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EXAMINING THE ROLE OF DYSFUNCTIONAL BELIEFS IN INDIVIDUALS WITH SCHIZOTYPY

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ABSTRACT

Luther, Lauren. M.S., Purdue University, May 2015. Examining the Role of Dysfunctional Beliefs in Individuals with Schizotypy. Major Professor: Michelle P. Salyers.

In accord with the cognitive model of poor functioning in schizophrenia, defeatist performance beliefs, or overgeneralized negative beliefs about one's ability to perform tasks, have been linked to poor functional outcomes, cognitive impairment, and negative symptoms in schizophrenia and are a suggested therapeutic target in Cognitive Therapy for Schizophrenia. However, there is a paucity of research investigating these beliefs in schizotypy, or those exhibiting traits reflecting a putative genetic liability for schizophrenia. This study had three aims: to examine whether defeatist performance beliefs 1) are elevated in schizotypy compared to non-schizotypy, 2) are associated with functioning-related outcomes (i.e., quality of life, working memory, negative schizotypy traits), and 3) mediate the relationships between working memory and both negative schizotypy traits and quality of life. Schizotypy (n = 43) and non-schizotypy (n = 45) groups completed measures of schizotypy traits, defeatist performance beliefs, quality of life, and working memory. Results revealed that the schizotypy group reported significantly more defeatist performance beliefs than the non-schizotypy group. Within the schizotypy group, defeatist performance beliefs were significantly positively associated with negative schizotypy traits and significantly inversely associated with

quality of life. No associations were observed between defeatist performance beliefs and positive schizotypy traits and working memory. Further, defeatist performance beliefs did not mediate the relationships between working memory and either quality of life or negative schizotypy traits. Findings are generally consistent with the cognitive model of poor functioning in schizophrenia and suggest that defeatist performance beliefs may be an important therapeutic target in early intervention services.

INTRODUCTION

Functional difficulties have long been observed in individuals with schizophrenia-spectrum disorders (Bleuler, 1911; Kraepelin, 1913) with difficulties spanning social, occupational, and community living domains (Bowie, Reichenberg, Patterson, Heaton, & Harvey, 2006). Moreover, these impairments have been identified in individuals in various phases of their illness, including in individuals with schizotypy, or the 10% of the population exhibiting traits reflecting a putative genetic liability for schizophrenia. Specifically, individuals with schizotypy have been found to have impairments in social functioning (Jahshan & Sergi, 2007; McCleery et al., 2012), as well as notable declines in quality of life (Chun, Minor, & Cohen, 2013; Cohen & Davis, 2009; Cohen, Leung, Saperstein, & Blanchard, 2006; Cohen & Minor, 2010; Lenzenweger & Loranger, 1989). However, there is recent evidence to suggest that while individuals with schizotypy report deficits in quality of life similar to those with diagnoses of schizophrenia or bipolar disorder, they do not demonstrate objective deficits in quality of life (Cohen, Auster, MacAulay, & McGovern, 2014). 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 (e.g., “If you cannot do something well, there is little point in doing it at all;” Beck, Rector, Stolar, &

Grant, 2009). Defeatist beliefs are presumed to develop prior to the onset of full-blown psychosis and contribute to the development and maintenance of negative symptoms and poor functioning in individuals with schizophrenia. Specifically, the cognitive model suggests that individuals with a vulnerability to schizophrenia often experience cognitive difficulties 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 further reduce motivation or engagement in tasks or goal-directed activities in individuals with a vulnerability for schizophrenia. 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 and the manifestation and maintenance of negative symptoms and functional impairment in individuals with schizophrenia. Defeatist performance beliefs, or overgeneralized negative beliefs about one's ability to successfully perform tasks, have received the most empirical support. Indeed, individuals with higher negative symptoms have been found to endorse defeatist performance beliefs to a greater extent than individuals with fewer negative symptoms, even when depression is controlled (Rector, 2004). Cross-sectional studies have found that defeatist performance beliefs were associated with elevated negative symptoms and poorer functioning (Grant & Beck, 2009) and that individuals with higher defeatist performance beliefs also reported higher negative symptoms and worse community functioning (Horan et al., 2010). Moreover, defeatist performance beliefs have been

found to mediate the relationship between cognitive impairment and both negative symptoms and functioning (Grant & Beck, 2009), as well as to mediate the relationship between the capacity to perform everyday functional behaviors and real-world performance of those behaviors (Horan et al., 2010). Taken together, these studies point to defeatist performance beliefs as an important psychological factor with implications for negative symptoms and poor functioning in individuals with schizophrenia.

While there is considerable research examining defeatist performance beliefs in individuals with prolonged schizophrenia, there is a dearth of research investigating defeatist performance beliefs in individuals with schizotypy. Defeatist performance beliefs have been assessed in inpatients and outpatients with schizophrenia (Grant & Beck, 2009; Green, Hellemann, Horan, Lee, & Wynn, 2012), older adults with schizophrenia (Granholm, Holden, Link, McQuaid, & Jeste, 2013), individuals with deficit syndrome schizophrenia (Beck, Grant, Huh, Perivoliotis, & Chang, 2012), as well as with veterans with schizophrenia (Horan et al., 2010). To my knowledge, only one study has assessed defeatist performance beliefs in individuals on the lower end of the schizophrenia-continuum (Perivoliotis, Morrison, Grant, French, & Beck, 2009). This preliminary study examined defeatist performance beliefs in treatment seeking individuals who were deemed to be at high risk of developing psychosis and found that compared to controls, those at high risk reported significantly more defeatist performance beliefs (independent of depression and positive symptoms). Although that study provides initial evidence for the presence of defeatist performance beliefs in higher functioning individuals on the schizophrenia-continuum, the small sample, use of an abbreviated defeatist performance beliefs measure, and nature of the sample (i.e., treatment seeking,

already experiencing prominent psychotic symptoms) demonstrate the need for further work in this area. Moreover, 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.

Therefore, this study aimed to examine individuals with schizotypy outside of a treatment setting. Specifically, we aimed to compare a college sample of individuals with schizotypy and non-schizotypy who were classified using a psychometric identification method (see methods below) that has been utilized in numerous studies (Gooding & Braun, 2004; Raine, 1991). The use of college samples is theoretically beneficial because participants are assessed near the peak age of schizophrenia onset (Chapman, Chapman, & Kwapil, 1994). Moreover, schizotypy samples can be examined without confounding factors, such as medication effects, that are usually apparent in individuals with schizophrenia (Gooding, Tallent, & Matts, 2005). 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 (Chun et al., 2013). 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 three main groups of hypotheses:

1. Compared to the non-schizotypy group, the schizotypy group will report more defeatist performance beliefs but lower quality of life. Also, based on a recent meta-analysis (Chun et al., 2013), which found that individuals with schizotypy do not evidence global cognitive impairment but demonstrate impairment of a small effect size in working memory, the schizotypy group will score lower on working memory tasks than those without schizotypy.
2. Based on previous research (Perivoliotis et al., 2009), within the schizotypy group, defeatist performance beliefs will be associated with negative schizotypy, independent of positive schizotypy and depression. Also, to ensure that defeatist performance beliefs are specific to negative schizotypy traits, I will examine the relationship between defeatist performance beliefs and positive schizotypy, hypothesizing that defeatist performance beliefs will not be associated with positive schizotypy. Also, defeatist performance beliefs will be associated with decreased quality of life and decreased working memory. In addition to specific hypothesis testing, I explored whether defeatist performance beliefs were related to disorganized schizotypy traits in the schizotypy group. All of these correlations were explored in the non-schizotypy group, and the magnitudes were compared to those with schizotypy.
3. Based on findings from Grant & Beck (2009), defeatist performance beliefs will mediate the relationship 1) between working memory and negative schizotypy traits and 2) between working memory and quality of life.

METHODS

Participants

All participants were undergraduate college students from a large mid-western university in the United States. Participants were recruited from psychology 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 Amazon gift cards, depending on where they were recruited from. The online survey consisted of a consent form, basic demographic questions, a measure of schizotypy traits, the Schizotypal Personality Questionnaire (SPQ; Raine, 1991), and four infrequency items (Chapman, & Chapman, 1983). Eight hundred and twenty participants completed the survey, with 716 (87%) providing valid responses (defined as not agreeing or strongly agreeing with any infrequency item; scoring < 8 across 4 infrequency items). Schizotypy (*z*-score > 1.65 above the mean on the positive, negative, or disorganized SPQ subscales) and non-schizotypy groups (*z*-score < mean on each of the three subscales of SPQ) were identified from valid responses on the SPQ using gender and ethnicity-derived means. Eligibility criteria also included being between 18 and 30 years old (n = 4 excluded), being fluent in English (n = 1 excluded), and having no self-reported diagnosis of a schizophrenia-spectrum disorder (n = 1 excluded). Participants meeting criteria were invited to complete 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 or with a combination of course research credit and $10 per hour of participation. The final sample consisted of 43 individuals with schizotypy and 45 individuals without schizotypy. Procedures were approved by the Institutional Review Board (IRB) at IUPUI.

Measures

Schizotypy Traits

To assess for schizotypy traits and identify individuals with schizotypy, the Schizotypal Personality Questionnaire (SPQ; Raine, 1991) was administered. The SPQ contains 74 items and has demonstrated high internal reliability, test-retest reliability, and convergent and discriminant validity (Raine, 1991) and is also correlated with other commonly used scales associated with schizotypy traits such as the Magical Ideation Scale (Eckblad & Chapman, 1983), Social Anhedonia Scale (Eckblad & Chapman, 1983), and Perceptual Aberration Scale (Chapman, Chapman, & Raulin, 1978). The SPQ is comprised of three main factors or subscales: 1) positive, 2) disorganization, and 3) negative. Following prior categorization methods (Cohen, Callaway, Najolia, Larsen, & Strauss, 2012; Cohen & Davis, 2009; Cohen, Matthews, Najolia, & Brown, 2010), the positive factor was comprised of the sum of the scores from the ideas of references, magical thinking, and unusual perceptual experiences scores, while the disorganization factor was comprised of the sum of the odd speech and odd behavior scores. Based on the above methods, the negative traits factor consisted of the sum of the no close friends and

constricted affect scores. We excluded the social anxiety score to exclude a trait that might be secondary to affective conditions while still assessing negative schizotypy traits that are consistent with those found in schizophrenia (Cohen & Davis, 2009; Cohen et al., 2010).

The original dichotomous response scale of the SPQ is not very sensitive to degrees of symptom severity (Peltier & Walsh, 1990); thus, 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 to the original response scale (Wuthrich & Bates, 2005). 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?"

Defeatist Performance Beliefs

Defeatist performance beliefs were assessed by the defeatist performance attitudes subscale of the Dysfunctional Attitude Scale (DAS; Weisman & Beck, 1978). 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. Sample items include: "If I do not do as well as other people, it means I am an inferior human being" and "If I fail at my work, then I am a failure as a person." The DAS has demonstrated satisfactory internal consistency and test-retest reliability with various samples, including college students (Cane, Olinger, Gotlib, & Kuiper, 1986; Oliver & Baumgart, 1985).

Quality of Life

Quality of Life was assessed using the World Health Organization Quality of Life-BREF (WHOQOL-BREF; WHOQOL Group, 1994) 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 (Skevington, Lotfy, & O'Connell, 2004). 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. WHOQOL-BREF domain scores have been shown to strongly correlate (r = .90) with the WHOQOL-100 domain scores.

Depression

In order to control for depression, which has also been linked to defeatist performance beliefs (Beck & Alford, 2009), the depression subscale of the Brief Symptom Inventory-18 (Derogatis, 2001; BSI) was used. The BSI-18 is an 18-item self-report scale that includes subscales that assess for depression, anxiety, somatization, and psychological distress. The depression subscale is comprised of six-items, and each item is 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 (Hayes, 1997).

Working Memory

Working memory was assessed by the digit sequencing subscale of the Brief Assessment of Cognition in Schizophrenia (BACS; Keefe et al., 2004). 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 (Keefe et al., 2004).

Data Analyses

Sample Size Determination Power Analysis

Prior to recruitment, I conducted a power analysis to gauge the sample size needed for analyses. First, in order to detect significant group differences of .5 magnitude or greater (based on findings from Grant & Beck, 2009) with .8 power, a minimum of 51 participants in each group was needed. Second, in order to detect significant correlations of .4 or greater (again, based on Grant & Beck, 2009) with .8 power, a minimum of 34 individuals with schizotypy was needed. Lastly, Fritz & McKinnon's (2007) sample size determination estimates for mediation effects indicate that in order to detect mediation findings similar to those in Grant and Beck (2009) using the bias-corrected bootstrap method and a power of .8, a minimum of approximately 115 participants with schizotypy was needed. Despite extensive recruitment, we failed to reach the sample size identified by the power analyses for group differences or mediation effects, suggesting that these analyses are underpowered.

Analytic Steps

Analyses were conducted in several parts. First, I conducted preliminary descriptive statistics to ensure that the data adhered to the statistical assumptions for parametric tests (i.e., normality, skewness, kurtosis, etc.). Next, I compared differences in demographic variables between groups 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. I then compared the entire sample and schizotypy vs. non-schizotypy groups on defeatist performance beliefs, quality of life, working memory difficulties, and depression using independent samples *t*-tests. I calculated Cohen's *d* as a measure of effect size and followed Cohen et al. (1988) in categorizing effect sizes (*d*) of 0.2 as small, 0.5 as medium, and 0.8 as large. To examine relationships within the entire sample, schizotypy, and non-schizotypy groups, I 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 in the entire sample and each group. Fisher's r-to-z transformations were used to compare the magnitude of the correlations between the schizotypy and non-schizotypy groups. To test the hypothesis that the proposed relationship between defeatist performance beliefs and negative schizotypy traits was independent of positive schizotypy and depression symptoms, significant correlations were followed up with partial correlations controlling for depression and positive schizotypy. Based on previous literature, directional a priori hypotheses, and previous procedures (Grant & Beck, 2009; Perivoliotis et al., 2009), all correlations in the schizotypy groups were tested with one-tailed tests.

The last phase of analyses consisted of mediation analyses (see Figure 1; Table 1 for hypotheses). I conducted two main mediation analyses using the PROCESS macro (Hayes, 2013). For each of the two models, I tested my hypotheses that defeatist performance beliefs mediate the relationship between the independent variable (X) and the dependent variable (Y) by testing the direct (*c'*), indirect (a**b*), and total effect of working memory difficulties (X) on the respective dependent variable (Y; negative schizotypy traits or quality of life variables). The PROCESS tool conducted the following three ordinary least square regressions to estimate each model: 1) defeatist performance beliefs (M) was regressed onto working memory (X), which produced *a* (needed to assess for indirect effect); 2) the dependent variable (Y; i.e., negative schizotypy traits or quality of life, depending on the model) was regressed onto both defeatist performance beliefs (M) and working memory (X), which produced *b* (needed to assess for indirect effect) and *c'* (direct effect); and 3) the dependent variable (Y) was regressed on working memory (X), which yielded the total effect of working memory. To account for our underpowered sample, a bias-corrected 90% and not 95% bootstrap confidence interval using 10,000 bootstrap samples was used to assess for the statistical inference of the indirect effect. This method is considered advantageous over other inference methods (i.e., normal theory approach, Sobel test), as it generally is more powerful, better to use with smaller samples (as long as your sample is deemed valid), and can be more accurate (Hayes, 2013). Mediation was supported if the indirect effect was statistically different from zero, which was indicated by a 90% bias-corrected bootstrap confidence interval that was above zero. Notably, this approach does not require the precondition that the independent variable (X) and the dependent variable (Y) are associated. Historically, this

has been viewed as a necessary step in order to establish mediation in Baron and Kenny's (1986) popular causal steps approach to mediation (Hayes, 2013). However, this precondition is no longer deemed necessary, as a lack of an association between X and Y does not automatically disprove causation (Hayes, 2013). Indeed, Hayes (2013) indicates that it is probable for the independent variable (X) to affect the dependent variable (Y) indirectly through the mediator even when the total effect is not statistically different from zero.

RESULTS

Descriptive Statistics

Correlations, means, standard deviations, minimum and maximum scores, and alphas for all study variables are presented in Table 2. Defeatist performance beliefs were significantly positively associated with negative, positive, and disorganized schizotypy traits and depression symptoms. Defeatist performance beliefs were significantly and inversely associated with overall quality of life and the quality of life domains of physical health, psychological health, social relationships, and the environment. There was not a significant association between defeatist performance beliefs and working memory.

Demographic Comparisons

Groups did not differ in age (Schizotypy, $M = 20.70$, $SD = 3.50$; Non-schizotypy, $M = 19.96$, $SD = 1.88$, $t\ (86) = -1.25$, $p = .22$), gender (Schizotypy, 60% female; Non-schizotypy, 64% female, $\chi^2\ (1) = 0.15$, $p = 0.70$), or ethnicity (Schizotypy: 74% Caucasian; Non-schizotypy: 87% Caucasian, $\chi^2\ (5) = 6.98$, $p = .22$). Accordingly, no demographic factors were controlled in subsequent analyses.

Group Differences

As hypothesized, the schizotypy group reported significantly more defeatist performance beliefs and significantly lower quality of life (overall, as well as physical health, psychological health, social relationships, and the environment) compared to the non-schizotypy group (See Table 3). However, contrary to hypotheses, the schizotypy and non-schizotypy groups did not differ in working memory. It should be noted that each group comparison had unequal homogeneity of variance except for working memory.

Correlations with Defeatist Performance Beliefs

I first examined relationships between defeatist performance beliefs, schizotypy traits, quality of life variables, working memory, and depression in the schizotypy group. Consistent with hypotheses, defeatist performance beliefs were significantly positively associated with negative schizotypy traits and negatively but significantly associated with overall quality of life, and the quality of life domains of physical health, psychological health, social relationships, and the environment (see Table 4). Also in line with my hypothesis, defeatist performance beliefs were not significantly associated with positive schizotypy traits, but contrary to my hypothesis, defeatist performance beliefs were not associated with working memory in the schizotypy group. As hypothesized, the partial correlations between defeatist performance beliefs and negative schizotypy traits were significant when positive schizotypy traits ($r = .41$, $p < .01$) and depressive ($r = .25$, $p = .05$) symptoms were controlled. In terms of exploratory analyses, defeatist performance beliefs were not significantly associated with disorganized schizotypy traits.

Within the non-schizotypy group, defeatist performance beliefs were significantly and positively associated with positive and disorganized schizotypy traits and depression symptoms. Defeatist performance beliefs were positively but not significantly related to negative schizotypy traits. In contrast, defeatist performance beliefs were significantly and inversely related to overall quality of life, and quality of life in the domains of physical health, psychological health, social relationships, and the environment. None of the correlations differed significantly between the schizotypy and non-schizotypy groups, except at a trend level where positive schizotypy traits were more strongly associated with defeatist performance beliefs in the non-schizotypy group than the schizotypy group.

Mediation Analyses

Mediation analyses tested the two hypotheses that defeatist performance beliefs would mediate the relationship between working memory and 1) negative schizotypy traits and 2) quality of life variables. As can be seen in Table 5 and Figure 2, contrary to my hypothesis, there was not a significant indirect effect of working memory on negative schizotypy traits through defeatist performance beliefs, 90% CI [-.06, .27]. Also contrary to my hypothesis, there was also not a significant indirect effect of working memory on quality of life through defeatist performance beliefs, as seen in Table 5 and Figure 3 (overall quality of life, 90% CI [-.02, .01]). Results for quality of life subscales were very similar and are reported in the Appendix (physical health, 90% CI [-.38, .10]; psychological health, 90% CI [-.72, .27]; social relationships, 90% CI [-.57, .12]; environment, 90% CI [-.35, .09]).

DISCUSSION

Informed by the cognitive model of poor functioning in schizophrenia (Beck et al., 2009), the primary aim of this study was to examine the presence and correlates of defeatist performance beliefs in individuals with schizotypy. College students with schizotypy reported increased defeatist performance beliefs compared to a non-schizotypy sample, 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. Also, 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 schizophrenia compared to a control sample (Grant & Beck, 2009). Indeed, this is the first study to my knowledge that explores defeatist performance beliefs in individuals with and without schizotypy. Interestingly, the magnitude of the effect size I found when comparing defeatist performance beliefs between schizotypy and non-schizotypy (d = 1.19) was slightly greater than found when comparing those with schizophrenia and a control group (d = .92; Grant & Beck, 2009). Yet, the magnitude of

the effect size was much lower for neurocognitive impairment (i.e., working memory) (*d* = -.33 versus *d* = -.99) and functioning (*d* = -.82 versus *d* = -1.5 for quality of life). Given that individuals with schizotypy in a college sample are likely at the higher end of functioning on the schizophrenia-spectrum, it is reasonable and consistent with prior findings (Chan et al., 2011) 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.

In part, our findings are consistent with the "paradox of schizotypy" (Cohen et al., 2014). This paradox is based on findings that individuals 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 objective deficits in areas such as functioning or cognitive abilities. While prior studies have suggested that psychological factors may be driving subjective deficits in schizotypy (Chun et al., 2013; Cohen et al., 2014) this study expands on prior studies by empirically identifying defeatist performance beliefs in particular as a central psychological factor.

In addition to self-reported functioning (i.e., 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 (Grant & Beck, 2009) and those at risk for psychosis (Perivoliotis et al., 2009), defeatist performance beliefs were significantly and inversely associated with negative schizotypy traits, as well as quality of life. 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. Given that other studies have identified other types of defeatist beliefs, such as negative expectations of success (Couture, Blanchard, & Bennett, 2011; Luther et al., under review) as being important in the 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 previous studies (Grant & Beck, 2009; Rector, 2004), defeatist performance beliefs evidenced a much 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; Beck, Steer, & Brown, 1996), rather than the depression subscale of the Brief Symptom Inventory-18 used in this study. While the BDI-II and BSI-18 both assess more cognitive-affective areas of depression, the BDI-II also contains more somatic complaints of depressive symptoms. 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 different domains of depression in individuals across the schizophrenia-spectrum.

Contrary to hypotheses, defeatist performance beliefs did not mediate the relationships between working memory difficulties and negative schizotypy traits or quality of life in the schizotypy group. This finding contrasts Grant and Beck's (2009)

study, as they found that defeatist performance beliefs mediated the relationships between neurocognitive impairment and both negative symptoms and functioning in individuals with schizophrenia. Further, Horan et al. (2010) found that defeatist performance beliefs and negative symptoms mediated the relationship between functional competence and real world functioning. It may be that defeatist beliefs work differently in schizotypy. However, two alternative explanations are also plausible. Both of the prior studies had larger samples of individuals with schizophrenia–54 (Grant & Beck, 2009) and 111 (Horan et al., 2010), compared to the 43 in the current study. Because the power analysis indicated we needed 115 individuals with schizotypy to detect a mediation effect, it is likely that we failed to find a mediation effect because of insufficient power. An alternative explanation is that mediation was not found because the schizotypy group had normal working memory, and working memory was not significantly correlated with defeatist performance beliefs. This may be 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 (Goldberg & Green, 1995). Future studies should seek to replicate these findings with larger non-college samples and possibly explore the relationship between defeatist performance beliefs and other areas of cognition that might be impaired in schizotypy, such as affectively valenced cognitive performance (Minor, Luther, Auster, Cohen et al., under review) or metacognition (Rabin et al., 2014).

Findings from this study offer some theoretical validity for the cognitive model of poor functioning in schizophrenia (Beck et al., 2009). In accord with the model, the

schizotypy group reported elevated defeatist performance beliefs and social problems (i.e., reduced quality of life in the domain of social relationships). However, the schizotypy group did not demonstrate objective deficits in cognitive abilities (i.e., working memory) that would be predicted from the model. While it is possible that cognitive difficulties experienced by this group might not be captured by the measure used in this study (the BACS), it is also possible that objective cognitive deficits were not evident because of heterogeneity or possibility of different subtypes of schizotypy in the schizotypy group. Indeed, most of *t*-tests used to test group differences had unequal homogeneity of variance, suggesting that perhaps different subgroups of schizotypy are present in the sample. Further, research has shown that only approximately 10% of those with schizotypy will go on to develop full-blown psychosis (Lenzenweger & Korfine, 1992). Thus, a more specific test of the model may involve examining subgroups of schizotypy, particularly those with elevated negative schizotypy traits and those who go on to develop psychosis, to identify whether these groups have decreased neurocognition, elevated defeatist beliefs, and social and occupational problems.

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 students in an urban university) limits the generalizability of findings; however, it is noteworthy that several of our findings are consistent with previous studies with clinical samples (Couture et al., 2011; Grant & Beck, 2009). Second, the lack of an objective measure of functioning is a limitation of the study, as it is unclear how the findings map on to more objective indicators of functioning (e.g. SLOF; Schneider & Struening, 1983). Additionally, while

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. Thus, future studies should seek to use either semi-structured interviews or more comprehensive measures of depression symptoms, such as the BDI-II (Beck et al., 1996).

Despite these limitations, there are 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 (Beck et al., 2009). 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 high risk of developing schizophrenia also evidence elevated defeatist performance beliefs (Perivoliotis et al., 2009) 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 measure of functioning, as well as the role of defeatist performance beliefs in the transition from schizotypy to schizophrenia.

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TABLES

Table 1

Overview of Mediation Models

	Model 1	**Model 2**
X. Independent Variable	Working Memory	Working Memory
M. Mediator	Defeatist Performance Beliefs	Defeatist Performance Beliefs
Y. Dependent Variable	Negative Schizotypy Traits	Quality of Life Variables[a]

[a]Each quality of life variable will comprise a separate model.

Table 2

Correlations, means, standard deviations, minimum and maximum scores, and alphas for study variables (n = 88)

	1	2	3	4	5	6	7	8	9	10	11
1. DAS – Defeatist performance beliefs	–										
2. SBQ – Negative	.60**	–									
3. SBQ – Positive	.37**	.39**	–								
4. SPQ – Disorganized	.56**	.66**	.75**	–							
5. WHOQOL–BREF – Physical	-.57**	-.52**	-.40**	-.57**	–						
6. WHOQOL–BREF – Psychological	-.78**	-.63**	-.36**	-.60**	.71**	–					
7. WHOQOL–BREF – Social relationships	-.47**	-.41**	-.10	-.25*	.39**	.54**	–				
8. WHOQOL–BREF – Environment	-.48**	-.33**	-.20	-.33**	.51**	.54**	.33**	–			
9. WHOQOL–BREF – Overall quality of life	-.59**	-.48**	-.10	-.30**	.48**	.69**	.52**	.48**	–		
10. BACS – Working memory	-.05	-.14	-.03	-.11	-.07	.12	.09	.08	.17	–	
11. BSI – Depression	.79**	.63**	.52**	.66**	-.67**	-.79**	-.48**	-.40**	-.55**	-.06	–
Mean	43.5	42.1	64.8	44.2	73.3	61.2	69.1	69.3	4.2	51.0	5.9
Standard deviation	19.3	13.5	17.8	13.5	16.1	21.7	21.7	16.0	0.8	8.7	5.4
Minimum	15.0	19.0	32.0	21.0	28.6	4.17	8.3	97.0	2.0	27.0	0.0
Maximum	87.0	73.0	108.0	75.0	100.0	95.8	100.0	69.3	5.0	66	20.0
α	.95	.92	.92	.94	.81	.91	.69	.79	–	–	.89

* $p < .05$, ** $p < .01$.

Table 3

Group Differences

	Schizotypy (n = 43)		Non-Schizotypy (n = 45)			
Variable	*M*	*SD*	*M*	*SD*	*t*	Effect size (*d*)
DAS – Defeatist Performance Beliefs	53.7	19.7	33.8	13.0	-5.59**	1.19
WHOQOL–BREF – Quality of Life						
Physical Health	64.9	16.3	81.3	11.2	3.62**	-1.17
Psychological	49.1	22.2	72.8	13.6	6.00**	-1.29
Social Relationships	63.2	24.1	74.8	17.5	2.58*	-0.55
Environment	64.8	17.9	73.7	12.8	2.67**	-0.57
Overall Quality of Life	3.9	0.9	4.5	0.5	3.62**	-0.82
BACS – Working Memory	49.5	9.7	52.4	7.5	1.58	-0.33
BSI – Depression	9.5	5.4	2.5	2.4	-7.74**	1.68

*$p < .05$. ** $p < .01$.

Note: All variables but working memory had unequal homogeneity of variance. Accordingly, for all but working memory, the *t* value and corresponding significance reported are those for equal variances not assumed.

Table 4

Correlations between defeatist performance beliefs and other study variables within each group

	Defeatist Performance Beliefs		
	Schizotypy (n = 43)	Non-Schizotypy (n = 45)	Statistical Difference (Z)
SBQ – Negative	.40**	.24	.81
SBQ – Positive	-.06	.30*	-1.67[t]
SPQ – Disorganized	.24	.37*	-.65
WHOQOL-BREF – Quality of Life			
Physical	-.48**	-.28	-1.07
Psychological	-.71**	-.62**	-.73
Social Relationships	-.38**	-.44**	.33
Environment	-.38**	-.46**	.44
Overall Quality of Life	-.51**	-.49**	-.12
BACS – Working Memory	.12	-.08	.91
BSI – Depression	.71**	.66**	.43

[t] $p < .10$ * $p < .05$, ** $p < .01$.

Table 5

Model Coefficients for Mediation Analyses in the Schizotypy Group (n = 43)

Figure	Antecedent	Consequent						
		M (Defeatist Performance Beliefs (DPB))						
			Coefficient	*SE*	*p*	R^2	*F*	*p*
All	*X* (Working Memory)	*a*	.25	.32	.44	.01	(1,41) = .62	.44
	Constant	i_i	41.50	15.88	.01			
		Y (Negative Schizotypy Traits)						
			Coefficient	*SE*	*p*	R^2	*F*	*p*
2	*X* (Working Memory)	*c'*	-.12	.17	.48	.17	(2, 40) = 4.16	.02
	M (DPB)	*b*	.24	.08	.01			
	Constant	i_2	45.94	9.27	.00			
		Y (Quality of Life – Overall)						
			Coefficient	*SE*	*p*	R^2	*F*	*p*
3	*X* (Working Memory)	*c'*	.02	.01	.21	.28	(2, 40) = 7.94	.00
	M (DPB)	*b*	-.02	.01	.00			
	Constant	i_2	4.43	.67	.00			

FIGURES

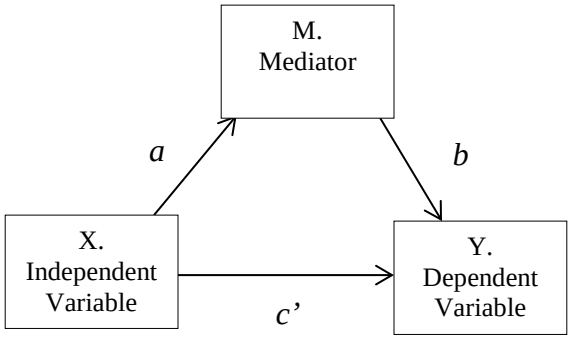


Figure 1. Basic Mediation Model

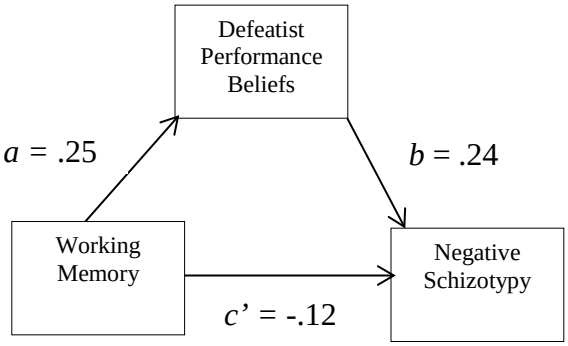


Figure 2. Mediation Model with Defeatist Performance Beliefs (M), Working Memory (X), and Negative Schizotypy Traits (Y).

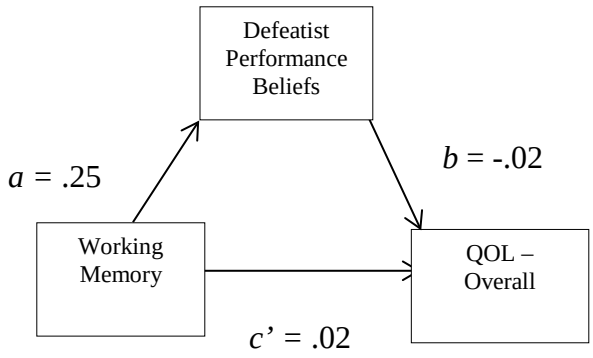


Figure 3. Mediation Model with Defeatist Performance Beliefs (M), Working Memory (X), and Quality of Life (QOL)—Overall (Y).

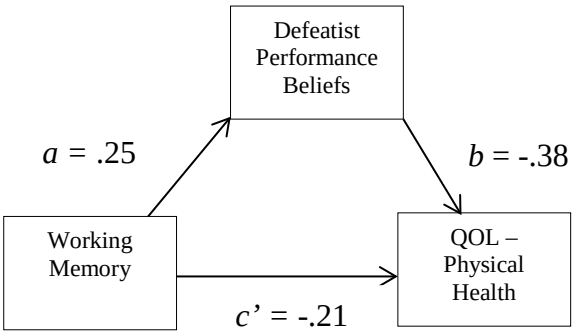
APPENDIX

APPENDIX

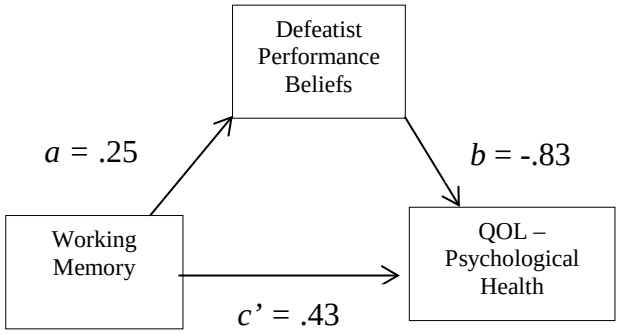
Appendix Table 1

Model Coefficients for Mediation Analyses Within the Schizotypy Group: Quality of Life Domains (n = 43)

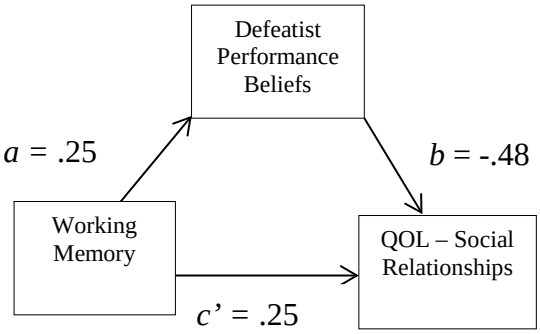
Figure	Antecedent		Consequent					
			Y (Quality of Life – Physical Health)					
			Coefficient	*SE*	*p*	R^2	*F*	*p*
4	*X* (Working Memory)	*c'*	-.21	.23	.38	.24	(2,40) = 6.39	.00
	M (DPB)	*b*	-.38	.11	.01			
	Constant	i_2	95.66	12.60	.00			
			Y (Quality of Life – Psychological Health)					
			Coefficient	*SE*	*p*	R^2	*F*	*p*
5	*X* (Working Memory)	*c'*	.43	.25	.09	.54	(2, 40) = 23.78	.00
	M (DPB)	*b*	-.83	.12	.00			
	Constant	i_2	72.55	13.33	.00			
			Y (Quality of Life – Social Relationships)					
			Coefficient	*SE*	*p*	R^2	*F*	*p*
6	*X* (Working Memory)	*c'*	.25	.37	.50	.15	(2, 40) = 3.59	.04
	M (DPB)	*b*	-.48	.18	.01			
	Constant	i_2	76.48	19.77	.00			
			Y (Quality of Life – Environment)					
			Coefficient	*SE*	*p*	R^2	*F*	*p*
7	*X* (Working Memory)	*c'*	.18	.27	.50	.15	(2, 40) = 3.65	.04
	M (DPB)	*b*	-.36	.13	.01			
	Constant	i_2	74.84	14.62	.00			



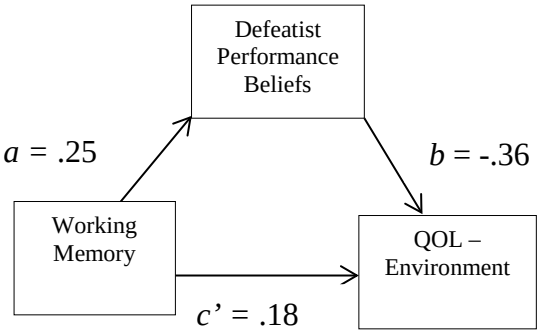
Appendix Figure 1. Mediation Model with Defeatist Performance Beliefs (M), Working Memory (X), and Quality of Life (QOL)—Physical Health (Y).



Appendix Figure 2. Model with Defeatist Performance Beliefs (M), Working Memory (X), and Quality of Life (QOL)—Psychological Health (Y).



Appendix Figure 3. Model with Defeatist Performance Beliefs (M), Working Memory (X), and Quality of Life (QOL)—Social Relationships (Y).



Appendix Figure 4. Mediation Model with Defeatist Performance Beliefs (M), Working Memory (X), and Quality of Life (QOL)—Environment (Y).