this is the first study to our knowledge that explores defeatist performance beliefs in individuals

with schizotypy. Interestingly, the magnitude of the effect size we found when comparing defeatist performance beliefs between schizotypy and controls ($d = 1.15$) was slightly greater than Grant & Beck [13] found when comparing those with schizophrenia to a control group ($d = .92$). Yet, the magnitude of the effect size was much lower for neurocognitive impairment (working memory in schizotypy, $d = -.05$ versus overall neurocognitive impairment in schizophrenia found by Grant and Beck [13], $d = -.99$) and overall quality of life (schizotypy, $d = -.69$ versus schizophrenia, $d = -1.5$). Given that college samples with schizotypy are likely at the higher end of functioning on the schizophrenia-spectrum, it is reasonable and consistent with prior findings [43] that this group did not demonstrate impairments in working memory and had less severe difficulties in self-reported functioning; however, given this, it is surprising that the schizotypy group had similar levels of defeatist performance beliefs compared to a sample with prolonged schizophrenia [13]. One explanation may be that poor insight or lack of awareness of one's illness or mental experiences (i.e., thoughts or emotions), which are commonly observed in schizophrenia [44,45], may have lead those with prolonged schizophrenia to underreport defeatist performance beliefs.

Further, in part, our findings are consistent with the "paradox of schizotypy" [9]. This paradox is based on findings that college students with schizotypy tend to report subjective deficits that are equal to or greater than individuals with psychiatric diagnoses (i.e., schizophrenia) but do not display equivalent objective deficits in areas such as functioning or cognitive abilities. That is, college students with schizotypy report greater subjective deficits than the deficits observed on objective tasks. Though prior studies have suggested that psychological factors may be driving subjective deficits in schizotypy [6,9], this study expands

on prior studies by empirically identifying defeatist performance beliefs as a specific psychological factor that may contribute to subjective deficits in schizotypy.

In addition to quality of life, our findings also suggest that defeatist performance beliefs have important implications for negative schizotypy traits. Consistent with previous studies in those with schizophrenia [13-16] and those at ultra high risk for psychosis [12], increased defeatist performance beliefs were significantly associated with greater negative schizotypy traits. Importantly, and in line with the aforementioned studies, the relationship between defeatist performance beliefs and negative schizotypy traits remained significant when controlling for both depressive symptoms and positive schizotypy traits. One interpretation of these findings is that independent of depression symptoms and positive schizotypy traits, negative beliefs about one's ability to perform tasks may lead to or maintain social withdrawal and inactivity. Although we cannot determine the direction of this relationship, these findings and interpretation are consistent with the cognitive model of poor functioning in schizophrenia [10]. Further, given that the cognitive model and other studies have identified additional types of defeatist beliefs such as negative expectations of success [11,46] as being important in the expression and maintenance of negative symptoms in individuals with schizophrenia, future studies should seek to examine the specificity of additional types of defeatist beliefs to negative schizotypy traits. Moreover, additional longitudinal investigations examining the types of beliefs that might be most central to the development of full-blown negative symptoms are needed.

In contrast to some previous studies ([11,12]; but also see [13]), defeatist performance beliefs in our sample evidenced a larger association with depression. One explanation may be due to the difference in the assessment of depressive symptoms, as most previous studies have used the Beck Depression Inventory-II (BDI-II; [47]), rather than the depression subscale of the

BSI-18 used in this study. While the BDI-II and BSI-18 both assess cognitive-affective areas of depression, the BDI-II also contains more somatic complaints of depressive symptoms [47]. It is possible that the somatic complaint items are not as strongly associated with defeatist performance beliefs, leading to a more moderate association between defeatist performance beliefs and BDI-II scores in prior samples. Future studies could compare the relationship between defeatist performance beliefs and different domains of depression in individuals across the schizophrenia-spectrum.

Findings from this study offer further support for the theoretical validity of the cognitive model of poor functioning in schizophrenia [10]. In accord with the model, the schizotypy group reported elevated defeatist performance beliefs, social problems (i.e., reduced quality of life in the domain of social relationships), and lower overall quality of life. Further, defeatist performance beliefs were significantly associated with increased negative schizotypy traits (but not positive schizotypy traits) and reduced quality of life in the schizotypy group. However, the schizotypy group did not demonstrate objective cognitive deficits (i.e., working memory) that would be predicted from the model. While it is possible that the BACS working memory subscale used in this study was not sensitive enough to capture more subtle cognitive difficulties in the schizotypy group, it is also possible that objective cognitive deficits were not evident because college students with schizotypy are cognitively performing at a higher level in order to be admitted to and attend college. Thus, there may have been less variability or impairment in cognition than in prior studies with individuals with schizophrenia who often demonstrate cognitive deficits in numerous domains [48]. Future studies should seek to replicate these findings with alternative working memory tasks in non-college samples and explore the potential relationships between defeatist performance beliefs and other areas of cognition that might be

impaired in schizotypy, such as affectively-valenced cognitive performance [30] or metacognition [49]. Further, research has shown that only approximately 10% of those with schizotypy will go on to develop full-blown psychosis [50]. Thus, a more specific test of the model may involve examining whether those with schizotypy who go on to develop psychosis have decreased neurocognition, elevated defeatist beliefs, and social and occupational problems prior to their onset of psychosis.

While this study offers important insights into the role of defeatist performance beliefs in schizotypy, there are several limitations that need to be considered. First, the nature and size of the sample (i.e., convenience sample, restricted to college students) are limitations, and additional studies with larger non-college samples are needed to confirm and enhance the generalizability of our findings. However, it is noteworthy that several of our findings are consistent with previous studies with clinical samples [11,13]. Second, the lack of an objective functioning measure is a limitation, and future studies should compare the relationship between defeatist performance beliefs and both self-report and clinician-rated measures of functioning. Third, the cross-sectional nature of this data is a limitation, and longitudinal modeling could help inform the direction of the findings. For example, it is possible that negative schizotypy traits lead to the development of defeatist performance beliefs. Additionally, as noted above, the high amount of shared variance between defeatist performance beliefs and depression symptoms limited our ability to adequately control for depression, and future work with alternative measures of depression is needed to disentangle this relationship in individuals with schizotypy. Indeed, although the Brief Symptom Inventory-18 is a widely used measure, it is more aptly used as a screener of overall psychological distress rather than a measure of depression

symptomology; future studies should use either semi-structured interviews or more comprehensive measures of depression symptoms, such as the BDI-II [47].

There are also several valuable implications for this study. Overall, findings are consistent with and provide additional support for the cognitive model of poor functioning in individuals with schizophrenia-spectrum disorders [10]. Further, this study extends prior findings to those with schizotypy, identifying that those at the higher end of functioning on the schizophrenia-spectrum also report elevated defeatist performance beliefs. Findings from this study in conjunction with findings that those at ultra high risk of developing schizophrenia also evidence elevated defeatist performance beliefs [12] point to defeatist performance beliefs as an important therapeutic target that may help to reduce the development or severity of psychosis, particularly negative symptoms. Future studies should seek to confirm and extend these findings by identifying the contribution of defeatist performance beliefs to more objective functioning measures, as well as the role of defeatist performance beliefs in the transition from schizotypy to schizophrenia.

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