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# Schizotypy and Health Promotion: The Mediating Role of Depressive Symptoms

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# Schizotypy and Health Promotion: The Mediating Role of Depressive Symptoms

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SCHIZOTYPY AND HEALTH-PROMOTION: THE MEDIATING ROLE OF  
DEPRESSIVE SYMPTOMS

By

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Presented to the faculty of the Graduate School of

Stephen F. Austin State University

In Partial Fulfillment

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For the Degree of

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May 2018

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DEPRESSIVE SYMPTOMS

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## ABSTRACT

*Introduction:* In general populations, schizotypy and depressive symptoms may be present at sub-clinical levels. Previous research has shown that schizotypy may negatively associate with underlying factors of health promotion. Furthermore, depressive symptoms have also been shown to negatively correlate with underlying factors of health promotion. *Method:* Undergraduate students and Mturk users were asked to complete an online questionnaire consisting of surveys measuring schizotypy, depressive symptoms and health promotion. *Results:* A mediation model showed a significant negative indirect effect of schizotypy through depressive symptoms on health promotion. Additionally, schizotypy positively predicted health promotion when depressive symptoms were controlled. *Discussion:* Results support previous research that depressive symptoms may act to nullify positive outcomes, or worsen negative outcomes associated with schizotypy. This suggests that interventions that target depressive symptoms may be more effective on health outcomes when a person presents with high schizotypy, and may lead to a positive health promoting lifestyle.

*Keywords:* Schizotypy, depressive symptoms, health promotion, mediation

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## SCHIZOTYPY AND HEALTHY LIFESTYLE: THE MEDIATING ROLE OF DEPRESSIVE SYMPTOMS

It is becoming evident that overall health is an important mediator of neurological disease and psychological disorder progression (including neuropsychiatric disorder such as schizophrenia and depression [Herbert, 1997]). However, just as a sound body may allow one to exercise and encourage healthy lifestyle behaviors, the state of the mind and brain may be equally as important in maintaining effective health promoting behaviors. Importantly, psychiatric disease, mental states, and personality are essential determinants of behavior and habits that promote a healthy lifestyle.

Schizotypy is conceptualized as the continuous form of schizophrenia and related disorders, and consists of traits indicative of behaviors that are expressed by individuals with schizophrenia and related disorders (DSM-5; American Psychological Association [APA], 2013). These traits may also be present in the general population at subclinical levels (Rado, 1953). Schizotypy traits include, but are not limited to, disorganized speech, delusions or false beliefs (e.g., superstitious or magical beliefs), lack of close relationships, and restricted affect. Expression of schizotypal traits often precedes diagnosis of schizophrenia later in life (Catts, Fox, Ward, & McConaghy, 2000). Schizophrenia has been linked to decrements in health promoting behaviors (Holmberg &

Kane, 1999). However, it is unknown how health promoting behaviors are affected for individuals high in schizotypy traits.

Major Depressive Disorder (MDD) is a common occurrence (30-50% of patients with schizotypal personality disorder have comorbid MDD) in those with schizotypal personality disorder and other schizophrenia spectrum disorders (APA, 2013). Also, poor health promoting behaviors have been associated with MDD. In addition to MDD, subclinical depressive states are negatively correlated with positive health promoting behaviors (Gonzalez et al., 2007). Increased levels of depression have been shown to be associated with poor nutrition (Bodnar & Wisner, 2005), decreases in exercise (Byrne & Byrne, 1993), and heightened stress/anxiety (Mealey, Abbott, Gyne, & McGillivray, 2014).

Understanding the link between schizotypy, depressive symptoms and health promoting behaviors is important. Given that depressive symptoms are associated with high schizotypy trait scores and that these symptoms may affect health promoting behaviors, it is particularly important to understand how depressive symptomatology may mediate health promoting behaviors in individuals with schizotypy traits.

#### Associations between health promoting behaviors and health

Health promoting behaviors involve maintaining interpersonal relationships, managing stress, eating healthily, performing regular exercise, taking responsibility for one's health, and striving toward self-actualization (working toward and achieving goals; Walker, Sechrist, & Pender, 1987). Overall, the individual facets of health promoting

behaviors are associated with factors that improve or maintain general health. For example, proper diet and exercise has been shown to reduce bad cholesterol, a known risk factor for cardiovascular disease (Stefanick et al., 1998). Also, a well-balanced diet may help slow age-related declines in cognition (Solfrizzi, Panza, & Capurso, 2003; Ströhle, 2009).

Healthy interpersonal relationships help establish meaning in life and improve physical health (Krause, 2004). Interpersonal relationships have been shown to be important to positive life adjustment and stress management. For instance, if a person does not maintain relationships, he/she may be prone to isolation and stress which could potentially have severe consequences for one's psychological and physical health (Smith, 2006). Furthermore, positive interpersonal relationships help strengthen social networks, and research supports the notion that pro-social networks positively affect cardiovascular health (Berkman, 1984). Additionally, individuals with strong social support exhibit healthier eating habits, such as eating a more balanced diet consisting of fruit and vegetables (Reblin & Uchino, 2008).

Essential for coping with everyday interactions and maintaining goals are effective stress management skills and striving for self-actualization. Stress management, or coping, is also a key factor in maintaining physical health. Failure to manage stress properly can lead to cardiovascular disease and other negative health outcomes (Dimsdale, 2008). Furthermore, stress reduction training has been shown to increase

physical well-being such as functionality, and to reduce pain (Grossman, Niemann, Schmidt, & Walach, 2004). Self-actualization is conceptualized by Walker and colleagues (1995) as a focus on the inner-self and finding meaning in life. For example, a person living with purpose and who has goals for the future would demonstrate high levels of self-actualization. A person with high levels of self-actualization would likely have a reduced risk of developing physical illness (Matthews et al., 1998).

In summary, facets of health promoting behaviors tend to overlap and as one aspect starts to decline, the other aspects likely follow. These associated declines may be responsible for poor outcomes in overall well-being (Walker et al., 1987). It has been suggested that mental illnesses, such as schizophrenia or depression, may be associated with deficits in health promoting behaviors (Gonzalez et al., 2007; Holmberg & Kane, 1999).

### Schizotypy and schizophrenia

Schizophrenia is characterized by abnormal social behaviors, cognitive dysfunction and delusions or hallucinations. There are three domains of these symptoms: positive, negative, and cognitive/behavioral dysfunction or disorganization. Positive symptoms include behaviors in excess of normal behaviors or behaviors that are not typically expressed. Examples of positive symptoms include hallucinations and delusions, as these symptoms are not present in the range of typical behaviors. Conversely, negative symptoms are a reduction or absence of a trait or behavior that is



typically present. For example, anhedonia is characterized by an inability to feel pleasure when engaging in behaviors that are usually enjoyable, or avolition, which involves a reduction in motivation for self-promoting behaviors. Symptoms of disorganization relate to incoherent cognition and motor agitation. For example, a patient presenting with schizophrenia may have hallucinations or delusions, in addition to avolition or anhedonia, which are reductions of self-directed behaviors and lack of pleasure. Furthermore, a patient may also appear to be unable to think rationally, or to focus or plan tasks (APA, 2013).

Personality disorders are relatively common, estimated to affect about 9% of the U.S. population (Lenzenweger, Lane, Loranger, & Kessler, 2007), and are present in about 18% of college students (Blanco et al., 2008). Several personality disorders have been identified that encompass aspects of the schizophrenia diagnosis. For example, schizotypal personality disorder is characterized by persistent deficits in social and interpersonal functioning, significant discomfort with close relationships, and odd or eccentric beliefs and behavior patterns (APA, 2013). Meanwhile, schizoid personality disorder is characterized by apathy towards social interactions and restricted emotional responsiveness. Both schizotypal and schizoid personality disorders may predispose individuals to heightened stress and social isolation, and may contribute to a lack of health promoting behaviors. For example, schizotypal personality disorder has a high prevalence in the homeless community comprised of individuals who often experience difficulties with health promoting behaviors (Connolly, Cobb-Richardson, & Ball, 2008).

Behavioral symptoms which are typically associated with schizophrenia and similar personality disorders may exist in the normal (i.e., non-diagnosed or non-clinical) population at measurable levels. Schizotypy traits may manifest as extreme personality trait factors that are still within the normal subclinical range. For example, persons high in schizotypy traits may exhibit cognitive and behavioral characteristics that resemble those observed in schizophrenia but to a much lesser degree of severity. Individuals with high schizotypy may have cognitive deficits such as inability to think rationally or to maintain a train of thought. Additionally, persons high on schizotypy may have trouble interacting with others through face-to-face interaction due to disorganized speech patterns and thoughts. Socially, individuals with high schizotypal features could appear less extraverted, agreeable, and conscientious, and more neurotic than the typical population (Duijesens & Diekstra, 1996). For example, persons high in schizotypy are more likely to be introverted and as a result have fewer relationships, if any, outside of their families (Teoh, 2010). Individuals high in schizotypy may also exhibit odd or eccentric behaviors such as wearing coats/excessive clothing during the summer or manifesting odd beliefs and magical thinking (such as attributing special meaning to the numbers representing their dates of birth or expressing peculiar conspiracy theories, APA, 2013).

Overall, research examining schizotypy traits has been limited and few studies have examined the associations between schizotypy and health promoting behaviors. Schizotypy -related behavior may result in lower scores in health promoting behaviors.

For example, lack of social interactions may lead to lack of a social safety net, and would leave individuals without support in difficult situations. Raine et al. (1994) conducted a factor analysis on a standard schizotypy questionnaire. The factor analysis supported interpersonal deficits as one of the three factors underlying schizotypy (Raine et al., 1994). Research suggests that these interpersonal deficits develop from a young age and are positively correlated with anxious and avoidant behaviors. These anxious and avoidant behaviors detrimentally impact the ability to establish healthy relationships in the future (Berry, Band, Corcoran, Barrowclough, & Wearden, 2007). Additionally, persons high on schizotypy traits have been shown to have fewer social supports and to report lower satisfaction with social supports (Gayer-Anderson & Morgan, 2013).

Furthermore, schizotypy is characterized by a number of traits that lead to behaviors that may increase the likelihood of negative social interactions. For example, social anhedonia, or the inability to feel pleasure in social interactions may lead to isolation and may prompt others to view those high in schizotypy as aloof or social awkward. Also, paranoia seen in schizotypy may lead to problems in social and work interactions, or even contribute to social exclusion (Lemert, 1962). Persons high in schizotypy may experience more tension in dealing with others and experience heightened levels of stress in social situations.

Social supports often are an important moderator of perceived stress, so it is not surprising that individuals high in schizotypy report higher levels of perceived stress (Horan, Brown, & Blanchard, 2007). Wang and colleagues (2017) divided participants

responding to a schizotypy scale into four categories based on the trajectory of symptoms over an 18-month time span. All levels of increased schizotypy traits (including slightly above average [i.e., the low schizotypy class]) were associated with higher stress responses. Considering the longitudinal design of the study, persistently experiencing schizotypy traits may explain the increase in stress, and as discussed above, stress has a powerful and detrimental impact on physical health

Additionally, disorganized thoughts may serve to hinder both social and work interactions. Disorganized thoughts may be accompanied by an inability to maintain regular schedules or to stay on task such as maintaining work, eating and sleeping schedules. The ability to maintain structured or routine schedules and organizing task-oriented aspects of life may be a critical part of health promoting behaviors. For example, a person who is disorganized may be less likely to receive yearly checkups, eat breakfast regularly, or plan time for exercise. Disorganized behaviors can result in an unhealthy lifestyle and may be particularly problematic in persons with high levels of schizotypy (Felker, Yazel, & Short, 1996).

Individuals with disorganized thoughts may have difficulty accomplishing longer-term goals which are important in maintaining self-esteem and achieving self-actualization. Cramer, Torgersen, and Kringlen (2006) conducted a study investigating self-actualization and personality disorders. Participants with personality disorders that are positively associated with schizotypy (e.g. schizotypal or schizoid personality disorders) were found to have lower self-actualization than a control sample. The

severity of traits in persons with a personality disorder was also negatively associated with self-actualization (Cramer, Torgersen, & Kringlen, 2006). In addition to decreased self-actualization, persons with schizotypal personality disorder scored lower on happiness, health, and self-esteem when compared to a control group (Kobzova, Zvereva, Goryunov, Shchelokova, & Simonov, 2013).

Interestingly, schizotypy has not been shown to be directly related to health promoting behaviors, but shares associations with many facets of health promotion. For example, higher schizotypy scores have been associated with increases in stress (Wang et al., 2017). As discussed above, quality interpersonal relationships help to maintain overall health and diminish stress; however, high levels of schizotypal features are associated with a lack of pleasure from social interactions (Kwapil, 1998). A proposed link by Kobzova et al. (2015) is depression, as high schizotypal symptoms may exacerbate depressive symptoms and depressive symptoms may serve as a mediator of schizotypy and poor health promotion.

### Depressive symptoms

Major depressive disorder (MDD) is characterized by a change in functioning which reflects a depressed mood or loss of interest or pleasure in activities (anhedonia), as well as other physical, cognitive, and/or psychological features such as weight loss/gain, insomnia/hypersomnia, psychomotor agitation/retardation, fatigue, feelings of worthlessness/ guilt, diminished concentration, and/or recurrent thoughts of death (APA, 2013). Similar to schizophrenia, related personality disorders (e.g., schizotypal and

schizoid), and schizotypy, depression can also be conceptualized using a continuity approach rather than a dichotomous approach (Hankin, Fraley, Labey, & Waldman, 2005). Thus, depressive symptomatology falls on a continuum from mild to very severe, and can be described as the way an individual expresses behaviors that are associated with depressive states, although they may not be sufficient to warrant a diagnosis.

The continuity approach suggests that behaviors associated with depression are seen in a normal population (i.e., non-diagnosed) and are measurable at subclinical levels. Persons high in depressive symptoms exhibit similar cognitive and behavioral characteristics to persons with MDD but to a lesser degree of severity. For example, persons scoring high on depressive symptoms can feel depressed (e.g. feelings of sadness or melancholy), have diminished verbalizations, and have less energy than usual. Additionally, persons high on depressive symptoms may be abnormally annoyed by normal events or have crying spells.

Depressive symptoms may negatively influence several facets of an individual's health-related behaviors. For example, individuals who are less talkative could also experience a decrease in interpersonal skills. Klein et al. (2016) used an interactive test to measure how quickly participants could adapt to different social situations. The researchers divided participants into three categories based on severity of depressive symptoms. Participants in the chronically depressed category demonstrated less adaptive social skills when compared to the control group (Klein et al., 2016). This finding

suggests that persistent depressive symptoms may be associated with deficits in interpersonal skills.

A previous study conducted by Liu and colleagues (2017) was designed to correlate depressive symptoms, physical activity and nutrition. The results suggest a strong negative correlation between depressive symptoms and physical activity. Furthermore, the results also suggested a negative relationship between depressive symptoms and nutrition. Persons experiencing more depressive symptoms exhibit worse exercise and dietary behaviors, which are both important for maintaining good health (Liu et al., 2017).

Furthermore, responsible health behaviors are positively associated with self-actualization (Duffy, 1988). A study conducted by Berndt and colleagues (1982) on adolescents examined self-actualization and the effect of depressive symptoms. The relationship between self-actualization and depressive symptoms was found to be negatively correlated. Adolescents who were not found to be “self-actualized” also reported lower self-esteem (Berndt et al., 1982).

A transactional approach proposes that individuals impact their environments which subsequently leads to changes that may then reciprocally impact the individual (i.e., stress generation). For example, research has suggested that prior depressive episodes predict severity of depressive symptoms after which severity of depressive symptoms predicts interpersonal stress (Shih & Eberhart, 2008). In addition to the previous study, a review conducted by Hammen and Shih (2008) supported the theory of

stress generation. For example, persons high on depressive symptoms may act in a way that leads to an increased proneness for stressful events. States of hopelessness or helplessness may produce a lack of successful management of stress, due to lack of caring.

### Schizotypy and depressive symptoms

Established criteria for schizotypal personality disorder and MDD suggest a possible overlap in symptoms at a diagnosis level. More specifically, schizotypal personality disorder criteria such as lack of pleasure and decreased emotional expressivity mirror anhedonia and lack of joy criteria for MDD. Furthermore, 50% or more of individuals with schizotypal personality disorder experience a depressive episode (APA, 2013).

Given the overlap between schizotypal personality disorder and MDD, researchers have also found a positive correlation at the trait and symptom level wherein higher levels of schizotypy are associated with greater depressive symptoms (Campellone, Elis, Sanchez, & Kring, 2016; Fonseca-Pedrero, et al., 2011; Jahn, Devylder, & Hilimire, 2016). Although the literature is correlational in nature, given that schizotypy traits are persistent personality dimensions and depressive states vary in intensity over time, it may be that schizotypy traits precede depressive symptoms. Furthermore, the majority of studies examining schizotypy do not include depression, despite their strong relationship. Additionally, both schizotypy and depressive symptoms



have been related to aspects of health promotion while they have not been studied simultaneously through regressions or mediation.

### Current Study

In the current study, we were interested in whether severity of depressive symptoms may explain the relationship between schizotypy and health promoting behaviors. We hypothesized that schizotypy will correlate negatively with health promoting behaviors. Previously, research has demonstrated that schizotypy negatively affects many underlying factors of health promoting behaviors (i.e., motivation, sociality) (Barrantes-Vidal et al., 2013; Cramer, Torgersen, & Kringlen, 2006; Wang et al., 2017); however, no research has directly examined the association between schizotypy and health promoting behaviors (i.e., maintaining interpersonal relationships, managing stress, diet, exercise, and self-actualization). Additionally, the current study examined how depressive symptoms mediate the association between schizotypy and health promoting behaviors. Previously, Kobzova et al. (2015) suggested that individuals with schizotypal personality disorder have less effective social skills and lower self-esteem which could have implications for health. The current study expanded on Kobzova et al. (2015) by introducing a multi-dimensional measure of health promoting behaviors and assessing these findings in a subclinical population. A limitation addressed by authors was that schizotypy could aggravate depressive symptoms and could result in poorer

health promoting behaviors. Furthermore, the introduction of depressive symptoms will satisfy a limitation addressed by Kobzova et al. (2015) in their previous study.

Participants completed a questionnaire designed to assess at what degree the participants exhibit depressive symptoms, schizotypy traits, and engage in health promoting life-style choices and behaviors (i.e., health promotion). Depressive symptoms included items that indicate possible symptomatology found in MDD. Participants will also complete a questionnaire designed to assess at what degree the participants exhibit schizotypy. Schizotypy trait items measured positive, negative, or disorganized behaviors and cognitions. Health promoting behaviors included items such as interpersonal skills, stress, health responsibility, physical activity, nutrition, and self-actualization.

### Hypotheses

Hypothesis 1. There will be a negative relationship between schizotypy and health promoting behaviors.

Hypothesis 2. The relationship between schizotypy and health promoting behaviors will be significantly mediated by depressive symptoms.

## Method

### Participants

Participants included the general population and undergraduate students from Stephen F. Austin State University. Participants from the general population will be

recruited through Mechanical Turk (MTurk) to help reach necessary power and increase generalizability. MTurk has shown comparably reliable consistency with studies done in a standard lab setting (Buhrmester, Kwang, & Gosling, 2011). Participants recruited through MTurk will receive \$.25 for the 30-minute study. The undergraduate students will be recruited through SONA Systems and will be given course credit or extra credit for completion of the study. The MTurk sample ( $n = 158$ ) was 57% Caucasian and 54% male with an average age of 32.7 years old. Previous diagnosis in the Mturk sample was 2.5% Schizotypal Personality Disorder, 9.5% MDD, and 1.9% had been diagnosed with both Schizotypal Personality Disorder and MDD. The undergraduate sample ( $n = 187$ ) was 73% Caucasian and 82% female with an average age of 20 years old. Previous diagnosis of MDD was 11.2%; no undergraduate participant was diagnosed with Schizotypal Personality Disorder or both disorders. Following the suggestions by Fritz and MacKinnon (2007) and effect sizes obtained from Mealey et al. (2014) and Jensen et al. (2006), a sample size of 400 was required to test for mediation.

According to the DSM-5, 18 years old is the minimum age of diagnosis for personality disorders (APA, 2013). Furthermore, previous research has suggested that 26% of college students experience depressive episodes and 18% of college students experienced some type of personality disorder (Blanco et al., 2008; Lindsey, Fabiano, & Stark, 2009). The use of a college sample offers the capacity to find participants on all parts of the continuous spectrum in regard to measurement of traits.

### Measures

Schizotypal Personality Questionnaire-Brief Revised (SPQ-BR). Schizotypy was measured using the Schizotypal Personality Questionnaire-Brief Revised (SPQ-BR; Cohen, Matthews, Najolia, & Brown, 2010). The scale was revised by Cohen et al (2010) to form a more psychometrically sound brief version of the original Schizotypal Personality Questionnaire (Raine et al., 1994). Participants were asked to complete 32 questions on a 5-point Likert scale (0 = *Strongly Disagree* to 4 = *Strongly Agree*) that compose the three superordinate subscales of schizotypy: positive, negative, and disorganization. The positive symptoms superordinate subscale is composed of subscales measuring ideas of reference, social anxiety, and magical thinking. An example item from the positive subscale is, “Do you believe in telepathy (mind-reading)?” The negative symptoms superordinate subscale is composed of measures of unusual perceptions, eccentric behavior, and interpersonal relationships. An example item from the negative subscale is, “I rarely laugh and smile.” Finally, the disorganized thinking superordinate subscale is composed of measures of constricted affect and suspiciousness. An example item from the disorganization subscale is, “Do you tend to wander off the topic when having a conversation?” The survey was reliable ( $\alpha = .93$ ). See Appendix A.

Center for Epidemiology Studies Depression Scale (CES-D). Measurements of depressive symptoms will be collected through the CES-D (Radloff, 1977). The CES-D was developed for use with the general population to measure depressive symptoms experienced (i.e., feelings or behaviors) within the past week. The participants will be asked to complete 20 questions on a 4-point scale (0 = *rarely* to 3 = *most or all of the*

time) that compose four subscales. Example questions are, “*I felt depressed*” and “*I felt that everything I did was an effort.*” The reliability for the current study was,  $\alpha = .83$ . See Appendix C.

Health Promoting Lifestyle Profile – ii (HPLP- II). Health promoting behaviors were measured by the Health Promoting Lifestyle Profile II (Walker, Sechrist, & Pender, 1995). The HPLP-II is the second edition of the HPLP which was developed to test the multi-dimensional construct of health promotion (Walker et al., 1987). The HPLP-II is comprised of 52 questions on a 4-point scale (1 = *never* to 4 = *routinely*). The HPLP-II also consists of six subscales: health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management. The HPLP-II provides an overall score of health promotion, in addition to the six subscales that can also be calculated. Example questions are, “*Accept those things in my life which I can not change*” and “*Discuss my health concerns with health professionals*”. The HPLP was reliable in the current study,  $\alpha = .94$ . See Appendix D.

Health Behaviors. Health was measured through the use of a 10-item subset of questions from the Brief Risk Factor Surveillance System (BRFSS-10; Centers for Disease Control and Prevention, 2010). The BRFSS-10 had 10 questions measuring subjective general health, smoking, alcohol, fruit intake, vegetable intake, salad intake, soda pop (soft drinks) intake, and marijuana use. Example questions were, “During the past 14 days, did you smoke cigarettes every day, some days, or not at all?” and “Not including juice, how often did you eat fruit in the past 14 days?” See Appendix E.

Demographics. Self-report questions was utilized to assess age, sex, college classification (i.e., Freshman, Sophomore). Participants were also be asked to report whether they have received a formal diagnosis of SPD or MDD from a licensed psychiatrist or psychologist.

Attention checks. Questions to assess whether participants are maintaining attention were embedded throughout the survey. This was accomplished by directing the participant to select a specific answer for that specific item. An example attention check is, *“If you are paying attention, please select Strongly Disagree.”*

### Procedure

Participants in the undergraduate sample were recruited through SONA Systems, which granted course credit and/or extra credit to students in undergraduate psychology courses for participation in the study. Participants in the MTurk sample were recruited through Amazon’s Mechanical Turk program that allows payment for completion of tasks. Participants who chose to participate in the study were redirected to a Qualtrics survey in which they were asked to complete the study. Once redirected, participants were asked to electronically agree to an informed consent form (see Appendix A) before they were allowed to proceed. The HPLP-II and BRFSS-10 appeared first and second, then the SPQ-BR and CES-D were presented randomly as the last two items. The randomization order was chosen based on the possibility of biasing the HPLP answers from participants who saw a mental health questionnaire first. Items from each scale were

randomly presented as well. Attention checks were interspersed throughout the survey. Demographic questions were asked at the end of the survey. After completion of the survey, participants were debriefed (see Appendix H) and were automatically given research participation credit through SONA, or were given payment through MTurk after approval.

### Data analysis

The first hypothesis was tested using a Pearson  $r$  correlation. The analysis tested schizotypy (SPQ-BR total) and self-care (HPLP-II total).

The second hypothesis was tested through a simple mediation model (Figure 1.). The simple mediation model includes three relationships and two effect pathways (Hayes, 2013). The three relationships are:  $a$ , schizotypy (predictor) to the depressive symptoms (mediator);  $b$ , depressive symptoms to self-care (outcome); and  $c'$ , schizotypy to self-care. The two pathways that are included in the total effect ( $c$ ; the relationship between predictor and outcome variables) are the direct effect, how schizotypy predicts self-care when controlling for depressive symptoms, and the indirect effect, the way in which schizotypy influences depressive symptoms and depressive symptoms influence self-care (Hayes, 2009).

The indirect effect of depressive symptoms was tested through PROCESS, an SPSS macro developed by Hayes (2013). PROCESS uses ordinary least squares regression to infer a linear relationship. A theoretical sample is formed by confidence

interval bootstrapping (no less than 5,000 resamples are recommended; Hayes, 2009). Bootstrapping allows for inferences based on the effects rather than on the sample distribution. Given a simple mediation model, the indirect effect will be measured as a proportion of how much it explains of the total effect when compared to the direct effect (complete mediation would explain the entire effect; Preacher & Kelley, 2011).

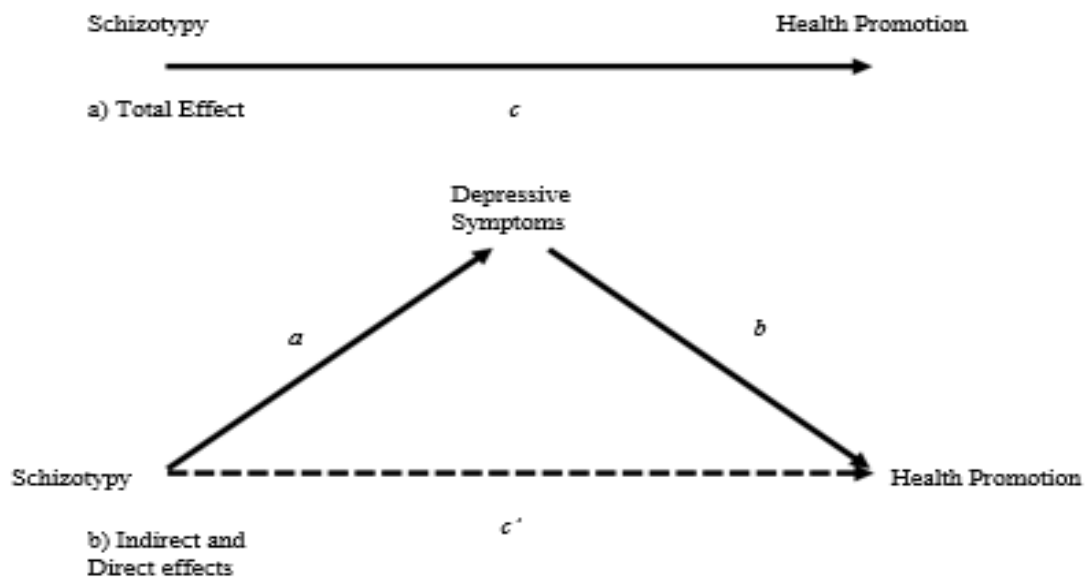


Figure 1. Mediation model being tested.

## Results

### Data Screening

The data were combined across samples to increase power for analysis. Group differences were observed between the Mturk and SONA population for the SPQ positive



subscale, the CESD interpersonal subscale, the HPLP total, and all HPLP subscales. Two participants were removed for failure to complete the survey. Fifty-five participants were removed for failing at least one attention check. Nine participants were removed due to duplicate IP addresses. Six participants were removed due to non-differential responses. The remaining combined sample contained 345 participants. Missing values occurred in 0.23% of responses. Missing values were addressed with series mean insertion.

### Assumptions

Data assumptions were first examined to see if Pearson's correlations would produce accurate results. Both variables (Schizotypy and health promotion) were continuous measures. There were no observed outliers, all responses fell within  $\pm 3.29$  standard deviations of the mean and the variables were normally distributed with both skewness and kurtosis falling between  $\pm 1$  and non-significant Shapiro-Wilkes test. The assumption of linearity was not met. The relationship between schizotypy and health promotion is quadratic/curvilinear in nature.

A Shapiro-Wilkes test was conducted to determine the normality of the variables. The Shapiro-Wilkes test for depressive symptoms was significant. To adjust, depressive symptoms scores were standardized with  $z$ -Scores. The Shapiro-Wilkes test was run again and found non-significant. In addition to standardizing depressive symptoms, the bootstrapping method accounts for samples being non-parametric (not from a normal distribution). Skewness and kurtosis for all variables were within  $\pm 1$ . No individual

response scored outside of  $\pm 3.29$  standard deviations from the mean. Before proceeding to the full data analysis plan, multivariate outliers were checked. Multivariate outliers could pose a problem if they are values that could distort the data through leverage or discrepancy in the model. All participants fell within the acceptable ranges of Mahalanobis ( $< 13.82$ ) and Cook's distance ( $< 1$ ). Multivariate normality was checked after completing univariate normality by plotting the standardized residuals on a histogram with a normal distribution curve, and skewness and kurtosis statistics for the standardized residuals. The residuals were normally distributed with both skewness and kurtosis being less than 1. A visual inspection of the P-P plot confirmed this assumption. The assumption of independence of errors (that errors were not associated with one another) was met; all paths scored within acceptable ranges (1.5, 2.5). Multicollinearity was also assessed and it was determined there was no multicollinearity present in the final regression model (Tolerance  $> .2$ , VIF  $< 10$ ).

#### Depressive symptoms mediates the relation of schizotypy and health promotion

An initial analysis of the relationship between schizotypy and health promoting behaviors was tested through a Pearson bivariate correlation. Schizotypy and health promoting behaviors were not significantly correlated,  $r(345) = -.015, p = .775$ . Probability values of .05 or lower ( $p < .05$ ) were considered significant. Next, the possibility that depressive symptoms mediated the effects of schizotypy and health promoting behaviors was examined. This was explored utilizing regression pathways to determine the mediation model (see Figure 2.) The total effect was non-significant,  $b = -$

.000, SE = .001, 95% CI = -.003, .002 (see Figure 2; pathway *c*). The confidence intervals for comparing the model to the mean contained 0 and were considered non-significant; if the confidence intervals did not contain 0, the test would have been considered significant. The direct effect of schizotypy on health promoting behavior (without the variance of depressive symptoms) was significant,  $b = .003$ , SE = .001, 95% CI = .001, .006 (see Figure 2; pathway *c'*). The indirect effect of schizotypy on health promoting behaviors through depressive symptoms was significant,  $b = -.004$ , SE = .001, 95% CI = -.006, -.002 (see Figure 2; pathways  $a * b$ ). So, in this model, depression mediates the relationship between schizotypy and health promotion.

#### Mediation exploring the curvilinear relationship of schizotypy and health promotion

The relationship between schizotypy and health promotion is quadratic/curvilinear in nature with a 'U' shaped distribution (See Figure 3.). Two additional mediation models were employed in order to further probe the results of depressive symptoms mediating the relationship between schizotypy and health promotion. The two models consisted of schizotypy low (all values below the inflection point of the quadratic equation ( $SPQ < 90.26$ ;  $n = 166$ )) and schizotypy high (all values above the inflection point of the quadratic equation ( $SPQ > 90.26$ ;  $n = 179$ )).

The mediation model for low schizotypy and health promotion with depressive symptoms acting as a mediator had a significant total effect (path *c*) of,  $b = -.007$ , SE = .002, 95% CI = -.011, -.002. The direct effect (path *c'*) was non-significant,  $b = -.003$ , SE = .003, 95% CI = -.008, .002. The indirect effect (path *ab*) was significant,  $b = -.004$ , SE

= .001, 95% CI = -.014, -.003. This model showed that higher values of schizotypy (approaching inflection point) predict lower health promotion.

The mediation model for schizotypy high and health promotion with depressive symptoms acting as the mediator had a significant total effect (path  $c$ ) of,  $b = .008$ ,  $SE = .003$ , 95% CI = .002, .014. The direct effect (path  $c'$ ) was significant,  $b = .011$ ,  $SE = .003$ , 95% CI = .005, .017. The indirect effect (path  $ab$ ) was significant,  $b = -.004$ ,  $SE = .002$ , 95% CI = -.007, -.001. This model showed that higher values of schizotypy (beyond the sample average) predict higher health promotion.

In accordance to the curvilinear relationship, the difference in the previous two mediation models revolved around the total and direct effect changing direction from schizotypy low having a negative relationship with health promotion and schizotypy high having a positive relationship to health promotion.

#### Depressive symptoms mediate schizotypy's relation to stress management.

An exploratory analysis was conducted through an additional mediation model of schizotypy through depressive symptoms on stress management. The total effect was not significant (see Figure 4; pathway  $c$ ). The direct effect of schizotypy on stress management (without the variance of depressive symptoms) was significant,  $b = .004$ ,  $SE = .002$ , 95% CI = .001, .008 (see Figure 4; pathway  $c'$ ). The indirect effect of schizotypy on the stress management subscale through depressive symptoms was significant,  $b = -.005$ ,  $SE = .001$ , 95% CI = -.007, -.003 (see Figure 4; pathways  $a * b$ ). Therefore, depressive symptoms mediated the relationship between schizotypy and stress management. The

mediation model followed a similar pattern to the first model of schizotypy through depressive symptoms predicting health promotion.

Stress management also had a curvilinear relationship with schizotypy. To further explore this, two additional mediation models were used with low schizotypy ( $SPQ < 90.26$ ) and high schizotypy ( $SPQ > 90.26$ ). The total effect (path  $c$ ) of the model including low schizotypy was significant,  $b = -.009$ ,  $SE = .003$ ,  $95\% CI = -.015, -.004$ . The direct effect (path  $c'$ ) was not significant,  $b = -.004$ ,  $SE = .003$ ,  $95\% CI = -.01, .002$ . The indirect effect (path  $ab$ ) was significant,  $b = -.006$ ,  $SE = .001$ ,  $95\% CI = -.009, -.003$ .

The model including high schizotypy had a significant total effect (path  $c$ ),  $b = .008$ ,  $SE = .003$ ,  $95\% CI = .002, .015$ . The direct effect (path  $c'$ ) was also significant,  $b = .012$ ,  $SE = .003$ ,  $95\% CI = .005, .019$ . The indirect effect (path  $ab$ ) was significant,  $b = -.004$ ,  $SE = .002$ ,  $95\% CI = -.007, -.001$ . The previous two mediation models mirrored the same pattern (including significance of effects and directionality change) of the mediation models used to explore the curvilinear relationship of schizotypy and health promotion.

#### Depressive symptoms predict interpersonal relationships

Next, a multiple regression was run with depressive symptoms and schizotypy as predictors on interpersonal relationships (having fulfilling social interaction). The regression model was significant,  $F(2,342) = 7.02$ ,  $p < .001$ ,  $r^2 = .04$ . Depressive symptoms were a significant negative predictor,  $\beta = -0.195$ ,  $t(345) = -2.91$ ,  $p = .004$ , where in as depressive symptom scores increased, interpersonal relationship scores

decreased. Schizotypy was not a significant predictor in the model and also did not exhibit a curvilinear relationship with interpersonal relationships, as might have been expected due to previous results.

#### Partial correlation of schizotypy and health promotion

Further analyses were conducted to explore the original hypotheses. A partial correlation was conducted in accordance to hypothesis 1; depressive symptoms was introduced as a control for the relationship between schizotypy and health promotion. The partial correlation was significant but weak,  $r(342) = .128, p < .05$ .

#### Positive schizotypy trait subscale relates to health promotion

Multiple regressions were also run with the three superordinate scales of schizotypy (Positive, Negative, and Disorganization) and depressive symptoms as predictors of health promotion and the related subscales. Positive schizotypy subscale positively predicted health promotion (total) and each health subscale (health responsibility, physical activity, nutrition, self-actualization, stress management, and interpersonal relationships) (See Table 1.).

#### Health promotion, schizotypy, depressive symptoms and health

Finally, to help validate the use of the health promotion scale (HPLP), Pearson  $r$  and Spearman  $\rho$  correlations were conducted to show the relatedness of health promotion to a survey of actual health behaviors (BRFSS-10). Subjective overall health was moderately and positively correlated with health promotion  $\rho(345) = .403, p < .001$  (see Table 2.). Fruit intake was weakly and positively correlated with health promotion  $\rho(345)$

= .273,  $p < .001$ . Salad intake was moderately and positively correlated with health promotion  $\rho(345) = .305, p < .001$ . Smoking, soda pop intake, alcohol intake and marijuana use were all non-significant correlates of health promotion. Health promotion correlated in the expected direction for all significant results on the health outcome measurements.

Additionally, schizotypy and depressive symptoms also correlated with some of the health-related items. Schizotypy correlated weakly and positively with marijuana usage,  $r(345) = .132, p < .05$  and with soda pop intake  $\rho(344) = .15, p < .01$ . Schizotypy did not significantly correlate with subjective overall health, smoking, juice intake, alcohol intake, vegetable intake or salad intake. Depressive symptoms negatively and weakly correlated with subjective overall health,  $\rho(345) = -.178, p < .01$ . Additionally, depressive symptoms negatively and weakly correlated with vegetable intake  $\rho(343) = -.123, p < .05$ . Depressive symptoms did not significantly correlate with smoking, juice intake, soda pop intake, marijuana intake, salad intake, or alcohol intake.

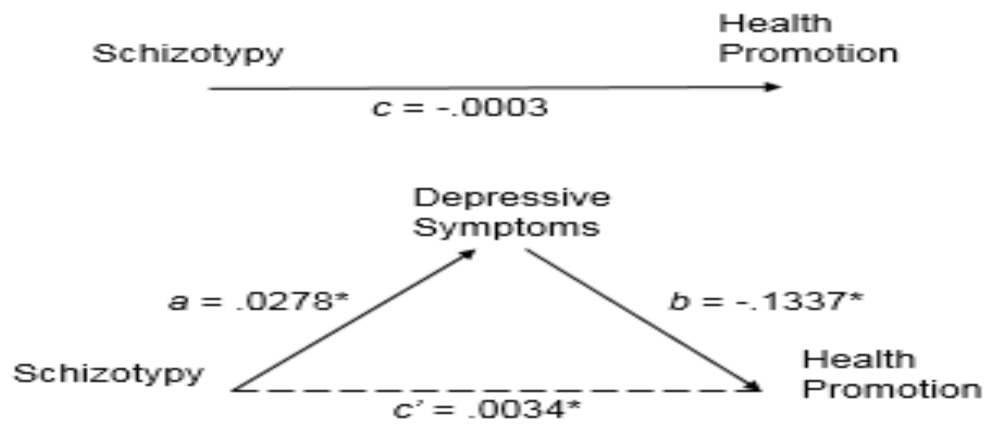


Figure 2. Displays mediation model of schizotypy through depressive symptoms predicting health promotion. Unstandardized beta weights are shown. \* means significant,  $\alpha = .05$

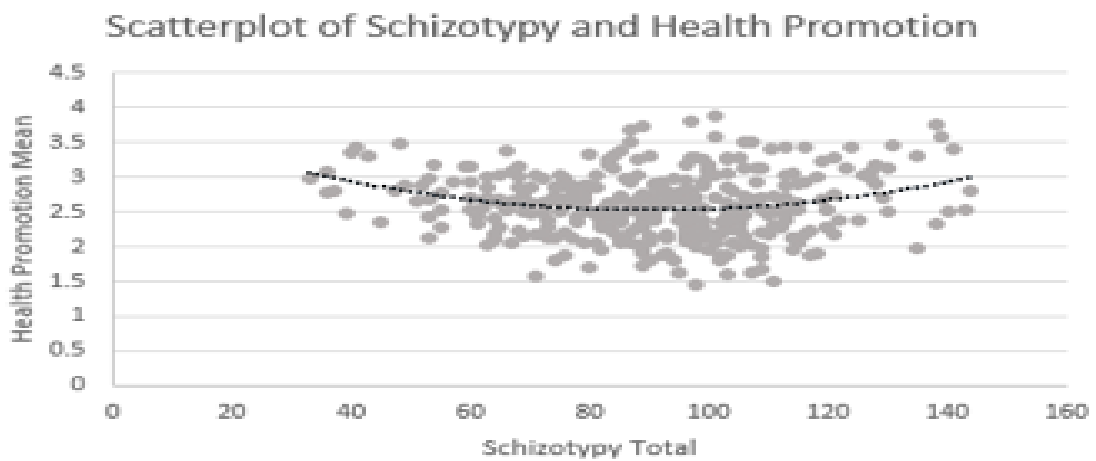


Figure 3. Scatterplot of schizotypy and health promotion showing the quadratic relationship of the two variables. The quadratic expression:  $0.0002x^2 - 0.0296x + 3.8949 = y$



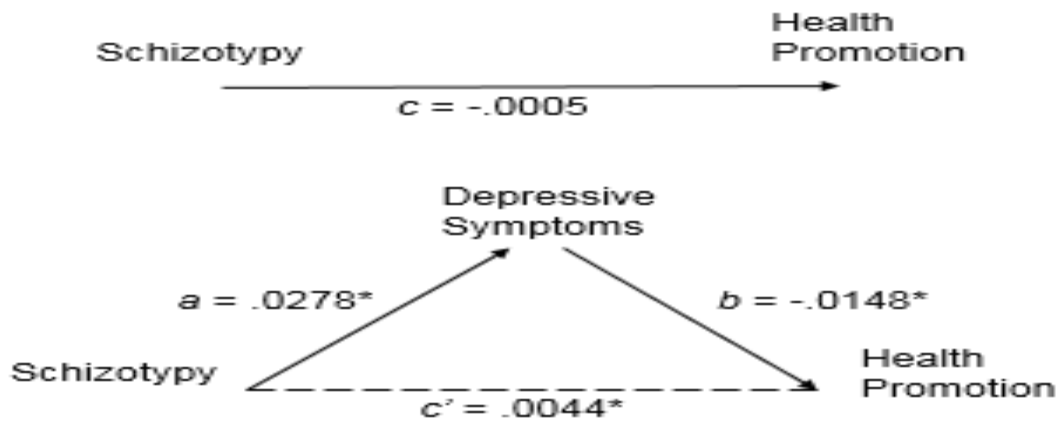


Figure 4. Displays mediation model of schizotypy through depressive symptoms predicting stress management. Unstandardized beta weights are shown. \* means significant,  $\alpha = .05$

TABLE 1. Multiple regression of achievement subscales and depressive symptoms on health promotion total and subscales

Variable	Total			Health Responsibility			Physical Activity			Nutrition		
	b	SE	$\beta$	b	SE	$\beta$	b	SE	$\beta$	b	SE	$\beta$
Positive	.02	.003	.467***	.03	.004	.508***	.026	.004	.442***	.021	.004	.406***
Negative	-.016	.004	-.291***	-.018	.005	-.231***	-.012	.005	-.153*	-.003	.005	-.043
Disorganization	-.007	.005	-.097	-.018	.007	.185*	-.021	.007	-.220**	-.021	.006	-.240**
Depressive Symptoms	-.094	.03	-.2**	-.02	.043	-.031	-.064	.043	-.098	-.044	.039	-.076
R <sup>2</sup>	.183			.15			.112			.085		
F change in R <sup>2</sup>	19.072***			14.942***			10.745***			7.943***		
Variable	Spiritual Growth			Interpersonal Relationships			Stress Management					
	b	SE	$\beta$	b	SE	$\beta$	b	SE	$\beta$			
Positive	0.017	0.004	.307***	.007	.004	.134*	.015	.004	.305***			
Negative	-.023	0.005	-.316***	-.035	.005	-.489***	-.002	.004	-.037			
Disorganization	0.004	0.006	.047	.021	.006	.239**	-.008	.006	-.100			
Depressive Symptoms	-.021	0.037	-.360***	-.06	.037	-.1	-.161	.036	-.295***			
R <sup>2</sup>	0.242			.201			.097					
F change in R <sup>2</sup>	27.064***			21.423***			9.161***					

Note: Positive, Negative, and Disorganization were all subscales of the SPQ. Depressive symptoms were standardized through Z-scores.

\*p < .05. \*\* p < .01. \*\*\* p < .001

*Table 2. Correlations between Health and Health Promotion (HPLP), Schizotypy (SPQ), and Depressive Symptoms (DS).*

	HPLP	SPQ	DS
General Health	.403***	-0.082	-.178*
Smoking	0.067	0.083	0.049
Alcohol	0.078	0.071	0.061
Fruit	.273**	-0.072	-0.062
Salad	.305**	0.072	0.031
Vegetables	.235**	0.098	-.123*
Soda Pop	-0.085	.150**	0.084
Marijuana	-0.079	0.132	-0.006

Note: General health, smoking, fruit, salad, vegetables, and soda pop were reported as Spearman Rho's with their corresponding  $p$  values. Alcohol and marijuana were reported as Pearson correlations with their corresponding  $r$  values. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

## Discussion

### Depressive symptoms mediates the relationship between schizotypy and HP

The current study examined the relationship between schizotypy and health promotion and how depressive symptoms may influence this relationship. Schizotypy is a multidimensional personality trait that encapsulates behaviors including disorganized speech, delusions or false beliefs, lack of close relationships, and restricted affect. Likewise, persons exhibiting depressive symptoms may feel unhappy, have diminished verbalizations, and have less energy. While, these two traits are known to significantly impact quality of life, it is unknown how they may affect health promoting behaviors (Yang, Lin, Wang, & Lu, 2017). Health promoting behaviors include actions such as

exercising routinely, eating a healthy diet, maintaining strong social ties and being responsible for one's own health. It was hypothesized that schizotypy would negatively relate to health promoting behaviors. In the current study, the initial analysis did not reveal a correlation between schizotypy scores and health promotion behaviors.

Next, the mediating effect of depressive symptoms on the relationship between schizotypy and health promotion was examined. The association of schizotypy to depressive symptoms and then depressive symptoms to health promotion was examined in a mediation model. Results of the model suggested that there was a negative indirect effect of schizotypy through depressive symptoms. In other words, depressive symptoms negatively impacted schizotypy's relation to health promotion.

Additionally, the correlation between schizotypy and health promotion was examined as a partial correlation with depressive symptoms as the covariate. The partial correlation was significant as suggested by the mediation model. So, when depressive symptoms were controlled for, schizotypy was found to be a positive predictor of health promotion. Though, in the overall analysis, the overwhelming negative effect of depressive symptoms overrode the positive relationship between schizotypy on health promotion in the overall effect.

Furthermore, there was a curvilinear relationship between schizotypy and health promotion. This was explored through additional mediational models with depressive symptoms as the mediator. The first model was on the lower half of schizotypy scores which suggested that higher values of schizotypy (approaching inflection point) predict

lower health promotion. Interestingly, the upper half of schizotypy scores had an opposite effect in that higher values of schizotypy (approaching the maximum value) predicted higher health promotion. Therefore, as schizotypy diverges from the mean, schizotypy positively predicts health promotion.

#### Aspects of health promotion are impacted by schizotypy and depressive symptoms

It may be possible that schizotypy and depressive symptoms affect specific aspects of health promotion. Wang et al. (2017) suggested that experiencing high levels of schizotypy, such as magical ideation or social anhedonia, could lead to increased levels of stress. Similarly, stress generation, from an inability to manage stress, is associated with high levels of depression (Shih & Eberhart, 2008). As schizotypy and depressive symptoms are highly correlated, a mediation model was utilized to examine whether depressive symptoms could influence the relationship between schizotypy and stress management. The results showed a similar pattern to the original mediation model of schizotypy and health promotion mediated by depressive symptoms. Depressive symptoms were seen to negatively influence the relationship between schizotypy and stress management through the indirect effect. Interestingly, the relationship between schizotypy and stress management was also curvilinear in the same pattern as above, with low and high values of schizotypy having the highest degrees of stress management (i.e., increased ability to effectively manage stress). Similarly, two additional mediation models explored the findings and found results akin to health promotion. The mediating effect stayed consistent across both lower and higher sections of schizotypy and the direct

effect mirrored a directionality change in the relationship from negative to positive when passing the inflection point.

#### Positive symptoms relationship with health promotion

Like most traits, schizotypy is complex and multifaceted. Schizotypy traits may be divided into positive traits (those traits not typically exhibited by the average person including, grandiosity and paranormal experiences), negative traits (those exhibited in typical persons but absent in those with high levels of schizotypy including social anhedonia, avolition, or lack of close relationships), and cognitive disorganization (trouble concentrating or maintaining a schedule). It may be that different aspects of schizotypy (subscales) may be more strongly associated with health promotion than others. For example, research by Goulding (2005) suggests that paranormal experiences, often observed in schizotypy, did not lead to more medical care or therapy than what would be expected from a typical population. However, this contrasts with Felker et al. (1996), who found that disorganized individuals might live less healthy lifestyles. Additionally, positive schizophrenia trait symptoms have been negatively associated with Body-Mass Index (BMI) scores suggesting that higher schizotypy scores would correspond with lower BMI scores. (Caravaggio et al., 2017). The contrasting results between Goulding (2005), Felker et al., (1996), and Caravaggio et al., (2017) suggest that the nature of the relationship between schizotypy and aspects of health or health promotion may be complex and differences within the three subscales of schizotypy may be important.

In order to examine the effects of the positive trait aspects of schizotypy, an additional analysis was performed. Higher positive schizotypy subscale scores predicted increased health responsibility (i.e., seeking medical advice when appropriate, learning how to live a healthy lifestyle). However, negative and disorganized subscales of schizotypy, and depressive symptoms did not predict aspects of health promotion as strongly or at all. Speculatively, taken together with the results of the mediation model for high scores on schizotypy (see above), it may be that positive schizotypy behaviors lead to increased health responsibility from a perspective that persons who score higher on the positive subscale could be more skeptical and thus consistently request more information from medical services in the form of follow-ups and second opinions. The current study suggests that when depressive symptoms are accounted for, schizotypy was not associated with interpersonal relationship difficulties (i.e., finding fulfilling relationships).

The current study's examination of schizotypy and health promotion supports the findings by Goulding (2005) that persons with high schizotypy scores can be as healthy as the typical population, especially given the curvilinear relationship the current study observed. As expected from previous literature, schizotypy and depressive symptoms were strongly related (APA, 2013; Campellone et al., 2016; Fonseca-Pedrero, et al., 2011; Jahn et al., 2016). The previous studies, as was the current study, were correlational; however, the causal assumption used in a mediational model and the previous results, suggests that schizotypy may precede comorbid depressive symptoms.

Depressive symptoms were negatively related to health promotion which supports previous literature on the effect of depressive symptoms on several of the underlying facets of health promotion including diet, physical activity, interpersonal relationships, and stress management (Hammen & Shih, 2008; Klein et al., 2016; Liu et al., 2017). For example, Klein et al. (2016) found that individuals with chronic depression demonstrated less effective adaptive social skills compared to a non-depressed sample. Additionally, Berndt et al. (1982) found that in a sample of adolescents, depressive symptoms and self-actualization were negatively correlated. Similarly, the results of the current study suggested that depressive symptoms appeared to affect multiple health related behaviors including self-actualization and stress management.

### Health Behaviors

The assumption that a person exhibiting health promoting behaviors would also have healthier lifestyles was examined. Subjective health levels were positively correlated with overall health promotion. Individuals who thought they were in good health were more likely to score high on health promotion. Additionally, health promotion was also positively associated with fruit and salad intake. Those high on health promotion were more likely to eat healthier. Furthermore, schizotypy positively correlated with marijuana use which adds to Cohen et al.'s (2011) study comparing low, medium, and high groups of schizotypy on the use of marijuana which demonstrated that persons in the high group were more likely to use marijuana. Additionally, depressive symptoms were negatively correlated with subjective overall health. Previous research by



Mokruue and Acri (2015) also suggested a similar link between subjective health and depressive symptoms.

### Implications of the mediation

The negative indirect effect of schizotypy through depressive symptoms predicting health promotion suggests that future interventions on persons that are high on schizotypy may be optimized by focusing on depressive symptoms. The indirect effect was the strongest effect in the mediation model, suggesting that depressive symptoms is the most problematic attribute that serves to exacerbate deficits in health promoting behaviors. Statistical removal of depressive symptoms suggests that persons higher on schizotypy would have higher health promotion. Furthermore, an additional mediation model was used to determine the effect that depressive symptoms had on the relationship between schizotypy and stress management. We saw that depressive symptoms concealed the positive relationship that was associated between higher levels of schizotypy and stress management. Regardless of the curvilinear relationships that schizotypy exhibited, the mediating effect of depressive symptoms was present in multiple measures of schizotypy and health promotion.

Kobzova and colleagues (2015) suggested that deficits in health promotion may exacerbate the depressive symptoms seen in persons with high schizotypy. However, the current research suggests that depressive symptoms pacify the positive effect of schizotypy's relationship with health promotion at higher levels. Furthermore, the present research is in congruence with Jahn and colleagues (2016) mediation model that showed

depressive symptoms mediated schizotypy and suicidal risk; however, the researchers made no comment of possible non-linear relationships. Additionally, in their study, the direct effect of schizotypy without depressive symptoms predicting suicidal risk was non-significant. In other words, schizotypy was not directly associated with suicidal risks when depressive symptoms were controlled. Comparatively, Jahn et al (2016) also suggested that depressive symptoms were a main factor of outcomes associated with schizotypy. Therefore, results of the current study may better elucidate the relationship between schizotypy and depression.

### Limitations

Undoubtedly, the nature of the relationship between depression and schizotypy is complex. The current study did not account for variables such as social anxiety or stress that have been previously suggested to mediate relationships between schizotypy and outcome behaviors. The potential positive relationships between schizotypy, social anxiety and stress suggests that including a mediational model with only depressive symptoms may not be the best representation of the relationship between schizotypy and health promotion. As explained by the current studies effect size for the mediation effect ( $ab_{cs} = -0.175$ ) compared to a previous mediation effect size ( $ab_{cs} = 0.107$ ; Jahn et al., 2016); this difference in the effect sizes could be that depressive symptoms in the current study may encompass variance that is more fully explained by other mediators in previous research. Also, the sample was non-clinical which broadens generalizability but limits the impact the study's implications for a clinical population. Lastly, results should

be approached with caution as the nature of the study was correlational and may not be applicable to clinical populations.

### Future Directions

Future research should take into consideration the influence other variables may have on the existing relationship between schizotypy, depressive symptoms and health promotion. Use of a multiple mediation model to try and accurately account for other known mediators of schizotypy and schizotypy-associated outcomes may present a better explanation of the true relationship between schizotypy and health promotion.

Furthermore, a longitudinal study could help explain the impact that having consistently high or moderate levels of schizotypy have on health promotion, and better clarify the curvilinear relationship that was apparent in the current study. Lastly, the current study suggests that future research should consider depressive symptoms when studying schizotypy and lifestyle-related behaviors as an important covariate or mediator.

### Conclusion

The current study examined the relationship between schizotypy and health promotion with depressive symptoms serving as a mediator. Results indicated that depressive symptoms account for a negative indirect effect of schizotypy on health promotion. Furthermore, it was found that when depressive symptoms are accounted for, schizotypy has an overall positive association with health promotion. The results present a reasoning as to why depressive symptoms may be more crucial to resolve than personality issues such as schizotypy.

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## Appendix A

### Informed Consent

#### INFORMED CONSENT

##### **Investigator's statement**

**PURPOSE:** The purpose of this study is to examine the relationship between personality and lifestyle behaviors.

**DURATION:** The length of time you will be involved with this study is approximately 20-30 minutes.

**PROCEDURES:** If you agree to be in this study, we will ask for you to complete four questionnaires. There are no right or wrong answers, and you can leave a question blank if you feel uncomfortable answering it. You may discontinue answering questions at any time.

**RISKS:** No risks are anticipated. However, though unlikely, it is possible that in certain instances, participants with depressive symptoms may experience some discomfort or depressive symptoms after completing the study. Participants will be advised that they may choose to leave questions blank and/or discontinue completing the study immediately if they feel uncomfortable answering a question. If discomfort or a depressive state persists, please contact one of the numbers located on the debriefing sheet for referral information.

**CONFIDENTIALITY:** The records of this study will be kept private and confidential information that will make it possible to identify a participant. This number will not be tied to any type of identifying information about you. Once collected, all data will be kept in secured files, in accord with the standards of Stephen F. Austin State University (SFASU), federal regulations, and the American Psychological Association. In addition, please remember that the researchers are not interested in any individual person's responses. We are interested in how people in general respond to the measures.

**VOLUNTARY NATURE OF THE STUDY:** Your participation in this study is voluntary. In addition, you may choose to not respond to individual items in the survey. Your decision whether or not to participate will not affect your current or future relations with SFASU nor any of its representatives. If you decide to participate in this study, you are free to withdraw from the study at any time without penalty and without affecting those relationships.

##### **CONTACTS AND QUESTIONS:**

Michael Rice: ricem1@jacks.sfasu.edu

Dr. Nathan Sparkman: sparkmann1@sfasu.edu

If you have questions or concerns regarding this study and would like to speak with someone other than the researchers, you may contact The Office of Research and Sponsored Programs at (936) 468-6606.

**BENEFITS:** Users from Mechanical Turk will receive \$.25 for completion of the study.

#### STATEMENT OF CONSENT

The procedures of this study have been explained to me and my questions have been addressed. The information that I provide is confidential and will be used for research purposes only. I am 18 years of age and I understand that my participation is voluntary and that I may withdraw anytime without penalty. I have read the information in this consent form and I agree to participate in the study.

**Signature of Participant: (Participant will click confirm as their electronic signature)**

## Appendix B

### Schizotypal Personality Questionnaire – Brief Revised (SPQ-BR)

1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*

1. I sometimes avoid going to places where there will be many people because I will get anxious.
2. Other people see me as slightly eccentric (odd).
3. Do you believe in telepathy (mind-reading)?
4. People sometimes comment on my unusual mannerisms and habits.
5. I sometimes jump quickly from one topic to another when speaking.
6. I am not good at expressing my true feelings by the way I talk and look.
7. When you look at a person or yourself in a mirror, have you ever seen the face change right before your eyes?
8. I sometimes forget what I am trying to say.
9. I rarely laugh and smile.
10. Do you sometimes get concerned that friends or co-workers are not really loyal or trustworthy?
11. I get anxious when meeting people for the first time.
12. Do you believe in clairvoyance (psychic forces, fortune telling)?
13. I often hear a voice speaking my thoughts aloud.
14. I find it hard to be emotionally close to other people
15. I often ramble on too much when speaking.
16. Do you often feel nervous when you are in a group of unfamiliar people?
17. Do you feel that there is no one you are really close to outside of your immediate family, or people you can confide in or talk to about personal problems?
18. When shopping do you get the feeling that other people are taking notice of you?
19. I feel very uncomfortable in social situations involving unfamiliar people.
20. Have you had experiences with astrology, see the future, UFO's, ESP, or a sixth sense?
21. Do everyday things seem unusually large or small?
22. Have you ever felt that you are communicating with another person telepathically (by mind-reading)?
23. Do you tend to wander off the topic when having a conversation?
24. I often feel that others have it in for me.
25. Do you sometimes feel that other people are watching you?
26. Do you sometimes feel that people are talking about you?
27. Are your thoughts sometimes so strong that you can almost hear them?
28. Do you often have to keep an eye out to stop people from taking advantage of you?

29. Do you feel that you cannot get “close” to people.
30. I am an odd, unusual person.
31. I have some eccentric (odd) habits.
32. I tend to keep my feelings to myself.

## Appendix C

### Center for Epidemiology Studies – Depression Scale (CES-D)

Instructions: Below is a list of the ways you might have felt or behaved. Please report how often you have felt this way during the past week.

Scores were 0 = Rarely or none of the time (less than 1 day), 1 = Some or a little of the time (1-2 days), Occasionally or a moderate amount of time (3-4 days), or Most or all the time (5-7days)

- 1 I was bothered by things that usually don't bother me.
- 2 I did not feel like eating; my appetite was poor.  
I felt that I could not shake off the blues even with the help from my
- 3 family.
- 4 I felt I was just as good as other people.
- 5 I had trouble keeping my mind on what I was doing.
- 6 I felt depressed.
- 7 I felt that everything I did was an effort.
- 8 I felt hopeful about the future.
- 9 I thought my life had been a failure.
- 10 I felt fearful.
- 11 My sleep was restless.
- 12 I was happy.
- 13 I talked less than usual.
- 14 I felt lonely.
- 15 People were unfriendly.
- 16 I enjoyed life.
- 17 I had crying spells.
- 18 I felt sad.
- 19 I felt that people dislike me.
- 20 I could not get "going".

## Appendix D

### Health Promoting Lifestyle Profile – II (HPLP-II)

**DIRECTIONS:** This questionnaire contains statements about your *present* way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behavior by selecting: Never, Sometimes, Often, or Routinely

1. Discuss my problems and concerns with people close to me.
2. Choose a diet low in fat, saturated fat, and cholesterol.
3. Report any unusual signs or symptoms to a physician or other health professional.
4. Follow a planned exercise program.
5. Get enough sleep.
6. Feel I am growing and changing in positive ways.
7. Praise other people easily for their achievements.
8. Limit use of sugars and food containing sugar (sweets).
9. Read or watch TV programs about improving health.
10. Exercise vigorously for 20 or more minute at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber).
11. Take some time for relaxation each day.
12. Believe that my life has purpose.
13. Maintain meaningful and fulfilling relationships with others.
14. Eat 6-11 servings of bread, cereal, rice and pasta each day.
15. Question health professionals in order to understand their instructions.
16. Take part in light to moderate physical activity (such as sustained walking 30-40 minutes 5 or more times a week).
17. Accept those things in my life which I can not change.
18. Look forward to the future.
19. Spend time with close friends.
20. Eat 2-4 servings of fruit each day.
21. Get a second opinion when I question my health care provider's advice.
22. Take part in leisure-time (recreational) physical activities (such as swimming, dancing, bicycling).
23. Concentrate on pleasant thoughts at bedtime.
24. Feel content and at peace with myself.
25. Find it easy to show concern, love and warmth to others.
26. Eat 3-5 servings of vegetables each day.
27. Discuss my health concerns with health professionals.
28. Do stretching exercises at least 3 times per week.

29. Use specific methods to control my stress.
30. Work toward long-term goals in my life.
31. Touch and am touched by people I care about.
32. Eat 2-3 servings of milk, yogurt or cheese each day.
33. Inspect my body at least monthly for physical changes/ danger signs.
34. Get exercise during usual daily activities (such as walking during lunch, using stairs instead of elevators, parking car away from destination and walking).
35. Balance time between work and play.
36. Find each day interesting and challenging.
37. Find ways to meet my needs for intimacy.
38. Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day.
39. Ask for information from health professionals about how to take good care of myself.
40. Check my pulse rate when exercising.
41. Practice relaxation or meditation for 15-20 minutes daily.
42. Am aware of what is important to me in life.
43. Get support from a network of caring people.
44. Read labels to identify nutrients, fats, and sodium content in packaged food.
45. Attend educational programs on personal health care.
46. Reach my target heart rate when exercising.
47. Pace myself to prevent tiredness.
48. Feel connected with some force greater than myself.
49. Settle conflicts with others through discussion and compromise.
50. Eat breakfast.
51. Seek guidance or counseling when necessary.
52. Expose myself to new experiences and challenges.



Appendix E  
Health (BRFSS-10)

1. Would you say that in general your health is
  - a. Excellent
  - b. Very good
  - c. Good
  - d. Fair
  - e. Poor
2. Have you smoked at least 100 cigarettes in your entire life (5 packs = 100 cigarettes)
  - a. Yes
  - b. No
  - c. Don't know / Not sure
3. During the past 14 days, did you smoke cigarettes every day, some days or not at all?
  - a. Every day
  - b. Some days
  - c. Not at all
  - d. Don't know / not sure
4. During the past 14 days, how many days per week or per month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor?
  - a. \_\_\_ Drinks in the past 14 days.
  - b. No drinks in past 30 days
  - c. Don't know / not sure
5. During the past 14 days, on the days when you drank, about how many drinks did you drink on the average? (One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor)
  - a. \_\_\_ Number of drinks per day
  - b. Don't know / not sure
6. Not including juice, how often did you eat fruit in the past 14 days?
  - a. 14 or more times
  - b. 7-13 times
  - c. 1-6 times
  - d. Not at all

7. How often did you eat a green leafy or lettuce salad, with or without other vegetables in the past 14 days?
  - a. 14 or more times
  - b. 7-13 times
  - c. 1-6 times
  - d. Not at all
8. Not including salads, how often did you eat other vegetables in the past 14 days??
  - a. 14 or more times
  - b. 7-13 times
  - c. 1-6 times
  - d. Not at all
9. During the past 14 days, how often did you drink regular soda or pop that contains sugar? Do not include diet soda.
  - a. 14 or more times
  - b. 7-13 times
  - c. 1-6 times
  - d. Not at all
10. During the past 14 days, on how many days did you use marijuana or hashish?
  - a. \_\_\_ Number of Days

## Appendix F

### Demographics

Please provide the following information by indicating your answer for each question:

Sex:

- Male
- Female
- Other
- Prefer not to answer

Age (in years):

I would describe my ethnicity as:

- Hispanic or Latino
- Not Hispanic or Latino

I would describe my race as:

- American Indian/Alaska Native
- Asian
- Native Hawaiian or Other Pacific Islander
- Black or African American
- White or Caucasian
- More than one race
- Unknown or Not Reported

My academic standing is:

- Freshman
- Sophomore
- Junior
- Senior
- Graduate Student
- Other

Major:

My highest degree of education is:

- Professional or Doctoral degree
- Graduate degree
- Bachelors
- Some college/ Technical school
- High school degree or equivalent
- Did not complete high school

Monthly income of household:

- \$0 - 19,999
- \$20,000 – 39,999
- \$40,000 – 74,999
- \$75,000 – 149,999
- \$150,000 or more

If you had to guess the purpose of this study, what would you guess is the purpose?

Is there anything about you or your recent experiences that may have affected your responses in this study?

Have you been previously diagnosed by a licensed professional (Psychologist or Psychiatrist) as having Major Depressive Disorder and/or Schizotypal Personality Disorder

- No
- Yes, Schizotypal Personality Disorder
- Yes, Major Depressive Disorder
- Yes, both

## Appendix G

### Debrief

#### Debrief Sheet

Thank you for participating in this study. In this study we are interested in the effect schizotypy and depressive symptoms on self-care behaviors.

If you have any emotional distress, please contact our campus-counseling center at (936) 468-2401 or [counseling@sfasu.edu](mailto:counseling@sfasu.edu).

Additional resources for those experiencing emotional distress:

National Suicide Hotline: 1-800-273-8255

Crisis Text Line: 741741

Local resources: [Link](#)

([http://www.sfasu.edu/counselingservices/documents/Mental\\_Health\\_Referral\\_List\\_FIN\\_AL-7-26-17.pdf](http://www.sfasu.edu/counselingservices/documents/Mental_Health_Referral_List_FIN_AL-7-26-17.pdf))

If you have further questions in the future, please feel free to contact:

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The Office of Research and Sponsored Programs can be reached at (936) 468-6606.

## MTurk Population

### Debrief Sheet

Thank you for participating in this study. In this study we are interested in the effect schizotypy and depressive symptoms on self-care behaviors.

Resources for those experiencing emotional distress:

National Suicide Hotline: 1-800-273-8255

Crisis Text Line: 741741

Local Treatment Referral Information: 1-877-726-4727

If you have further questions in the future, please feel free to contact:

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## VITA

After completing high school at Flint Academy, Arlington, Texas, Michael went to Illinois College in Jacksonville, Illinois. He completed his Bachelor Science in Psychology in May 2016. Michael then went on to study at Stephen F. Austin State University in August 2016, where he received his Masters of Arts in General Psychology in May 2018.

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This thesis was typed by Michael David Rice