



THE INTERPLAY AMONG LOCUS OF CONTROL, SUB-CLINICAL PSYCHOTIC SYMPTOMS AND PSYCHOLOGICAL WELL-BEING IN WHITES AND ETHNIC MINORITIES

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ABSTRACT

An external locus of control has largely been associated with worse psychological well-being. In general, patients with schizophrenia demonstrate a more external locus of control compared to non-psychiatric populations. Prior research in schizophrenia also suggests that the relationship between greater psychotic symptoms and decreased psychological well-being is stronger for individuals who endorse a more external locus of control. This relationship has not been tested in a non-clinical population. In an ethnically diverse sample of 420 participants, this study found, in line with hypotheses, that a more external locus of control was negatively associated with psychological well-being. While sub-clinical psychotic symptoms were negatively associated with psychological well-being, locus of control did not moderate the overall relationship between sub-clinical psychosis and psychological well-being as expected. Secondary analyses examined the relationships between sub-clinical psychotic symptoms, locus of control and psychological well-being by ethnicity and suggested that ethnicity moderated the relationship between an external locus of control and decreased well-being. In other words, for minorities there was a relationship between greater external locus of control and decreased well-being, but not for Whites.

Keywords:

sub-clinical psychosis, locus of control, psychological well-being, ethnicity

RESUMEN

Un locus de control externo en gran medida se ha asociado con el bienestar psicológico peor. En general, los pacientes con esquizofrenia demuestran un locus de control externo más en comparación con las poblaciones no psiquiátricas. Antes de investigación en la esquizofrenia también sugiere que la relación entre mayores síntomas psicóticos y la disminución del bienestar psicológico es más fuerte para los individuos que apoyan un locus de control externo más. Esta relación no ha sido probado en una población no clínica. En una muestra de la diversidad étnica de 420 participantes, este estudio encontró, en línea con las hipótesis, de que un locus de control externo más se asoció negativamente con el bienestar psicológico. Mientras que los síntomas psicóticos subclínicos se asociaron negativamente con el bienestar psicológico, el locus de control no moderó la relación general entre la psicosis subclínica y el bienestar psicológico como se esperaba. Los análisis secundarios examinaron las relaciones entre los síntomas psicóticos subclínicos, locus de control y el bienestar psicológico por el origen étnico y sugirieron que la etnicidad moderó la relación entre un locus de control externo y la disminución de bienestar. En otras palabras, para las minorías que había una relación entre una mayor locus de control externo y la disminución de bienestar, pero no para los blancos.

Palabras clave:

psicosis subclínica, locus de control, el bienestar psicológico, la etnicidad

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LA INTERACCIÓN ENTRE EL LOCUS DE CONTROL, LOS SÍNTOMAS PSICÓTICOS SUB-CLÍNICOS Y EL BIENESTAR PSICOLÓGICO DE LOS BLANCOS Y LAS MINORÍAS ÉTNICAS

Social cognition refers to the mental operations underlying how individuals think about themselves and others in the social world (Tas et al., 2012). An area of social cognition that has been extensively studied involves individuals' explanations regarding the causes of events in their lives (e.g., locus of control; LoC). While the construct of LoC has been extensively studied in individuals with schizophrenia (e.g., Ekinici et al., 2012), little is known about how locus of control relates to sub-clinical psychotic symptoms and psychological well-being in non-psychiatric populations. Studying locus of control attributions in tandem with sub-clinical symptoms of psychosis is important because it can inform our understanding of the full spectrum of psychosis, and elucidate whether patterns seen in full-blown psychosis are present at lower levels of symptom severity.

Locus of control and psychological well-being

The construct of LoC was first proposed by Julian Rotter (1954) within the context of social learning theory. Rotter did not characterize one LoC orientation as better than the other; however, the bulk of the literature on LoC shows that internal (versus external) orientations accrue more beneficial outcomes for one's own mental health. For example, an internal LoC has been found to predict greater mental well-being, life satisfaction, and physical health (Ng et al., 2006). Ng and colleagues (2006) also found that internal LoC relates to increased job satisfaction, greater feelings of self-efficacy, reduced levels of work and family conflict, as well as increased feelings of empowerment. A large body of research on emotional well-being has found that an external LoC is associated with increases in depressive symptoms and the occurrence of major depressive disorder (e.g., Lester, 1999). Further, individuals with an internal LoC have been found to make more improvements in their depressive symptoms (e.g., Bann et al. 2004). The association between an individual's LoC orientation during depression seems to be constant across an array of populations. Studies examining depression in college students (Twenge et al., 2004), patients with cancer (De Brander et al., 1997), and caregivers (Cheng et al., 2014) all found a relationship between an external LoC and increased depressive symptoms.

Locus of control and psychosis

Research on LoC and psychosis presents similar results, such that individuals with schizophrenia or increased psychotic symptoms tend to be more externally oriented (e.g. Hoffman & Kupper, 2002; Bentall & Kaney, 2005). Patients who had beliefs that were externally oriented tended to have a lower quality of life (Bechdolf et al., 2003). Individuals with psychosis who were more external also had decreased occupational performance (Eklund, 2007). On the other hand, having an internal LoC in patients with schizophrenia is associated with increased chances of recovery or rehabilitation (Hoffman & Kupper, 2002). A 15-year longitudinal study examined LoC in patients with schizophrenia compared to other diagnostic and control groups (Harrow et al., 2009). Harrow and colleagues replicated findings that an external LoC is associated with higher levels of psychosis, and that an internal orientation is associated with increased recovery. Further, Harrow's research has found that LoC can change across the course of the illness. While orientations tend to be external during the acute phase of a psychotic episode, patients were not more external than comparison groups after the acute phase. Additionally, their results indicated that an external LoC is significantly related to depression in this population.

A theory for why LoC changes with psychotic symptoms has been presented through the social cognitive theory of psychosis. The social cognitive theory of psychosis posits that when an individual starts to believe a hallucination is coming from an external source *and* that the voice is significant and uncontrollable, these together may cause enough distress to lead to a psychotic disorder (Garety et al., 2007). This cognitive style of blaming others rather than oneself or the circumstances, known as the "personalizing bias," is a well-documented phenomenon in schizophrenia (Kinderman & Bentall, 2000). Another example of this is evidenced in cases of persecutory delusions. An individual with schizophrenia who has an external orientation may make eye contact with someone walking down the street and think that the person is colluding with the devil to hurt him/her. The personalizing bias is believed to affect



well-being, as it can be used to support misguided beliefs and lead to increased distress (Freeman, 2007). By seeking evidence that confirms a delusion, rather than attribute the thought to something internal or false, individuals with schizophrenia often have negative emotional social-cognitive consequences (Kinderman, Dunbar, & Bentall, 1998). While this theoretical framework is well understood for more severe levels of psychosis, little is known about how LoC interacts with sub-clinical psychotic symptoms in non-clinical populations. In this study, we were interested in elucidating whether psychotic symptoms interact with one's locus of control to affect well-being in a normative population as it does in individuals with schizophrenia. This topic was investigated in the current study.

Locus of control and ethnicity

An important aspect of LoC is the different orientations that are found within different ethnicities and cultures. Individuals from collectivistic cultures (e.g. many Asian and South American cultures) are often self-rated as more externally oriented than individuals from individualistic cultures (e.g., the United States; Dyal, 1984; Stocks et al., 2012). Collectivistic cultures tend to place greater emphasis on group-harmony and making decisions that are for the benefit of the greater good (Markus & Kitayama, 1991; 2010). This viewpoint creates a self-concept that focuses on the demands the larger world/society places on one's thoughts and actions. As a result, individuals from collectivist cultures often align with a more external orientation, which explains events as being the result of some outside agent. Individuals from individualist cultures tend to have a self-concept that revolves around a sense of autonomy and self-agency (Markus & Kitayama, 1991; 2010). This leads people from individualistic cultures to more often endorse internal orientations that construe events as resulting from one's own actions.

The current study

A large body of work has examined the unique role locus of control plays in individuals with elevated levels of psychotic symptoms. Previous studies have also assessed the associations between LoC and psychological well-being (i.e. quality of life, depression, and well-being). The trends in these studies portray a fairly consistent picture—an external LoC is negatively associated with well-being, and an external LoC may moderate the relationship between symptoms and well-being. However, the bulk of literature ignores the lower level, subclinical symptoms of psychosis, thereby, leaving out a large proportion of the psychosis spectrum. Studying these relationships in a non-clinical population is an important step to understanding the complete psychosis spectrum and elucidating whether these patterns are present before the onset of a psychotic spectrum diagnosis.

There were three overarching aims of the current study. The first was to assess whether LoC has the same associations with psychological well-being in a non-clinical population as it does in schizophrenia. It was hypothesized that an external LoC will be negatively associated with psychological well-being. The second was to assess whether LoC moderates the link between sub-clinical psychotic symptoms and well-being in a non-clinical population? It was hypothesized that the negative relationship between psychotic symptoms and psychological well-being would be stronger for individuals with a more external LoC. Finally, secondary analyses were conducted to assess the relationship between sub-clinical psychotic symptoms, LoC, and psychological well-being by ethnicity. It was hypothesized that the relationship between a more external LoC and poorer psychological well-being would be stronger for Whites than for ethnic minorities.

Methods

Participants

A total of 420 undergraduates were recruited from the psychology research pool at the University of Miami as part of a larger study examining sub-clinical symptoms of psychosis and attitudes towards disadvantaged others (Tabak & Weisman de Mamani, 2014; Weintraub & Weisman de Mamani, 2015). Mean age was 19.18 years ($SD = 2.73$) and a significant proportion of the sample was female (62.9%, $n = 264$). Forty-six percent of participants identified as White ($n = 191$), twenty-three percent as Hispanic ($n = 95$), eleven percent as Asian American ($n = 47$), five percent as African American ($n = 19$), and sixteen

percent as “other” ($n = 68$). Class credit was awarded for participation. This sample had a good range of schizotypal symptoms, well-being, and locus of control (shown in Table 1).

Table 1

Means of indicators and moderator variables (variables described in greater detail below)

	SPQ-B	O-LIFE	PWB	DASS-D (reverse)	QoL	LoC
Overall Mean (SD)	7.67 (4.83)	30.93 (13.78)	382.49 (48.99)	5.62 (1.97)	29.77 (18.97)	11.08 (3.56)
Majority/ White Mean (SD)	7.47 (4.98)	30.02 (13.66)	382.33 (47.68)	5.59 (1.95)	29.32 (17.05)	10.90 (3.56)
Hispanic Mean (SD)	7.61 (4.43)	30.47 (12.99)	389.80 (42.60)	5.90 (1.93)	32.36 (19.68)	11.11 (3.74)
Black Mean (SD)	9.16 (4.06)	32.35 (15.37)	391.00 (44.35)	5.86 (1.99)	30.28 (20.94)	11.44 (2.63)
Asian Mean (SD)	7.54 (5.32)	31.17 (13.70)	378.53 (46.65)	5.49 (2.08)	25.39 (23.68)	11.07 (3.71)
“Other” Mean (SD)	8.07 (4.92)	33.65 (15.18)	364.08 (59.57)	5.37 (2.00)	29.86 (19.43)	11.52 (3.69)
Range in this study	0 - 22	4 - 81	192 - 484	0 - 9	-64 - 72	1 - 21
Possible range	0 - 22	0 - 104	84 - 504	0 - 9	-120 - 120	1 - 29

Procedures

The study was reviewed and approved by the Institutional Review Board of the University of Miami. A trained research associate administered the questionnaires in a quiet room with 5 to 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 (i.e. created latent variables for psychotic symptoms and well-being).

Measures

Sub-clinical psychosis symptoms

Schizotypal Personality Questionnaire—Brief Form. The Schizotypal Personality Questionnaire—Brief Form (SPQ-B; Raine & Banishay, 1995) measures positive, negative, and disorganized schizotypal traits using 22 self-report, True/False items. A sample item is, “People are taking special notice of you.” It is based on the full 74-item SPQ (Raine, 1991) and has demonstrated strong reliability (reliability average = 0.76; Raine & Banishay, 1995). The SPQ-B evidenced strong internal consistency in the current sample (Cronbach’s $\alpha = 0.83$). The SPQ-B also had strong internal



consistency when examined by ethnicity (Cronbach's $\alpha = 0.84$ for Caucasians and Cronbach's $\alpha = 0.82$ for minorities).

Oxford-Liverpool Inventory of Feelings and Experiences. The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE; Mason & Claridge, 2006) measures schizotypal traits across four sub-categories: Unusual Experiences, Introvertive 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 $\alpha = 0.91$). The O-LIFE also had good reliability when examined by ethnicity (Cronbach's $\alpha = 0.91$ for Caucasians and Cronbach's $\alpha = 0.91$ for minorities).

Magical Ideation Scale. The Magical Ideation Scale (MIS; Eckblad & Chapman, 1983) measures positive schizotypy traits with 30 True/False items. The scale inquires about physically impossible, illogical, or magical cause and effect beliefs (i.e. paranormal, superstitious, or extra-sensory perceptual beliefs and thoughts). The scale includes items such as, "I think I could learn to read other's minds if I wanted to" and "The hand motions that strangers make seem to influence me at times." Chapman, Chapman, and Miller (1982) previously found the MIS to have strong internal consistency (Cronbach's $\alpha = 0.79$ to 0.89). The current study found the MIS to have acceptable internal consistency (Cronbach's $\alpha = 0.65$). The MIS also had acceptable internal consistency when broken down by ethnicity (Cronbach's $\alpha = 0.64$ for Caucasians and Cronbach's $\alpha = 0.66$ for minorities).

Locus of control

Rotter's Locus of Control. Rotter's Locus of Control (LoC; Rotter, 1966) scale measures the degree to which individuals believe that they can control the events of their lives. The scale is made up of 29 binary items—one option in each scenario indicates a belief in lack of control (External LoC) for that event, while the other indicates a perception of control (Internal LoC) for that event. An example is (a) "People are lonely because they don't try to be friendly" vs. (b) "There's not much use in trying too hard to please people, if they like you, they like you." Previous research has found the internal consistency for this measure to be good, ranging from a Cronbach's α of $0.65 - 0.79$ (Rotter, 1966). The current study found acceptable internal consistency for this measure (Cronbach's $\alpha = 0.63$). When reliability was examined by ethnicity, internal consistency was also acceptable (Cronbach's $\alpha = 0.63$ for Caucasians and Cronbach's $\alpha = 0.64$ for minorities).

Psychological well-being

Depression Sub-Scale of the Depression, Anxiety and Stress Scale. The Depression, Anxiety and Stress Scale (DASS_D; Lovibond & 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 4-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 $\alpha = 0.94$). The DASS_D also had strong internal reliability when broken down by ethnicity (Cronbach's $\alpha = 0.95$ for Caucasians and Cronbach's $\alpha = 0.94$ for minorities).

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 twelve 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 3-point Likert scale (0 = not important, 1 = important, and 2 = very important. Satisfaction for each item is measured on a 6-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 $\alpha = 0.82$). The QOLI also had good reliability when examined by ethnicity (Cronbach’s $\alpha = 0.79$ for Caucasians and Cronbach’s $\alpha = 0.84$ for minorities).

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, 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 $\alpha = 0.94$). The PWB also had strong internal consistency when broken down by ethnicity (Cronbach’s $\alpha = 0.94$ for Caucasians and Cronbach’s $\alpha = 0.94$ for minorities).

Results

Primary analyses

Primary analyses were conducted using structural equation modeling (SEM) in Mplus version 6.0 (Muthen & Muthen, 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 variable first included the SPQ, O-LIFE, and MIS. The psychological well-being latent included the DASS_D, PWB, and QoL. The confirmatory factor analysis for psychotic symptom and well-being latent variables did not create good model fit. The comparative fit index was greater than 0.95 (CFI = 0.97) and the standardized root mean square residual was less than 0.06 (SRMR = 0.05); however, there was a significant Chi-square test of model fit ($\chi^2(8) = 52.31, p < 0.001$), and the root mean square error of approximation was greater than 0.09 (RMSEA = 0.12). The modification indices indicated that the residual variances of the measures PWB and QoL were correlated, so a covariance between these two indicators was added. This modification improved the Chi-square test of model fit value; however, the model did not fit the data ($\chi^2(7) = 33.51, p < 0.001$). The modification indices were again examined, and the indicator, MIS, empirically load onto both the sub-clinical psychosis latent and the psychological well-being latent. Due to empirical and theoretical misfit, the MIS was removed from the model. With the MIS indicator removed, the model had 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. The SPQ had a factor loading of .832 ($p < 0.001$) and the O-LIFE had a factor loading of .965 ($p < 0.001$) onto the sub-clinical psychosis latent. The DASS_D had a factor loading of .806 ($p < 0.001$), the PWB had a factor loading of .780 ($p < 0.001$), and the QoL had a factor loading of .721 ($p < 0.001$) onto the psychological well-being latent. The means of each indicator and locus of control are presented in Table 1.

Sub-clinical psychotic symptoms, locus of control, and psychological well-being

As predicted, sub-clinical psychotic symptoms were negatively associated with psychological well-being, controlling for locus of control, gender, and ethnicity ($b = -0.286, SE = 0.022, p < 0.001$). Further, locus of control was associated with psychological well-being such that a more external locus of control was associated with poorer psychological well-being, controlling for psychotic symptoms, gender, and ethnicity ($b = -0.045, SE = 0.019, p < 0.05$). Sub-clinical psychotic symptoms and locus of control were positively associated such that an external locus of control was associated with greater psychotic symptoms, controlling for gender and ethnicity ($b = 6.355, SE = 0.889, p < 0.001$). However, locus of control did not moderate the relationship between psychotic symptoms and psychological well-being ($b = 0.002, SE = 0.004, p = 0.571$). Results are presented in Figure 1.

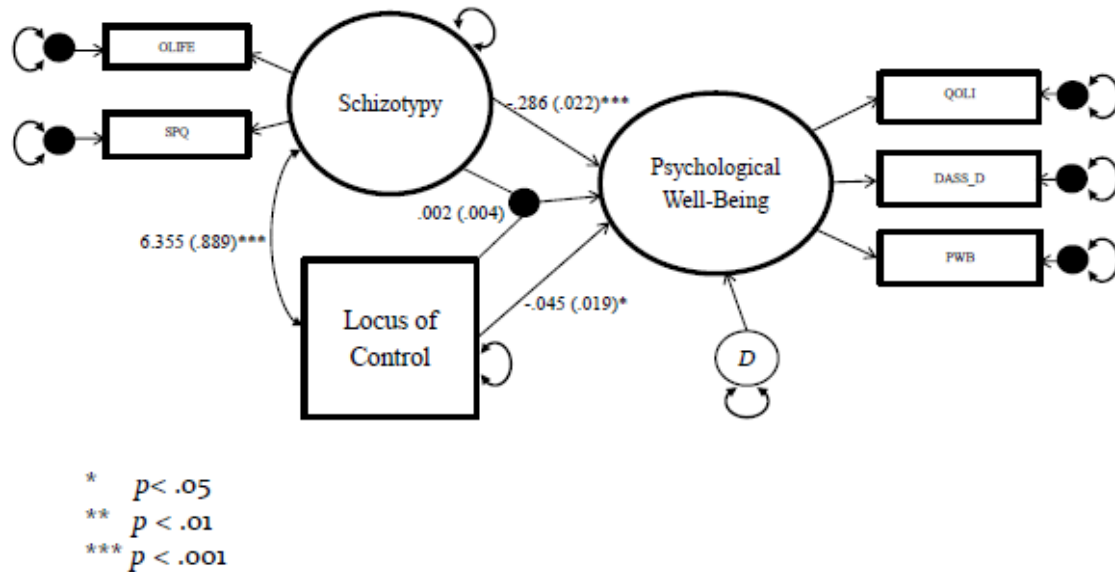


Figure 1. Path analytic representation of the interactive effect of sub-clinical psychotic symptoms and locus of control on psychological well-being

Sub-clinical psychotic symptoms, locus of control and psychological well-being by ethnicity

In both groups, sub-clinical psychotic symptoms were similarly negatively associated with psychological well-being, controlling for gender and locus of control (White: $b = -0.269$, $SE = 0.029$, $p < 0.001$; Minority: $b = -0.302$, $SE = 0.034$, $p < 0.001$). However, ethnicity significantly moderated the relationship between locus of control and psychological well-being ($b = 0.06$, $SE = 0.028$, $p < 0.05$). Contrary to expectations the main effect of a more external locus of control relating to poorer psychological well-being only occurred for minorities and did not occur for Whites, controlling for gender and psychotic symptoms (White: $b = -0.026$, $SE = 0.031$, $p = 0.41$; Minority: $b = -0.070$, $SE = 0.034$, $p < 0.05$). The interaction of psychotic symptoms with locus of control did not significantly predict psychological well-being for either group, controlling for gender (White: $b = 0.001$, $SE = 0.006$, $p = 0.814$; Minority: $b = 0.004$, $SE = 0.007$, $p = 0.536$). Results by ethnicity are presented in Figures 2 and 3.

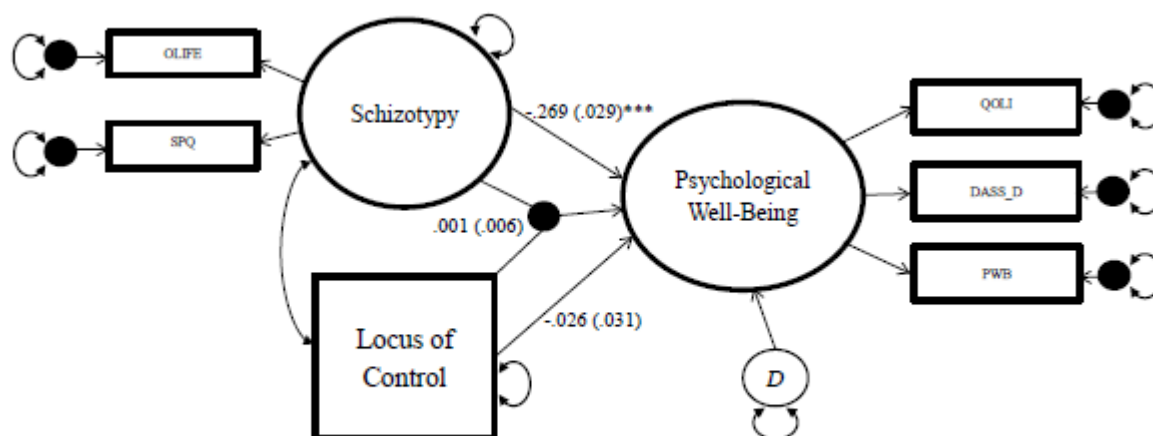


Figure 2. Path analytic representation of the interactive effect of sub-clinical psychotic symptoms and locus of control on psychological well-being for Whites

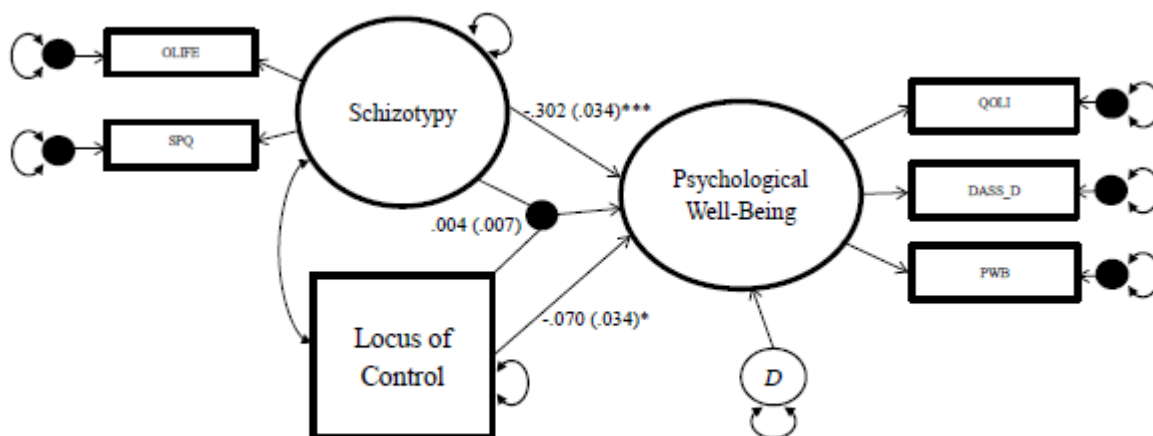


Figure 3. Path analytic representation of the interactive effect of sub-clinical psychotic symptoms and locus of control on psychological well-being for minorities

Discussion

Study results indicated that a more external orientation was associated with poorer well-being than an internal orientation; however, participants' ethnicity moderated this relationship. Individuals who self-identified as a minority (e.g. Hispanic, Black, Asian-American) demonstrated a relationship between an external LoC and poorer well-being. For those that identified as White, there was no significant relationship between LoC and well-being. While there is much research to suggest that an internal locus



of control orientation tends to be associated with more beneficial outcomes, at least for Whites (e.g., Ng et al., 2006), the current study found no such association for Whites. Additionally, some research suggests that individuals from non-Western cultures hold a more external orientation, and that an external orientation can be beneficial for these individuals (e.g., Marks, 1998; Wenzel, 1993). This finding for minorities was not replicated. Instead, the results from the current study suggest that an external LoC is connected to poorer psychological well-being for minorities.

We do not have data to speak to why the relationship between locus of control and well-being is different by ethnicity. However, the association between an external locus of control and well-being for minorities may be due to a mismatch between the minority culture and the culture within which they live (Fulmer et al., 2010). Individuals who live within a culture that supports their LoC orientation may have an easier time justifying the actions around them and making sense of their experiences. Both the individual and his/her community would have similar orientation styles, and there would not be any disconnect between the ways these two parties make sense of their environment. On the other hand, individuals who maintain allegiance with ideals and values that do not align with their current culture may face greater struggles as they attribute life circumstances to causes that are different than their current culture's views. In other words, an external orientation may be beneficial within a culture that values this orientation. However, when an individual is more external but in a culture that values a more internal orientation, this may have a detrimental impact on their well-being.

The social cognitive theory of psychosis (Garety et al., 2007) would suggest that the relationship between increased psychotic symptoms and decreased psychological well-being would be stronger for individuals with a more external locus of control. However, the current study did not support this hypothesis. Sub-clinical psychotic symptoms had the same relationship with well-being regardless of participants' locus of control orientation. Greater sub-clinical psychotic symptoms were strongly associated with an external LoC. One explanation for not seeing the expected interaction may be that, statistically, the power of the moderation analysis was greatly hindered by the strength of the association between psychotic symptoms and LoC. The current study cannot speak to why these variables were so collinear; however, this trend does match the pattern seen in schizophrenia—greater psychotic symptoms are generally associated with an external LoC (Bentall & Kaney, 2005).

Limitations

First the study measured all variables cross-sectionally, which limits the ability to make any causal inferences. Measuring sub-clinical psychosis, well-being, and locus of control over time could provide greater insight into the trajectory of individuals' well-being as a function of sub-clinical symptoms of psychosis. Measuring the study variables using self-report measures is another 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. Participants also selected from pre-defined ethnic categories, which is a limitation of this study. Performing assessments with participants or allowing them to write in their ethnicity may allow for more accurate/flexible ethnic categories that better capture the participants' ethnic affiliation. Further, the sample was collected from a pool of undergraduate students. The generalizability of college students may be somewhat limited, as these individuals tend to be higher functioning than the general population. Further, assuming the Caucasian population as individualistic and the minority population as collectivistic is an assumption based on the literature. However, levels of individualism and collectivism were not directly assessed in this study. Finally, the moderation analysis to test the social cognitive theory of psychosis was greatly limited by the collinearity between LoC and sub-clinical psychotic symptoms. It is unclear whether these two variables are commonly collinear in sub-clinical populations, but collecting a sample in which these two variables are orthogonal will provide more conclusive evidence either for or against the social cognitive theory of psychosis.

Future directions

The reasons why the relationships between sub-clinical psychosis, locus of control, and psychological well-being are stronger for ethnic minorities is beyond the scope of this study. However, on a speculative basis, this finding could be related to the stigma related to unusual thoughts and/or behaviors for minority cultures, differing cultural values, or less access to care that make unusual thought and/or behaviors more distressing for minorities (e.g. Veling et al., 2007). Examining why the patterns found in this study differ based on ethnicity is an important step for basic science and treatment research. Since cultural factors often play an important role in individual's experience, it is important to elucidate both similarities and differences across ethnicities/cultures and determine why individuals experience similar situations with different outcomes. Additionally, future research should attempt to test the social cognitive theory of psychosis in another sub-clinical sample to investigate whether LoC and sub-clinical psychotic symptoms can be measured as independent, unrelated variables, or whether the association between LoC and symptoms are consistently strongly associated.

Conclusion

This study examined the relationships between locus of control, sub-clinical psychotic symptoms, and psychological well-being. Results indicated that a more external locus of control is associated with poorer psychological well-being for minority populations, but there was no significant relationship between locus of control and well-being for Whites. Further, sub-clinical psychotic symptoms were associated with decreased psychological well-being; however, contrary to expectations, locus of control did not moderate this relationship. Therefore, this study did not find evidence for the social cognitive theory of psychosis in sub-clinical populations. Future research should attempt to elucidate the factors that differentially impact ethnicities' relationship between locus of control and psychological well-being.

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