



Effects of sub-clinical psychosis and cognitive insight on psychological well-being: A structural equation model



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ABSTRACT

Psychological well-being has been widely researched along the psychosis spectrum, and increased psychotic symptoms are generally associated with worse well-being. Additionally, the construct of insight has been extensively studied in schizophrenia. While having greater insight has many benefits for those with schizophrenia, a paradox exists in which greater insight is also associated with poorer psychological well-being. However, it is unclear whether the link between insight and poor well-being occurs only once serious psychopathology has been established, or whether this is a more universal process seen even at lower levels on the psychosis spectrum. We used a structural modeling approach in an ethnically diverse, non-clinical sample of 420 undergraduates to evaluate the association between sub-clinical psychosis, cognitive insight and psychological well-being. As hypothesized, results indicated that sub-clinical psychotic symptoms were negatively associated with psychological well-being. The insight paradox was also substantiated, as greater cognitive insight was associated with worse psychological well-being. However, cognitive insight did not moderate the association between symptoms and well-being. The link between sub-clinical psychotic symptoms and psychological well-being as well as the insight paradox appears to emerge even before reaching threshold for a psychotic disorder. Research and clinical implications are discussed.

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1. Introduction

Unusual experiences and symptoms of psychosis (e.g. false beliefs and hallucinations) that do not meet criteria for a psychotic disorder have been termed psychosis proneness, “at-risk mental states,” or schizotypy (Claridge, 1997). Psychotic experiences are generally thought to be distributed along a spectrum/continuum (van Os et al., 2009; Tabak and Weisman de Mamani, 2013), with lesser symptom severity deemed a sub-clinical manifestation of a psychotic disorder, such as schizophrenia. The distinction between these various levels of psychosis is based on the differing degrees of similar symptoms, rather than qualitative differences (van Os et al., 2009). This dimensional view of psychosis assumes it is a continuous variable that ranges progressively from healthy individuals to individuals with a psychotic disorder. Changes in the new DSM-5 reflect this dimensional perspective: schizotypal personality disorder is included under the Psychotic Spectrum Disorders, and personality disorders are rated using a three-point dimensional scale to assess the severity of the disorder, in

addition to assigning a categorical diagnosis (American Psychiatric Association, 2013). To better understand the full spectrum of psychosis, this study examined how lower level psychotic symptoms and cognitive insight relate to psychological well-being.

Studying lower level symptoms can help us elucidate whether cognitive patterns seen in schizophrenia (e.g. the insight paradox—discussed below) are general processes seen across the psychosis spectrum or whether these processes emerge only after one reaches threshold for a clinical disorder (Chapman et al., 1994; Sacks et al., 2012). Research on the overlap between sub-clinical psychosis and schizophrenia has revealed the two populations share common genes (Siever and Davis, 2004), neuroimaging results (Dickey et al., 2002), and neurocognitive abnormalities (Spaulding et al., 1999; Siever and Davis, 2004). These patterns continue to emerge when comparing patients with schizophrenia to their healthy relatives (Mechri et al., 2010) and to high-risk populations (Johnstone et al., 2005), as all three groups rated higher degrees of psychotic features, compared to controls. However, it is unclear whether patterns seen in schizophrenia are also seen among persons with lower level psychotic symptoms. To measure lower level symptoms, we used two psychotic symptom measures and created a latent variable of sub-clinical psychosis to examine individuals along the psychosis spectrum.

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1.1. Sub-clinical psychosis and well-being

One such pattern seen in schizophrenia is the negative association between psychotic symptoms and well-being (Ho et al., 2000). Psychological well-being has been widely researched along the psychosis spectrum, using a variety of methods. For example, well-being can be measured with objective measures (e.g. socioeconomic status, income) and/or subjective methods (e.g. self-reported quality of life (QoL), emotional distress; Layard, 2010). In general, greater psychotic symptoms have been linked to worse well-being, but there has been no consistency in the measurement of well-being. One common construct used to measure psychological well-being is quality of life (QoL), which tends to be lower among individuals with both sub-clinical and elevated levels of psychotic symptoms (e.g. Verdoux and van Os, 2002). Worse quality of life in the early stages of sub-clinical psychotic experiences has also been shown to compromise quality of life following the first episode of schizophrenia (MacBeth and Gumley, 2008).

Researchers have used emotional distress (e.g. depression) as another way of measuring psychological well-being in patients with psychosis. Depression is highly comorbid with psychosis (comorbidity estimates range from 15–25%; Buckley et al., 2009), and more severe depression is strongly associated with lower levels of satisfaction and quality of life in patients with schizophrenia (Huppert et al., 2001). The occurrence of depression in schizophrenia is also associated with worse symptom outcomes (Siris, 2000), higher rates of re-hospitalization (Birchwood et al., 1993), and higher rates of suicide (Caldwell and Gottesman, 1990). The research on less severe psychotic symptoms is scant, however, and the relationship between psychotic symptoms and psychological well-being in non-clinical populations is not well known. Additionally, the literature has been inconsistent in its conceptualization of well-being. This study combined multiple constructs from the well-being literature (e.g. QoL and depression) by creating a psychological well-being latent variable in a structural regression model to provide a more complete perspective on the relationship between psychotic symptoms and well-being.

1.2. Cognitive insight and well-being (the insight paradox)

Individuals with schizophrenia tend to have poor insight into their illness, and have difficulties recognizing a need for treatment (e.g. Amador et al., 1993). Poorer insight is also common in individuals with elevated schizotypy symptoms (Peters et al., 1999; Warman and Martin, 2006). The original conceptualization of insight was based on clinical insight, a binary in which the individual either recognized their disorder or did not (Lewis, 1934). Subsequent research has approached insight in a more dimensional and continuous fashion (Mintz et al., 2003), measuring the degree to which the individual is aware of the illness, its signs and symptoms, the need/benefit of treatment, and their acceptance of the illness label (Amador and Kronengold, 2004). An alternative method of capturing insight (termed cognitive insight) measures the participant's ability to question their flawed beliefs when presented with discordant feedback from others, and their ability to evaluate and correct distorted beliefs and misinterpretations (Beck et al., 2004). A measure of cognitive insight is useful in measuring insight across the psychosis spectrum, as those without a diagnosis can have cognitive insight into their unusual experiences, whereas they cannot demonstrate clinical insight into an illness they do not have.

A well-replicated pattern in schizophrenia finds that higher levels of insight are often associated with better outcomes in schizophrenia (e.g. Francis and Penn, 2001; Sim et al., 2006). However, this association is not consistent across all outcomes. Increased insight is beneficial for treatment adherence, social functioning, and vocational functioning, but may create other problems that occur because

of poor psychological well-being (Lysaker et al., 2004). One of the most robust examples of this is the paradoxical association between insight and depression. Greater insight into one's symptoms has been associated with greater hopelessness and more depressive symptoms in populations with schizophrenia (e.g. Lysaker et al., 2007; Mintz et al., 2003). It is unclear, however, whether increased insight into one's unusual experiences is associated with worse well-being in individuals who do not meet criteria for schizophrenia.

Two studies have examined insight and depression in schizophrenia using the same measure of insight we used in the current study (Beck's Cognitive Insight Scale (BCIS); Beck et al., 2004). The first study found that higher self-reflective insight was positively associated with depression in patients with schizophrenia and the second found a positive association between self-certainty and depression (Colis et al., 2006; Warman et al., 2007). The same effects are seen in realms of psychological well-being other than depression. For example, greater insight has been associated with decreases in one's felt agency (Warner et al., 1989) and greater insight has been linked to decreased quality of life (e.g. Hasson-Ohayon et al., 2009; Kravetz et al., 2000). The association between insight and well-being pattern has not been tested in individuals with subclinical levels of psychosis. In addition, we were interested in elucidating whether insight interacts with psychotic symptoms to intensify the negative relationship that these variables have with psychological well-being. To address these gaps, we evaluated whether greater cognitive insight is related to worse psychological well-being, and whether insight moderates the relationship between sub-clinical psychotic symptoms and well-being.

1.3. The current study

This study had three overarching aims. The first was to examine associations between sub-clinical psychotic symptoms and psychological well-being in a non-clinical sample. The second was to assess whether the insight paradox was present in lower level psychotic symptoms. The third aim was to elucidate whether cognitive insight would moderate the relationship between sub-clinical psychotic symptoms and psychological well-being.

Drawing from the research reviewed above, the current study tested two main sets of hypotheses:

1. The first analysis examined the association between sub-clinical psychotic symptoms and psychological well-being. Specifically, greater symptoms were expected to be related to worse well-being.
2. The second set of analyses examined whether the "insight paradox" was present in a non-clinical sample. It was hypothesized that greater insight would be associated with poorer psychological well-being.
3. Cognitive insight was also predicted to moderate the relationship between sub-clinical psychotic symptoms and psychological well-being, whereby symptoms would be more strongly associated with worse psychological well-being in individuals with higher levels of insight.

2. Methods

2.1. Participants

A total of 420 undergraduates were recruited from the psychology research pool at the University of Miami. Mean age was 19.18 years (S.D.=2.73) and a significant proportion of the sample was female (62.9%, $n=264$). Forty-six percent of participants identified as Caucasian ($n=191$), 23% as Hispanic ($n=95$), 11% as Asian American ($n=47$), 5% as African American ($n=19$), and 16% as "other" ($n=68$). Class credit was awarded for participation.

2.2. Procedures

The study was reviewed and approved by the Institutional Board of the University of Miami. A trained research associate administered the questionnaires in a quiet room with 5–15 participants at a time. Participants completed the packet of questionnaires in a conventional paper-and-pencil format, and each participant was allowed to work at their own pace. To avoid order effects, measures of sub-clinical psychosis and well-being were counter-balanced within the packet. Using a measurement model approach, this study aggregated the shared variance across these different measures of each construct.

2.3. Measures

2.3.1. Sub-clinical psychosis symptoms

2.3.1.1. Schizotypal Personality Questionnaire-Brief Form. The Schizotypal Personality Questionnaire-Brief Form (SPQ-B; [Raine and Banishay, 1995](#)) measures positive, negative, and disorganized schizotypal traits using 22 self-report, True/False items. A sample item is, "Have you had experiences with astrology, seeing the future, UFO's, ESP, or a sixth sense?" It is based on the full 74-item SPQ ([Raine, 1991](#)) and has demonstrated strong reliability (reliability average=0.76; [Raine and Banishay, 1995](#)). The SPQ-B evidenced strong internal consistency in the current sample (Cronbach's $\alpha=0.83$).

2.3.1.2. Oxford-Liverpool Inventory of Feelings and Experiences. The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE; [Mason and Claridge, 2006](#)) measures schizotypal traits across four sub-categories: Unusual Experiences, Introverted Anhedonia, Cognitive Disorganization, and Impulsive Nonconformity using 104 True/False items, with statements like "I have felt that I have special, almost magical powers." A total composite score is calculated by summing each sub-category. The O-LIFE had good reliability in this sample (Cronbach's $\alpha=0.91$).

2.3.2. Social cognition

2.3.2.1. Beck Cognitive Insight Scale. The Beck Cognitive Insight Scale (BCIS; [Beck et al., 2004](#)) is a 15-item self-report scale that measures an individual's evaluation and perception of their own judgments and unusual experiences. Participants rate their agreement for each item on a four-point Likert Scale (0=do not agree at all, 1=agree slightly, 2=agree a bit, and 3=agree completely). A sample item is, "Some of my experiences that have seemed very real may have been due to my imagination." The internal consistency for the BCIS in the current study was somewhat low (Cronbach's $\alpha=0.61$) but closely resembles the reliability found in other studies that used the scale (Cronbach's $\alpha=0.66$; [Pedrelli et al., 2004](#)).

2.3.3. Psychological well-being

2.3.3.1. Depression Sub-Scale of the Depression, Anxiety and Stress Scale. The Depression, Anxiety and Stress Scale (DASS-D; [Lovibond and Lovibond, 1995](#)) is a measure of emotional well-being. The DASS is a self-report questionnaire with 42 items that create three factors: depression, anxiety, and stress. Each factor is measured by 14 items on a four-point Likert Scale (0=did not apply to me at all, 1=applied to me somewhat, 2=applied to me a considerable degree, or a good part of the time, and 3=applied to me very much, or most of the time) that are summed to make a composite score. A sample item is, "I couldn't seem to experience any positive feelings." In this study, the internal reliability for the DASS-D subscale was very good (DASS-D Cronbach's $\alpha=0.94$).

2.3.3.2. Quality of Life Inventory. The Quality of Life Inventory (QOLI; [Frisch et al., 1991](#)) is a global assessment of life satisfaction. It is a 24-item measure that conceptualizes satisfaction across 12 domains (Health, Self-Esteem, Goals and Values, Money, Work, Play, Learning, Creativity, Helping, Love, Friends, and Spirituality). Each domain contains two parts—the *importance* of that domain to the participant's happiness, and the level of *satisfaction* with that domain of the participants' life. Importance for each item is measured on a three-point Likert scale (0=not important, 1=important, and 2=very important). Satisfaction for each item is measured on a six-point Likert scale (0=very dissatisfied, 1=somewhat dissatisfied, 2=a little dissatisfied, 3=a little satisfied, 4=somewhat satisfied, and 5=very satisfied). For example, "How important is love in your life?" and "How satisfied are you with love in your life?" Good reliability was found in this sample (Cronbach's $\alpha=0.82$).

2.3.3.3. Psychological Well-Being Scale. The Psychological Well-Being Scale (PWB; [Ryff, 1989](#)) is a measure of social competence and adaptability containing 84 items on six scales, including self-acceptance (e.g., "I like most aspects of my personality"), positive relations with others (e.g., "I know that I can trust my friends and they know they can trust me"), autonomy (e.g., "my decisions are not usually influenced by what everyone else is doing"), environmental mastery (e.g., "I feel I am in charge of the situation in which I live"), purpose in life (e.g., "I have a sense of direction and purpose in life"), and personal growth (e.g., "for me, life has been a continuous process of learning, changing and growth"). Items are scored on a six-point Likert-

scale (1=strongly disagree, 2=strongly somewhat, 3=disagree slightly, 4=agree slightly, 5=agree somewhat, and 6=strongly agree). All six scales are combined to form an overall degree of psychological well-being (with some items reverse scored). In this study, internal consistency was good (Cronbach's $\alpha=0.94$).

2.4. Statistical analyses

Statistical analyses were conducted using structural equation modeling (SEM) in Mplus version 6.0 ([Muthén and Muthén, 1998–2010](#)). The first step for modeling was to create latent variables for sub-clinical psychotic symptoms and psychological well-being and determine the fit of the indicators on the latent variables in the model. Model fit was determined based on [Kline's \(2011\)](#) criteria: a non-significant Chi-square test of model of fit, a comparative fit index (CFI) of greater than or equal to 0.95, a root mean square error of approximation (RMSEA) of less than or equal to 0.09, and a standardized root mean square residual (SRMR) of less than or equal to 0.06. When acceptable measurement models were established, latent variables were used in the SEM model specification and evaluation.

The next step was to test the association between sub-clinical psychotic symptoms and psychological well-being by examining the significance of the direct path coefficient between these latent variables. To conduct the moderation analyses, the predictor and moderating variable for each set of analyses were entered together in one model. In Mplus, moderation involving latent variables requires a random effects analysis. The standard model fit statistics are not calculated for random effects analyses; therefore, the following moderation analyses hinged on the model fit of the confirmatory factor analysis. [Bollen's \(1989\)](#) and [Hayduk's \(1987\)](#) SEM approach was used to test the moderation hypotheses.

3. Results

3.1. Preliminary data analysis

All outcome variables were examined for normality by assessing skewness and kurtosis. Using [Kline's \(2011\)](#) criteria, a variable was deemed to have a non-normal distribution when the absolute value of the skew index was greater than three and the absolute value of the kurtosis index was greater than eight. The DASS was negatively skewed, so a logarithmic transformation was conducted to normalize the distribution. All other variables had skewness and kurtosis values within normal limits. Relationships between demographics (i.e. age, gender, and ethnicity) and dependent variables were tested prior to conducting primary analyses to identify potential covariates. There were no differences between gender or ethnicity on measures of sub-clinical psychotic symptoms. However, females rated themselves as having significantly higher well-being on the PWB ($F(1, 344)=4.636, p < 0.05$) and QOLI scales ($F(1, 410)=4.420, p < 0.05$), as well as higher cognitive insight ($F(1, 409)=8.212, p < 0.01$) than males. Additionally, Hispanics and Caucasians rated themselves as having significantly better well-being than all other ethnicities on the PWB ($F(1, 341)=10.329, p < 0.01$ and $F(1, 341)=6.659, p < 0.05$, respectively). Therefore, both gender and ethnicity were statistically controlled in primary analyses.

3.2. Model fit analyses

Primary analyses were conducted using structural equation modeling (SEM) in Mplus version 6.0 ([Muthén and Muthén, 1998–2010](#)). Latent variables were created for both sub-clinical psychotic symptoms and psychological well-being and tested for model fit. The sub-clinical psychosis latent included two measures: the SPQ and the O-LIFE. The psychological well-being latent included three measures: the DASS-D, the PWB, and the QoL. This model with the two latent constructs created good model fit: $\chi^2(3)=0.22, p=0.97, CFI=1.0, RMSEA=0.00, SRMR=0.002$. Each indicator significantly loaded onto its respective latent. SPQ had a factor loading of 0.832 ($p < 0.001$) and the OLIFE had a factor loading of 0.965 ($p < 0.001$) onto the sub-clinical psychosis latent. PWB had a factor loading of 0.780 ($p < 0.001$), DASS had a factor loading of 0.806 ($p < 0.001$), and the QoL had a factor loading of 0.721 ($p < 0.001$) onto the psychological well-being latent. Therefore, the sub-clinical psychosis latent and psychological well-being latent

represent unified measurements of their respective constructs. The means of each variable are presented in Table 1.

3.3. Sub-clinical psychosis and psychological well-being

To test the first hypothesis of the association between psychological well-being and sub-clinical psychotic symptoms, the psychological well-being latent was regressed onto the sub-clinical psychosis latent. Sub-clinical symptoms were negatively associated with psychological well-being, controlling for gender and ethnicity ($b = -0.306$, $SE = 0.020$, $p < 0.001$). Thus, an increase in sub-clinical psychotic symptoms was associated with worse psychological well-being (see Fig. 1).

3.4. Cognitive insight and psychological well-being

To test the second hypothesis of the insight paradox, the psychological well-being latent was regressed onto the cognitive insight observed variable. Supporting the insight paradox, greater cognitive insight was associated with poorer psychological well-being, controlling for psychotic symptoms, gender and ethnicity ($b = -0.031$, $SE = 0.014$, $p < 0.05$). Additionally, sub-clinical psychotic symptoms and cognitive insight were strongly positively associated ($b = 4.818$, $SE = 0.906$, $p < 0.001$; see Fig. 1).

3.5. Cognitive insight moderating sub-clinical psychosis and psychological well-being

The moderation hypothesis was tested by regressing the psychological well-being latent onto an interaction variable defined by both the sub-clinical psychosis latent and the observed moderator (cognitive insight). Cognitive insight did not moderate the relationship

between sub-clinical psychosis and psychological well-being, controlling for ethnicity and gender ($b = -0.002$, $SE = 0.004$, $p = 0.491$; see Fig. 1).

4. Discussion

The current study examined the relationships between sub-clinical psychotic symptoms, cognitive insight, and psychological well-being. Similar to the pattern seen in schizophrenia, the results demonstrated that increased sub-clinical psychotic symptoms are associated with worse psychological well-being. Further, having increased cognitive insight was related to worse well-being, paralleling the insight paradox seen in schizophrenia (Lysaker et al., 2007).

The finding that lower levels of psychotic symptoms are related to well-being supports the continuum perspective of psychotic symptoms. Matching the pattern seen in schizophrenia, psychotic symptoms appear to play a role in individuals' psychological well-being in a non-clinical population as well (Claridge, 1985; Rabin et al., 2014). This suggests that individuals with lower levels of psychosis begin experiencing declines in their psychological well-being even before reaching threshold for a psychotic disorder. Although the participants were fairly high achieving (considering they were college students at a research one private university at the time of data collection) and the sample was non-clinical, a significant negative relationship between sub-clinical symptoms and psychological well-being was still found. Therefore, the pattern of poorer well-being in relation to increased psychotic symptoms appears to be universal across the psychosis spectrum.

The second major finding, examining the relationship between cognitive insight and psychological well-being, provided support for the insight paradox in lower level symptomatology. This is the first

Table 1
Means of all study variables.

	SPQ	OLIFE	PWB	DASS-D (reverse)	QoL	BCIS
Overall Mean (S.D.)	7.67 (4.83)	30.93 (13.78)	382.49 (48.99)	5.62 (1.97)	29.77 (18.97)	4.41 (4.70)
Caucasian Mean (S.D.)	7.47 (4.98)	30.02 (13.66)	382.33* (47.68)	5.59 (1.95)	29.32 (17.05)	4.68 (4.53)
Hispanic Mean (S.D.)	7.61 (4.43)	30.47 (12.99)	389.80** (42.60)	5.90 (1.93)	32.36 (19.68)	3.94 (4.56)
Black Mean (S.D.)	9.16 (4.06)	32.35 (15.37)	391.00 (44.35)	5.86 (1.99)	30.28 (20.94)	3.17 (5.34)
Asian Mean (S.D.)	7.54 (5.32)	31.17 (13.70)	378.53 (46.65)	5.49 (2.08)	25.39 (23.68)	3.77 (4.72)
"Other" Mean (S.D.)	8.07 (4.92)	33.65 (15.18)	364.08 (59.57)	5.37 (2.00)	29.86 (19.43)	5.10 (5.21)
Male Mean (S.D.)	7.94 (4.67)	31.56 (13.39)	373.33 (48.43)	5.45 (1.98)	27.23 (17.25)	3.55 (4.18)
Female Mean (S.D.)	7.52 (4.92)	30.58 (13.99)	385.00* (28.92)	5.73 (1.96)	31.28* (19.81)	4.92** (4.91)
Range in this study	0–22	4–81	192–484	0–9	–64 to 72	–8 to 17
Possible range	0–22	0–104	84–504	0–9	–120 to 120	–24 to 27

* Statistically different from other group(s) at $p < 0.05$.

** Statistically different from other group(s) at $p < 0.01$.

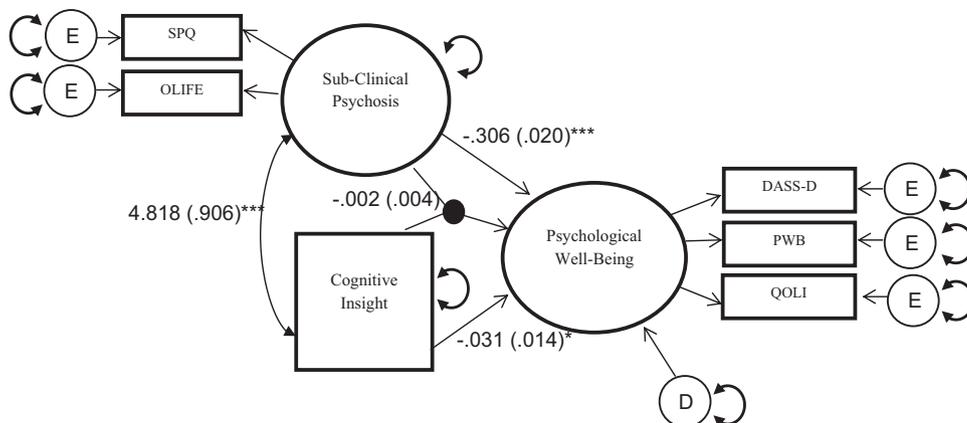


Fig. 1. Path analytic representation of the effect of sub-clinical psychotic symptoms and cognitive insight on psychological well-being.

study to explore this relationship in a sub-clinical population. While cognitive insight did not moderate the relationship between sub-clinical psychotic symptoms and psychological well-being, the direct effect for cognitive insight still supports the insight paradox. Having insight into one's unusual experiences appears to be related to poorer psychological well-being for both patients with schizophrenia as well as individuals within the non-clinical population. This relationship is not accentuated for individuals with elevated psychotic symptoms and increased cognitive insight, as was hypothesized. Instead, there is an overall trend that an increased ability to self-reflect and question one's experiences is associated with poorer well-being. In this sample, psychotic symptoms were positively related to cognitive insight, and it was difficult to see moderation with two variables that were highly collinear. It could be the case that in a sample where these two variables are orthogonal, the hypothesized moderation becomes evident. Alternatively, it may be the case that individuals with sub-clinical psychotic symptoms maintain higher levels of insight, and that it is the loss of some insight in combination with increased psychotic symptoms that characterizes a clinical psychotic disorder.

The notion that insight can be detrimental to well-being is similar to a theory presented in the depression literature: depressive realism (Alloy and Abramson, 1988; Carson et al., 2010). Depressive realism posits that individuals who are mildly depressed make inferences about the world that are less optimistic, yet more realistic than non-depressed individuals. For example, whereas healthy individuals tend to overestimate their abilities (e.g., "I am smarter than most"), mildly depressed individuals are more realistic and do not overestimate their abilities. Having increased insight into one's symptoms may produce something similar to depressive realism. In other words, when a person has the insight to recognize that their experiences are not normal, they may become disheartened and more prone to depression (perhaps supporting the cliché, "ignorance is bliss").

An alternative hypothesis for the relationship between insight and well-being is that poorer psychological well-being could lead to greater self-questioning and less certainty about one's thinking. Insight in this study was measured by the students' ability to self-reflect and question unusual experiences. Because the study was cross-sectional, the directionality between variables is unknown. Therefore, it could be the case that individuals with greater distress are less certain about their thinking, are not as capable of critically self-reflecting on their experiences, and, as a result, have poorer insight.

It is unclear why and for whom the insight paradox takes place; however, research in populations with schizophrenia has begun to uncover some potential moderators for the insight paradox. How one interprets their experiences can play a large role in how symptoms affect well-being. For example, internalized stigma (i.e. the extent to which individuals come to believe and internalize negative stereotypes about their mental state) was found to moderate the insight paradox (Lysaker et al., 2007). Specifically, having minimal internalized stigma buffered against the negative impact that insight played on the patients' well-being. Social cognition and metacognition (i.e. the ability to form complex ideas of self and others) have also been found to buffer against the relationship between insight and poorer well-being (Lysaker et al., 2013). The ability to make sense of, critically evaluate, and/or accept one's unusual experiences appear to be valuable processes that buffer against the negative relationship between insight and well-being. Moderators of the insight paradox have not been well-studied in individuals with sub-clinical symptoms of psychosis. Future research should examine whether stigma, metacognition, and social cognition play a similar role in the insight paradox for individuals with sub-clinical symptoms as they do for patients with schizophrenia.

There are a few limitations within this study design. First, while we found evidence that cognitive insight was negatively associated with well-being in a normative population, we did not assess

whether insight had positive associations with any beneficial outcomes (as seen in schizophrenia). Therefore, when we use the term "insight paradox," we are making the assumption that insight is associated with a variety of beneficial outcomes across the psychosis spectrum, and provide evidence in this study that insight also had a negative association with well-being. Additionally, the current study measured all variables cross-sectionally. Measuring sub-clinical psychotic symptoms, well-being, and cognitive insight over time can provide greater insight into the trajectory of individuals' well-being as a function of sub-clinical symptoms of psychosis. Additionally, measuring the study variables using self-report measures is certainly a limitation. Conducting clinical interviews to determine participants' levels of psychotic symptoms and psychological well-being would provide a more objective method of measuring study variables. Additionally, this study only examined the negative association between cognitive insight and well-being, but did not assess the benefits of increased cognitive insight that are evident in patients with schizophrenia (e.g. social and vocational functioning). Future research should examine whether these benefits of insight are also present in sub-clinical populations. Finally, conducting the study in an undergraduate sample is a limitation as these results may differ if measured in a community sample.

4.1. Clinical implications

Overall, these findings have important implications for our understanding of the psychosis continuum. Greater symptoms are associated with worse psychological well-being, indicating that even individuals with sub threshold levels of psychosis may benefit from intervention. Although these individuals do not meet criteria for a psychotic disorder, the results indicate that they still experience reductions in psychological well-being as their sub-clinical symptoms increase. Previous research suggests that the longer psychotic symptoms remain untreated, the poorer the prognosis; therefore, there may be benefit to educating young people about relatively common occurrence of unusual experiences and psychotic symptoms. While assigning a label should be avoided (as it can be stressful and stigmatizing for the client), in some cases, it can be beneficial to intervene early even if these individuals do not develop a psychotic disorder (McGlashan, 1999, 2001).

Additionally, because the current study found support for the insight paradox even prior to full-fledged psychosis, future research is needed to elucidate why this pattern occurs. In other words, what about having increased awareness of one's unusual experiences relates to poorer well-being before the onset of a psychotic disorder? Hypothetically, individuals with greater cognitive insight may feel different or even ostracized from others, which could lead to poorer well-being. Certainly, maintaining high levels of insight would be encouraged. However, it is potentially valuable to help individuals with increased insight cope with the unhelpful thoughts that result from their heightened insight (e.g. reframing thoughts such as, "I know it is unusual to feel that others are watching me" to "My awareness that it is unusual to feel that others are watching me can be used to change my dysfunctional thoughts and behaviors"). Cognitive therapy has been found to be effective for individuals at high-risk for schizophrenia (Morrison et al., 2004; Gould et al., 2001) and may also be useful in helping individuals with lower level psychotic symptoms produce more helpful thoughts in relation to their unusual experiences/perceptions.

Integrative psychotherapies may also be helpful in reducing distress and improving well-being for individuals with poor insight (Hamm et al., 2013; Buck et al., 2013). Integrative therapies merge aspects of cognitive and psychodynamic theories to help individuals make sense of their unusual experiences by improving social cognitive and metacognitive processes. For example, clients may work to develop a greater sense of self as active agents and think about

themselves and others in more complex ways. An integrative approach appears to be especially useful in addressing distress related to poor insight as it aims to improve clients' ability to think critically about their experiences and thereby improve insight. A newly developed treatment, a culturally informed treatment for schizophrenia, can also be used to help individuals cope with their psychotic experiences (Weisman de Mamani et al., 2014). This treatment explicitly teaches clients to draw from their cultures' explanatory models to reconstrue their symptoms in a less stigmatizing manner. These treatments appear pertinent and can be adapted for individuals at the lower end of the psychosis spectrum, as metacognitive abilities have been found to be more impaired and affect functional outcomes compared to individuals without sub-clinical psychotic features (Rabin et al., 2014; Scheyer et al., 2013).

5. Conclusion

This study replicates patterns seen in schizophrenia. Results indicated that increased sub-clinical psychotic symptoms were associated with decreased psychological well-being. Additionally, the paradoxical finding seen in schizophrenia that increased insight into one's unusual experiences is associated with decreased psychological well-being was also demonstrated in a non-clinical population. These patterns seen in schizophrenia appear to be universal relationships that are evident throughout the psychosis spectrum. Future research should attempt to measure study variables longitudinally in a high-risk sample and test whether these patterns can be adjusted in therapeutic interventions.

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