

DETERMINANTS OF PERCEIVED SOCIAL SUPPORT IN INDIVIDUALS
WITH SERIOUS MENTAL ILLNESS: A SECONDARY ANALYSIS

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SERIOUS MENTAL ILLNESS: A SECONDARY ANALYSIS

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University of Missouri-Kansas City, 2022

ABSTRACT

Social support appears to provide protective effects for those with serious mental illness (SMI), but these effects may be attenuated by factors that hinder positive perceptions of support. Improved understanding of social support and its determinants may provide avenues to promote recovery and improve functioning. The present study sought to further investigate relationships among negative symptoms, social cognition, social anxiety, and perceived social support in a population of outpatient community mental health participants with SMI. Sixty participants were included in this secondary analysis from data collected as part of a psychosocial rehabilitation treatment study at a community mental health center from 2016-2018. Participants were predominantly male ($n = 47$), between the ages of 21 and 74 years ($M = 42.98$, $SD = 13.02$). In terms of self-reported race/ethnicity, 50% identified as African American, 25% White, 8% Asian or Pacific Islander, 5% Hispanic, and 12% multi-racial/other. Primary diagnoses included schizophrenia ($n = 41$), schizoaffective disorder ($n = 12$), bipolar disorder ($n = 2$), PTSD ($n = 3$), and other ($n = 2$). Each participant completed a battery of measures including: the Interpersonal Support Evaluation List (ISEL), measuring perceived social support; the Mayer-Salovey-Caruso Emotional Intelligence Test, Managing Emotions subscale (MSCEIT-ME), measuring social cognition; the Liebowitz Social Anxiety Scale (LSAS), measuring social anxiety; and the Scale for the Assessment of Negative

Symptoms (SANS) to assess negative symptoms. Bivariate Pearson correlations revealed statistically significant associations between social cognition and total perceived social support ($p < .05$) and appraisal support subscale ($p < .01$), between negative symptoms and appraisal support subscale ($p < .05$), and between social anxiety and self-esteem support subscale ($p < .05$). A multiple linear regression was run to predict total perceived social support from negative symptoms, social cognition, and social anxiety. The overall model was significant ($p < .05$), however, social cognition was the only significant predictor in the model ($p < .05$). A second model was estimated to examine the hypothesized double-moderation effects of social cognition and social anxiety on the relationship between total perceived social support and negative symptoms—neither the overall model, nor the interaction terms were significant. Overall findings suggest a correlative relationship between social cognition and perceived social support. Conclusions, limitations, and future directions are discussed.

APPROVAL PAGE

The following faculty members, appointed by the Dean of the College of Arts and Science, have examined the thesis titled “Determinants of Perceived Social Support in Individuals with Serious mental Illness: A Secondary Analysis,” by Joseph Hunter Howie, Candidate for the Master of Arts degree, and certify that in their opinion it is worthy of acceptance.

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CHAPTER 1

INTRODUCTION

Mental illness impacts millions of people in the U.S. and around the world each year. According to prevalence data from the National Alliance on Mental Illness (NAMI) one in five U.S. adults experience mental illness each year—or roughly 51.5 million Americans—of whom only about 45% receive treatment in a given year (“Mental health by the numbers,” n.d.; U.S. Department of Health and Human Services, 2019).

The National Institute of Mental Health (NIMH) defines serious mental illness (SMI) as a mental, behavioral, or emotional disorder resulting in serious functional impairment, which substantially interferes with or limits one or more major life activities (U.S. Department of Health and Human Services, 2019). Roughly 5.2% of U.S. adults experience serious mental illness, a prevalence which appears highest in young adults aged 18-25 (8.6%) and adults aged 26-49 (6.8%) (U.S. Department of Health and Human Services, 2019). SMI includes several disorders—principally among them, schizophrenia, bipolar disorder, and severe major depression. Successful treatment for SMI often involves a combination of medication and psychosocial interventions.

Social support, social cognition, social anxiety, and symptomatology have been the subjects of SMI research and treatments that seek to improve functional outcomes, community reintegration, and life satisfaction (Dalagdi et al., 2014; McEnery et al., 2019; Terry & Townley, 2019). For example, cognitive enhancement therapy (CET), a recovery-phase intervention for SMI, was developed specifically to enhance social cognitive and neurocognitive abilities (Hogarty et al., 2004). Additionally, research has identified social anxiety disorder as a co-morbid disorder in schizophrenia, and several targeted cognitive

behavioral therapy (CBT) interventions focusing on social anxiety have produced clinically significant improvements to symptoms and quality of life (Halperin et al., 2000; Kingsep et al., 2003). Lastly, research has suggested that social support may promote recovery in persons with SMI and offset functional decline (Berkman, 1995; Hendryx et al., 2009; Kilbourne et al., 2007). Still, understanding of these factors, particularly in relation to each other, is understudied among those with SMI. The present study seeks to further investigate the influence and interactions between social support, negative symptoms, social cognition, and social anxiety.

CHAPTER 2

REVIEW OF THE LITERATURE

Social Support

Social support has garnered interest from psychologists over the past half-century, both for its role in mitigating stressful life events and its positive impact on psychological and physical health outcomes (Leigh-Hunt et al., 2017; Wang et al., 2018). The construct of social support broadly defined refers to resources provided by one’s interpersonal ties—typically from significant others, families, and friends—and can be subdivided into four components including appraisal, self-esteem, belonging, and tangible support (Cohen & Hoberman, 1983). *Appraisal support* provides help in defining, understanding, and coping with problematic events (also referred to as information support or cognitive guidance; Cohen & Wills, 1985). *Self-Esteem support* is “communicating to persons that they are valued for their own worth and experiences and are accepted despite any difficulties or personal faults” (also referred to as emotional support; Cohen & Wills, 1985, p. 313). *Belonging support* is spending meaningful time with others in a recreational or leisure capacity and implies “acceptance and inclusion by members of one’s primary or secondary groups” (also referred to as social companionship; Cohen & Wills, 1985; Thoits, 2011, p. 149). Finally, *tangible support* is “the provision of financial aid, material resources, and needed services” (also referred to as instrumental support; Cohen & Wills, 1985).

In research examining social support and stress two theoretical models have emerged. The direct (main effect) model conceptualizes social support as a “basic human need that must be satisfied in order for an individual to enjoy a sense of well-being” (Sandler & Barrera, 1984, as cited in Buchanan, 1995, p. 70). Benefits do not necessarily impact coping

skills, but rather provide esteem-enhancing elements that boost morale and reduce problematic appraisals of threat (Buchanan, 1995). The direct model does not necessitate the presence of a major stressor and may serve as a means of primary prevention—emphasizing components such as self-esteem and belonging support (Buchanan, 1995). In the buffering (interaction effect) model, social support mediates the influence of major life stressors, modifying the effects of stress (Buchanan, 1995). In this ‘buffering hypothesis’ social support serves as a protective factor, expanding the individual’s ability to cope in the face of increased strain from acute stressors (Thoits, 2011). This can be viewed as a form of ‘coping assistance’ that is driven by appraisal and tangible support. Although empirical evidence exists for both models, the literature is mixed and may indicate that these models are not mutually exclusive but rather work together in concert (Buchanan, 1995). While these models are not tested explicitly in the present study, this theoretical background underscores the scope of social support’s influence and its importance as an outcome of interest.

In the general population social support has been linked to several positive health outcomes. A systematic review from 2017 investigating the public health consequences of social isolation and loneliness found consistent evidence linking both to poor cardiovascular and mental health outcomes (Leigh-Hunt et al., 2017). In a student population, those with lower quality social support were more likely to experience mental health problems—six times the risk for depressive symptoms compared to those with high quality social support (Hefner & Eisenberg, 2009). Garipey et al. (2016) in a systematic review found consistent evidence of an association between social support and protection from depression in the general population. Further, a review by McDonald (2018) suggested that lack of social support was associated with higher levels of depression, anxiety, alcohol or drug misuse,

risky sexual behaviors, shame, and low self-esteem in adolescents who identify as LGBTQ. The protective or buffering effects of social support in the general population appear consistently in the literature and is an important factor for those with mental health disorders as well. For example, a study by Vaingankar et al. (2020) suggested that perceived social support was negatively associated with having a mental disorder. Further, among patients with OCD, panic disorder, and agoraphobia there is a negative association between perceived social support and symptom severity (Palardy et al., 2018). Similarly, those reporting higher levels of social support also reported experiencing fewer mental health problems (such as depression, anxiety, and suicidal ideation) after one year follow-up (Scardera et al., 2020).

For illnesses such as schizophrenia and bipolar disorder, social support may be of particular interest. Current etiological frameworks place emphasis on both genetic predisposition and environmental and/or psychosocial stressors (Zubin & Spring, 1977). Therapeutic approaches that aid in reducing the influence of major life stressors and increase capacity to cope with existing stressors may prove valuable in improving quality of life and decreasing potential for relapse—and indeed this is supported by the current research in this sphere.

In SMI populations social support is associated with cognition and psychological stress, a lower degree of psychotic and negative symptoms, and improved quality of life (Degnan et al., 2018; McCorkle et al., 2007; Munikandan et al., 2017; Peng et al., 2019; Pernice et al., 2017; Reddy et al., 2019; Ribas & Lam, 2010; Warren et al., 2018). However, those with SMI were also more likely to report low levels of social support (Kilbourne et al., 2007). Social support deficits experienced among subjects at high risk for psychosis may be a potential risk factor for later conversion to psychosis (Huang et al., 2019). Similarly, in an

ultra-high risk for schizophrenia population, loneliness and having fewer and worse quality relationships was associated with greater symptom severity and lower overall functioning (Robustelli et al., 2017). Furthermore, satisfaction and quality of social support appear to be protective factors for frequency and duration of hospital admissions; Huang et al. (2008) found that belonging, tangible, and self-esteem social support moderated the relationship between psychiatric symptoms and number of hospitalizations, that is, those with higher social support had fewer hospitalizations (Vazquez-Morejon et al., 2018). Evidence also suggests that social support may play an important role in influencing community integration for individuals with SMI (Terry & Townley, 2019).

While social support may provide protective effects for those with SMI, it may also be the case that increased symptomatology resulting in functional or cognitive deficits leads to lower engagement in social relationships. That is, the causal direction of any relationship remains a question. Additionally, much of the research into social support has focused on the positive benefits, and potential negative influences (i.e., stressful or problematic relationships) are often unaccounted for. Indeed, a review by Lincoln (2000) reported that in studies examining both negative and positive social interaction, twenty-one percent found equal effects, and sixty-eight percent reported larger effects for negative social interactions. While negative aspects of social support are beyond the scope of this paper, this nuanced approach to examining social interaction is still an underdeveloped area of study that appears to hold relevance, especially for those living with highly stigmatized illnesses such as SMI (Yanos et al., 2001).

A principal consideration for the study of social support is the distinction between received and perceived support. Especially within the direct model which concerns itself with

self-esteem and emotional support, perceptions of support may play a larger role than received support. In cases where an individual's ability to navigate social situations and interactions may be impaired—due to deficits in social cognition or increased social anxiety—the perception of social support may not reflect the reality and may suppress potential benefits (Barnett et al., 2021; Palardy et al., 2018; Zhao et al., 2019). The present study focuses solely on perceived social support.

Social Cognition

Social cognition refers to an individual's ability to navigate and make sense of social interactions, including perceiving and interpreting the intentions and behaviors of others, identifying emotions, and maintaining social connections (Green et al., 2005; Green, 2016). Social cognitive research in schizophrenia has focused primarily on five areas: emotional processing, theory of mind, social perception, social knowledge, and attributional bias (See Green et al., 2005 for an in-depth discussion of these areas). Deficits in these social cognitive areas have been consistently implicated in functional and social impairments for those with SMI and have garnered attention from researchers seeking targets for cognitive remediation therapies (CRTs) (Dodell-Feder et al., 2015; Green et al., 2005). While research to-date has indicated a link between social cognition and social engagement the relationship between social cognitive function and perceived social support is not well studied (Kang et al., 2016).

A meta-analysis from 2011 revealed larger effect sizes for reducing loneliness in studies which addressed maladaptive social cognition, and evidence suggests that greater social engagement is broadly associated with higher levels of cognition (both social and non-social) across the lifespan—a finding that appears to be more prominent in populations at risk of cognitive impairment (Kang et al., 2016; Kelly et al., 2017; Masi et al., 2011). Social

support and social cognition are negatively correlated to many clinical symptoms and social support has been consistently indicated as both a mediator and a moderator in a variety of studies examining social cognition (Espinosa & Rudenstine, 2020; Mike et al., 2019; Zysberg & Sizberg, 2020). For example, in a geriatric sample perceived social support partially mediated the relationship between social cognition scores and life satisfaction and happiness, that is, social cognition was positively related to perceived social support, which in turn was positively related to life satisfaction and happiness (Rey et al., 2019). In a population of male athletes, Malinauskas & Malinauskiene (2018) found that perceived social support and perceived stress partially mediated the association between social cognition and psychological wellbeing— social cognition was positively associated with perceived social support which in turn was positively related to wellbeing; conversely, social cognition was negatively associated with perceived stress, which in turn was negatively associated with wellbeing. Chen (2019) found that social support from friends (although not from family) was significant in moderating the relationship between social cognition and resilience, specifically, the positive relationship between social cognition and resilience was stronger for participants high in social support from friends. Social cognition also appears to play a significant mediating role on the effects of social support on mental symptoms (as measured by Symptom Checklist 90 Scale: SCL-90), with social support positively related to social cognition, but social cognition negatively related to mental symptoms (Zhao et al., 2019). Finally, Fabio and Kenny (2012) demonstrated that social cognition explained some of the variance in perceived social support in a student population, further emphasizing the possible link between these two factors (Fabio, 2015).

While there is compelling evidence to suggest that a relationship between social cognition and perceived social support exists, the nature of the relationship has not been investigated among individuals with SMI. And though some CRTs have already demonstrated significant and large effects for improving social cognition, and research has demonstrated that psychosocial support may provide lasting benefits for cognitive functioning, the interplay between the two is not well understood (Dalagdi et al., 2014; Eack et al., 2007).

Social Anxiety

Social anxiety (also referred to as social phobia) is marked by the presence of fear or anxiety in one or more social situations, including social interactions, being observed, and performing in front of others (American Psychiatric Association, 2013). Researchers have traditionally overlooked social anxiety in individuals with SMI due to its symptomological proximity to negative (and to some extent positive) symptoms. Current research demonstrates that social anxiety is not only an independent feature of SMI (see below), but one with a highly prevalent co-morbidity, and which contributes significant impairment in social relationships (Aikawa et al., 2018; Mazeh et al., 2009; Pallanti et al., 2004; Romm et al., 2011).

Interactions between social support and social anxiety have also been evidenced, with several studies linking social anxiety to lower perceived social support (Aune et al., 2020; Barnett et al., 2021; Lei et al., 2020). Even within romantic relationships socially anxious individuals reported receiving less social support, highlighting the role social anxiety symptoms may play in influencing perceived social support. Additionally, social support appears to buffer against the effects of social anxiety, attenuating the association between

anxiety symptoms and negative life events (Aune et al., 2020; Ren & Li, 2020; Singh et al., 2020). Similar to social cognition, the link between perceived social support and social anxiety has not been well studied in individuals with SMI, and little is known about how these constructs together might relate to symptomatology.

Negative Symptoms

Symptom research in SMI has historically focused on positive symptoms, such as hallucinations and delusions, often neglecting the less prominent negative symptoms (e.g., anhedonia). Presently, the importance of negative symptoms is recognized in the literature as a significant contributor to long-term disability, quality of life, and functional outcomes (Correll & Schooler, 2020). Negative symptoms are defined as behavioral and emotional deficits that deviate from normal function in motivation, interest, or verbal expression. Clinicians have identified five core negative symptom domains: 1) Alogia (or poverty of speech), marked by few words, lack of conversation, and avoiding communication. 2) Affect flattening/blunting, marked by difficulty in expressing emotion, diminished facial and vocal expression, and poor eye contact. 3) Anhedonia, or the reduced ability to experience pleasure, marked by lack of enjoyment or engagement in life experiences (e.g., leisure activities, sexual activities, etc.). 4) Asociality, marked by reduced initiative for interacting with other people, few friends, or poor relationships. 5) Avolition, or the inability to initiate and persist in goal-directed activities, marked by emotional withdrawal, poor grooming/hygiene, and withdrawal from work or school (American Psychiatric Association, 2013; Correll & Schooler, 2020).

Researchers examining both social cognition and social anxiety have questioned their independence from negative symptoms. Investigators examining negative symptoms and

social cognition have demonstrated a clear link, most commonly reporting a negative correlative relationship between these constructs (Kalin et al., 2015; Sergi et al., 2006; Yolland et al., 2020). A recent article by Pelletier-Baldelli and Holt (2019) focuses on this relationship, suggesting that negative symptoms are downstream consequences of deficits in social cognition. While the boundaries of negative symptoms are well defined (e.g., Alogia, affect flattening/blunting, anhedonia... etc.) those for social cognition are not as clear; if we expand social cognition to include social motivation, we may find overlap with domains such as asociality or anhedonia. Conversely, if we restrict social cognition's definition to purely processing ability, we may find more independence (Green, 2020). What is clear, is that these two constructs are consistently related and contribute to one's experience and perception of social interactions (Madeira et al., 2016; Penn et al., 2008).

Similarly, a challenge in the study of social anxiety in individuals with SMI is the tendency for researchers to conflate its presentation with negative symptoms. Some may argue that social anxiety is itself a negative symptom or component of the syndrome; when we consider it in relation to asociality this may feel intuitive, yet there is little evidence to support this conclusion (Birchwood et al., 2006). This misconception has hindered research focusing on social anxiety co-morbidities, and in recent years researchers have outlined the distinction between social anxiety and negative symptoms. Several studies examining individuals with schizophrenia have investigated differences between those with and without social anxiety disorders—while they report higher self-blame, shame, and lower self-esteem for those with social anxiety, they did not find any significant differences in negative symptoms (Gumley et al., 2004; Pallanti et al., 2004). Current research indicates that these two constructs are independent, but disentangling the discrete differences remains

challenging (Cosoff & Hafner, 1998; McEnery et al., 2019; Pallanti et al., 2004). For those with co-morbid anxiety disorders there is evidence to suggest a positive relationship with negative symptoms (Aikawa et al., 2018; Lysaker et al., 2010; Vrbova et al., 2018).

Rationale (Current Study)

As noted above, the literature consistently implicates social support, social cognition, and social anxiety in several SMI outcomes; to our knowledge no studies have investigated the interaction between these three determinants in this population. Perceived social support appears to provide protective effects for those with SMI, however, artifacts of illness may serve to hinder a positive perception of this factor. Specifically, high social anxiety and deficits in social cognition, coupled with symptomatology may impact an individual's ability to accurately perceive social support, reducing any potential benefits

Hypotheses

Given the dearth of knowledge surrounding the interrelationships between these constructs, the present study seeks to investigate the relationships among perceived social support, social cognition, social anxiety, and symptomatology in individuals with SMI. Given the present literature, the following hypotheses/aims were developed:

Aim 1: Examine relationships among perceived social support, social cognition, social anxiety, and symptomatology:

H1.1: Perceived social support will be positively correlated with social cognition (Dalagdi et al., 2014).

H1.2: Perceived social support will be negatively correlated with social anxiety.

H1.3: Perceived social support will be negatively correlated with negative symptoms (Degnan et al., 2018; Peng et al., 2019; Robustelli et al., 2017).

H1.4: Social cognition will be negatively correlated with negative symptoms (Eack et al., 2010; Mike et al., 2019; Sergi et al., 2006).

H1.5: Social anxiety will be positively correlated with negative symptoms (Aikawa et al., 2018; Pallanti et al., 2004; Romm et al., 2011; Vrbova et al., 2018).

Aim 2: Exploratory investigation of the individual components of perceived social support. To our knowledge no study to-date has examined the relationship between subscale components of perceived social support and these constructs.

H2.1: Social cognition will be most strongly correlated to appraisal support compared with other perceived social support subscales.

H2.2: Social anxiety will be most strongly correlated to belonging support compared with other perceived social support subscales.

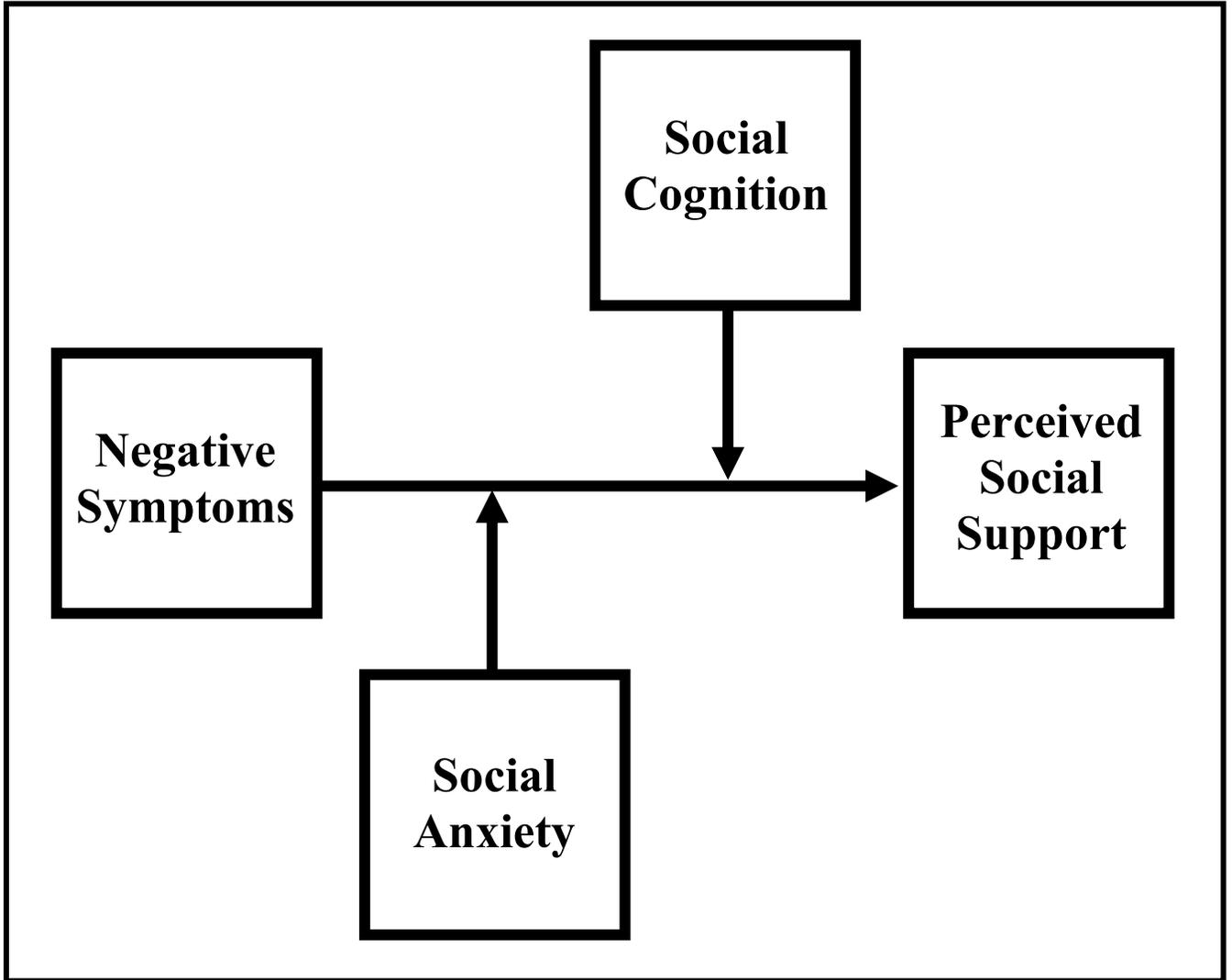
H2.3: Negative symptoms will be most strongly correlated to self-esteem support compared with other perceived social support subscales.

Aim 3: Investigate the relationship between determinants of perceived social support.

H3.1: Using multiple regression analysis, negative symptoms, social cognition, and social anxiety will explain a significant amount of variance in perceived social support.

H3.2: Using multiple regression double moderation analysis, both social cognition and social anxiety will moderate the relationship between negative symptoms and perceived social support (see Fig. 1). We predict a negative relationship between negative symptoms and perceived social support. This relationship will be qualified by two two-way interactions between negative symptoms and social anxiety, as well as between negative symptoms and social cognition. Specifically, we predict that the negative relationship between negative symptoms and perceived social support will be strongest for those low in social cognition. We also predict that this negative relationship will be strongest for those high in social anxiety. Conversely, we expect the weakest relationship between negative symptoms and perceived social support to be for those high in social cognition. We also expect the weakest relationship to be for those low in social anxiety. Together, this pattern of findings would imply that social cognition and social anxiety can buffer the negative effect of negative symptoms on perceived social support. We predict that the moderation/interaction effects assessed in H3.2 will explain additional variance above and beyond H3.1.

Figure 1: H3.2 Conceptual Model Diagram.



CHAPTER 3

METHODOLOGY

Sixty participants were included in this secondary analysis from data collected as part of a community-based Cognitive Enhancement Therapy (CET) program at Truman Medical Center (TMC) from 2016-2018. The program consisted of 48 sessions over the course of 12 months. CET groups were offered in annual cycles, data were collected over the course of two cycles (two per year, with four groups total). Participants included individuals referred to enroll in CET based on clinical judgement regarding the following inclusion criteria: having a diagnosis of schizophrenia or other SMI, neurocognitive impairment, and interest in the CET program. Eligibility criteria was determined using chart review. Data were collected at three time-points; the present study utilizes data collected in session #1, and includes symptom, social cognitive, and neurocognitive assessments administered at baseline. Participants were offered \$25 compensation for their participation in session #1, and a total amount of \$65 possible for completing all three sessions. Participants were predominantly male ($n = 47$), between the ages of 21 and 74 ($M = 42.98$, $SD = 13.02$). In terms of self-reported race/ethnicity, 50% African American, 25% White, 8% Asian or Pacific Islander, 5% Hispanic, and 12% multi-racial/other. Primary Diagnoses included schizophrenia ($n = 41$), schizoaffective disorder ($n = 12$), bipolar disorder ($n = 2$), PTSD ($n = 3$), and other ($n = 2$).

Measures

Interpersonal Support Evaluation List (ISEL)

The ISEL is a 40-item scale developed by Cohen and Hoberman (1983) to measure the perceived availability of social support. The ISEL contains four 10-item subscales which

measure the different components of social support, including: Appraisal support, Self-esteem support, Belonging support, and Tangible support. Each item consists of a statement rated on a four-point Likert scale from *definitely false* (0) to *definitely true* (3). Higher scores indicate more perceived social support.

In the general population the ISEL is a valid and reliable measure (Brookings & Bolton, 1988). Research in populations with SMI have demonstrated similar trends—internal consistency assessed using Cronbach’s Alpha yielded a value of $\alpha = .92$ for the total ISEL and $\alpha = .82-.84$ for individual subscales (Rogers et al., 2004).

Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT-ME)

The MSCEIT managing emotions subscale is included in the MATRICS Consensus Cognitive Battery (MCCB)—the gold standard for cognitive assessment for those with SMI— as the measure of social cognition. The MSCEIT is a performance-based measure, with the managing emotions subscale consisting of eight vignettes outlining social situation. Each of them presents four reactions a person might have in these situations. Participants then rate these reactions on a five-point Likert scale from *very ineffective* (1) to *very effective* (5). (For a complete description see Mayer et al., 2002).

The MSCEIT managing emotions subscale was selected for the MCCB based on findings that it was more strongly correlated with areas of community functioning than the other subscales (DeTore et al., 2018). This scale is a valid and reliable measure for those with SMI— internal consistency assessed using Cronbach’s Alpha yielded a value of $\alpha = .94$ for MSCEIT total and $\alpha = .81$ for the managing emotions subscale (Eack et al., 2008).

Liebowitz Social Anxiety Scale (LSAS)

The LSAS is a 24-item self-report scale which measures social phobia (Liebowitz, 1987). The scale is divided into two subscales which evaluate social interaction and performance situations. Each question is rated on a four-point Likert scale for fear/anxiety [*none* (0) to *severe* (3)] and avoidance [*never* (0) to *usually* (3)]. Higher scores indicate more social anxiety.

The LSAS is a valid and reliable measure of social phobia (Heimberg et al., 1999). Research in populations with SMI have demonstrated similar trends—internal consistency assessed using Cronbach’s Alpha yielded a value of $\alpha = .96$ for LSAS total, $\alpha = .94$ for fear/anxiety subscale, and $\alpha = .93$ for avoidance subscale (Romm et al., 2011).

Symptomatology

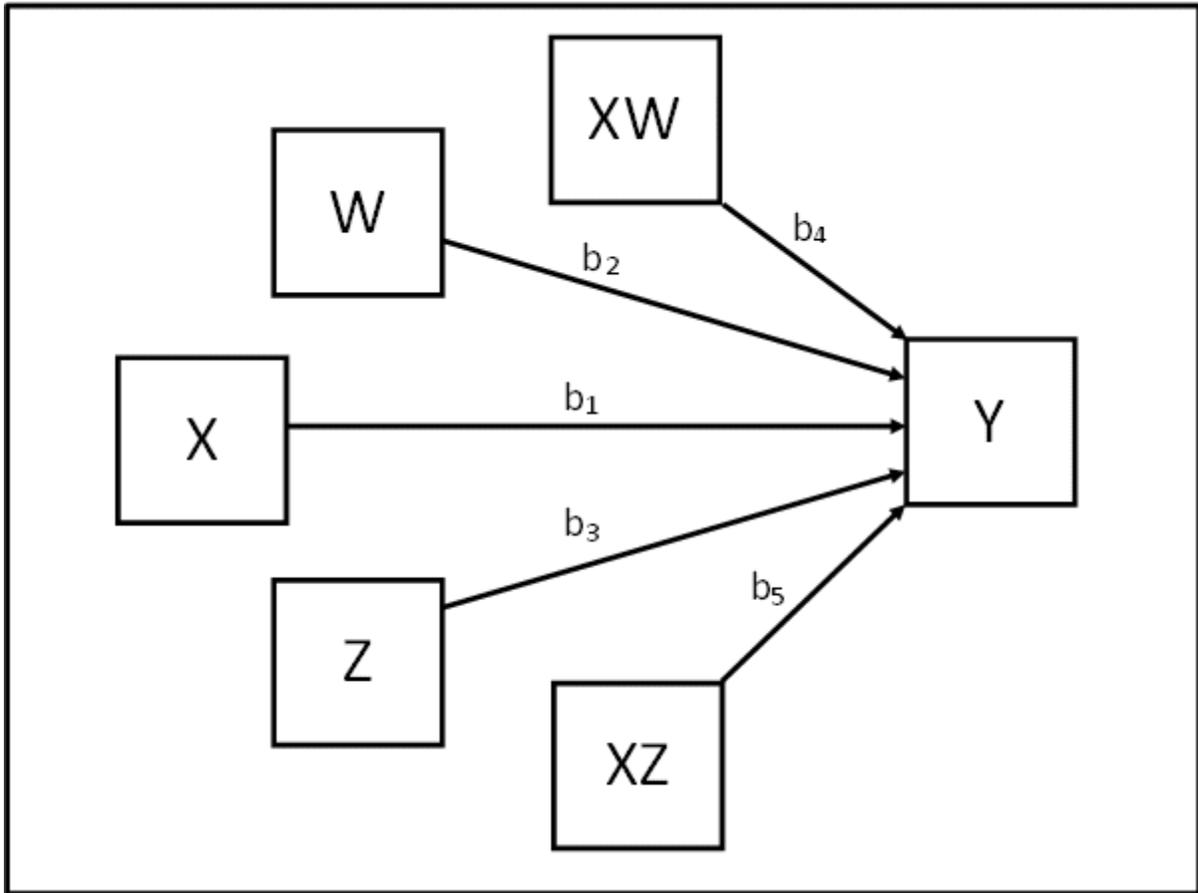
Scale for the Assessment of Negative Symptoms (SANS) is a 25-item rating scale measuring five domains of negative symptoms in schizophrenia including: Affective flattening or blunting; alogia; avolition/apathy; anhedonia/asociality; and attention. Each question is rated on a six-point Likert scale from *none* (0) to *severe* (5). The SANS is a valid and reliable measure of negative symptoms—internal consistency assessed using Cronbach’s Alpha yielded values of $\alpha = .85$ for global ratings; $\alpha = .83$ for affective flattening; $\alpha = .63$ for alogia; $\alpha = .74$ for avolition/apathy; $\alpha = .74$ for anhedonia/asociality; and $\alpha = .75$ for attention (Andreasen, 1989).

Statistical Analyses

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) and Hayes PROCESS v4.0 macro. To investigate aim 1 and 2, bivariate Pearson correlations were run to assess the zero-order correlations between variables, and to investigate the

relationship with individual ISEL subscales. Significant differences between correlations with ISEL subscales were assessed using Fisher's r-to-Z transformation. To investigate aim 3, H3.1 a multiple linear regression analysis was run with negative symptoms, social cognition, and social anxiety entered simultaneously as predictors and total perceived social support as the outcome variable. To investigate aim 3, H3.2 we utilized PROCESS v4.0 model 2 to run a multiple linear regression double moderation analysis examining the moderating effects of social cognition (z) and social anxiety (w) on the relationship between negative symptoms (x) and the outcome variable total perceived social support (y) (See Fig. 2). With regard to adequacy of the proposed sample size, power analysis indicates adequate power (i.e., 0.80) to detect a medium to large effect size ($R^2 \geq 0.24$) with a sample of 60 participants (Faul et al., 2009).

Figure 2: H3.2 Statistical Model Diagram.



(Stride et al., 2015)

Note: Y: Perceived Social Support; X: Negative Symptoms; W: Social Anxiety; Z: Social Cognition.

CHAPTER 4

RESULTS

Preliminary analyses

Sixty participants completed CET data collection for session #1 (the sole data used for this study), of whom one participant had missing data for their LSAS, and two for the ISEL. Data were assessed for outliers; no problematic univariate outliers were identified in the data using Tukey's method (below $Q_1 - 3IQR$, or above $Q_3 + 3IQR$). Visual inspection of histogram and scatter plots indicated data were normally distributed and linear, and skewness and kurtosis within the acceptable range (i.e., non-significant) as outlined by Kim (2013).

Tests for assumptions of OLS regressions indicated that multicollinearity was not a concern (SANS, Tolerance = .958, VIF = 1.04; MSCEIT, Tolerance = .919, VIF = 1.09; LSAS, Tolerance = .935, VIF = 1.07), and data met the assumption of independent errors (Durbin-Watson value = 2.03). The scatterplot of standardized residuals revealed that the assumptions of homogeneity of variance and linearity were met. One multivariate outlier was identified using Mahalanobis Distance Test, $p < .001$, and removed for regression analyses (Tabacknick & Fidell, 2013). The final sample ranged from $N = 58-60$ for bivariate correlation analyses (pairwise deletion), and $N = 57$ for the multiple linear regression analyses (casewise deletion). Descriptive Statistics are listed in table 1.

Table 1
Descriptive Statistics

	N	Mean	Std. Deviation
<i>Demographics</i>			
Age	59	42.98	13.017
Sex	60		
Male	47		
Female	13		
Race	60		
Asian or Pacific Islander	5		
African American or Black	30		
Caucasian or White	15		
Hispanic	3		
Multi-Racial	6		
Diagnosis	60		
Schizophrenia	41		
Schizoaffective	12		
Bipolar Disorder	2		
PTSD	3		
Other	2		
<i>Measures</i>			
ISEL Total	58	68.71	17.59
ISEL Belonging	58	17.71	5.73
ISEL Self-Esteem	59	17.00	4.41
ISEL Tangible	59	15.61	4.97
ISEL Appraisal	59	18.20	6.08
SANS	60	14.00	3.98
MSCEIT	60	32.58	12.67
LSAS	59	47.29	29.74

Note: ISEL: Interpersonal Support Evaluation List; SANS: Scale for the Assessment of Negative Symptoms; MSCEIT: Mayer-Salovey-Caruso Emotional Intelligence Test; LSAS: Liebowitz Social Anxiety Scale.

Aim 1

To examine the relationship among ISEL total score (perceived social support), MSCEIT (social cognition), LSAS (social anxiety), and SANS (negative symptoms), bivariate Pearson correlations were run, see table 2. H1.1 predicted a positive relationship between ISEL total score and MSCEIT. Analysis revealed a positive and significant correlation between ISEL total score and MSCEIT, $r(56) = .302, p < .05$, thus H1.1 was supported. H1.2 predicted a negative relationship between ISEL total score and LSAS.

Analysis revealed a non-significant negative correlation between ISEL total score and LSAS, $r(56) = -.199, p > .05$, thus H1.2 was not supported. H1.3 predicted a negative relationship between ISEL total score and SANS. Analysis revealed a non-significant negative correlation between ISEL total score and SANS, $r(56) = -.204, p > .05$, thus H1.3 was not supported. H1.4 predicted a negative correlation between MSCEIT and SANS. Analysis revealed a non-significant negative correlation between MSCEIT and SANS, $r(58) = -.112, p > .05$, thus H1.4 was not supported. Finally, H1.5 predicted a positive correlation between LSAS and SANS. Analysis revealed a non-significant positive correlation between LSAS and SANS, $r(57) = .197, p > .05$, thus H1.5 was not supported.

Table 2

Correlations Between Perceived Social Support, Negative Symptoms, Social Cognition, and Social Anxiety

Variables	1	2	3	4
1. ISEL Total	-			
2. SANS	-0.20	-		
3. MSCEIT	0.30*	-0.11	-	
4. LSAS	-0.20	0.20	-0.18	-

Note: ISEL: Interpersonal Support Evaluation List; SANS: Scale for the Assessment of Negative Symptoms; MSCEIT: Mayer-Salovey-Caruso Emotional Intelligence Test; LSAS: Liebowitz Social Anxiety Scale.

*Correlation is significant at the 0.05 level (2-tailed).

Aim 2

Additional exploratory analyses were run to investigate the zero-order correlation between MSCEIT, LSAS, and SANS and each of the four subscales of the ISEL: Appraisal Support (ISEL AS); Belonging Support (ISEL BS); Self-Esteem Support (ISEL SE); and Tangible Support (ISEL TS). See table 3. H2.1 predicted that MSCEIT would be most strongly correlated to ISEL AS when compared with the other ISEL subscales. Analyses revealed a significant correlation between MSCEIT and ISEL AS, $r(57) = .398, p < .001$. No significant correlations were identified between MSCEIT and ISEL BS, SE, or TS. Fisher's

r-to-Z transformation was computed to compare the strength of subscale correlation coefficients. No significant differences were observed between the MSCEIT-ISEL AS correlation coefficient and any of the other subscale coefficients ($z = .90$ to 1.28 ; $p > .05$), thus H2.1 was not supported. H2.2 predicted that LSAS would be most strongly correlated to ISEL BS when compared with the other ISEL subscales. Analyses revealed a non-significant correlation between LSAS and ISEL BS, $r(56) = -.203$, $p > .05$. However, a significant correlation between LSAS and ISEL SE was identified, $r(57) = -.291$, $p < .05$. No significant correlations were indicated between LSAS and ISEL TS or AS. Fisher's r-to-Z transformations and comparison revealed no significant differences between the LSAS-ISEL BS correlation coefficient and any of the other subscale coefficients ($z = -1.00$ to $-.49$; $p > .05$), thus H2.2 was not supported. H2.3 predicted that SANS would be most strongly correlated to ISEL SE when compared with the other ISEL subscales. Analyses revealed a non-significant correlation between SANS and ISEL SE, $r(57) = -.158$, $p > .05$. However, a significant correlation between SANS and ISEL AS was identified, $r(57) = -.291$, $p < .05$. No significant correlations were identified between SANS and ISEL BS or TS. Fisher's r-to-Z transformations and comparison revealed no significant differences between the SANS-ISEL SE correlation coefficient and any of the other subscale coefficients ($z = -1.09$ to $-.74$; $p > .05$), thus H2.3 was not supported.

Table 3
Correlations Between ISEL Subscales, Negative Symptoms, Social Cognition, and Social Anxiety

Variables	ISEL BS	ISEL SE	ISEL TS	ISEL AS
1. SANS	-0.09	-0.16	-0.16	-0.29*
2. MSCEIT	0.16	0.18	0.25	0.40**
3. LSAS	-0.20	-0.29*	-0.11	-0.12

Note: ISEL: Interpersonal Support Evaluation List; ISEL BS: Belonging Support; ISEL SE: Self-Esteem Support; ISEL TS: Tangible Support; ISEL AS: Appraisal Support; SANS: Scale for the Assessment of Negative Symptoms; MSCEIT: Mayer-Salovey-Caruso Emotional Intelligence Test; LSAS: Liebowitz Social Anxiety Scale.

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Aim 3

Investigation of the relationship between determinants of ISEL total (perceived social support) was conducted in two stages. H3.1 utilized multiple linear regression to examine the variance of ISEL total explained by SANS, MSCEIT, and LSAS scores, see table 4.

Statistical analysis indicated that the overall model was statistically significant, $F(3, 53) = 3.34, p < .05, R^2_{\text{adjusted}} = .11$. Results revealed that MSCEIT was a significant predictor of ISEL total score, $t(56) = 2.64, p < .05, \beta = .346$, but neither SANS nor LSAS reached significance. The model achieved a small to medium effect size (Cohen, 1988), explaining 11% of the variance in ISEL total scores, thus H3.1 was supported.

H3.2 predicted that the addition of interaction terms for SANS x LSAS, and SANS x MSCEIT would explain additional variance above and beyond the initial regression in H3.1. Analysis was conducted using PROCESS v4.0 model 2, with all predictor variables mean centered. A double moderation analysis was run with ISEL total as the dependent variable, SANS as the predictor, and MSCEIT and LSAS as moderator variables, see table 5. Results revealed that the overall model was non-significant, $F(5, 51) = 2.35, p = .054, R^2_{\text{adjusted}} = .108$. MSCEIT was a significant predictor in the model, $t(56) = 2.76, p < .001, B = .51$, however, neither the interaction terms for SANS x LSAS, $t(56) = 1.24, p > .05$, and SANS x MSCEIT, $t(56) = -.19, p > .05$, nor the remaining predictors were significant. A comparison of the R^2_{adjusted} values for models H3.1 ($R^2_{\text{adjusted}} = .11$) and H3.2 ($R^2_{\text{adjusted}} = .108$) revealed no additional variance explained by the addition of the interaction terms, thus H3.2 was not supported.

Table 4
Regression Model for H3.1

	Unstandardized Coefficients		Standardized	<i>t</i>	<i>p</i>
	B	SE	Coefficients <i>β</i>		
(Constant)	61.38	11.52		5.33	0.00
SANS	-0.41	0.57	-0.10	-0.74	0.47
MSCEIT	0.49	0.18	0.35	2.64	0.01*
LSAS	-0.04	0.08	-0.07	-0.54	0.59

a. Dependent Variable ISEL Total

Note: ISEL: Interpersonal Support Evaluation List; SANS: Scale for the Assessment of Negative Symptoms; MSCEIT: Mayer-Salovey-Caruso Emotional Intelligence Test; LSAS: Liebowitz Social Anxiety Scale.

*Correlation is significant at the 0.05 level (2-tailed).

Table 5
Regression Model for H3.2

	Unstandardized Coefficients		<i>t</i>	<i>p</i>
	B	SE		
(Constant)	68.72	2.23	30.86	0.00
SANS	-0.19	0.60	-0.32	0.75
MSCEIT	0.51	0.19	2.76	0.008**
LSAS	-0.05	0.08	-0.63	0.53
SANS x LSAS (interaction 1)	0.03	0.02	1.24	0.22
SANS x MSCEIT (interaction 2)	-0.01	0.05	-0.19	0.85

a. Dependent Variable ISEL Total

Note: ISEL: Interpersonal Support Evaluation List; SANS: Scale for the Assessment of Negative Symptoms; MSCEIT: Mayer-Salovey-Caruso Emotional Intelligence Test; LSAS: Liebowitz Social Anxiety Scale.

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

CHAPTER 5

DISCUSSION

Perceived social support has been identified in the literature as an important protective factor, buffering against stressful life events and positively impacting psychological and physiological health (Leigh-Hunt et al., 2017; Wang et al., 2018). Particularly in SMI populations where environmental and psychosocial stressors may serve as antecedents for worsening illness, it is important to understanding how co-occurring symptomatology (e.g., clinical or cognitive factors) may contribute to a diminished perception of social support, and thus a reduced experience of the potential benefits. The present study sought to examine the interrelationships between social cognition, social anxiety, negative symptoms, and perceived social support.

As Hypothesized (H1.1) social cognition was significantly and positively correlated with perceived social support. This finding indicates that as social cognition increases, so does perceived social support. What is unclear from this finding is the directionality of the correlation—it may be the case that increased social cognitive abilities (e.g., emotional processing, theory of mind, etc.) lead to a heightened perception of social support. Alternatively, higher perceived social support—and perhaps also higher received support—may lead to more opportunities to practice social cognitive skills or interact in a social setting, thus improving social cognition. Prior research found a positive relationship between psychosocial support and broad cognitive functioning (Dalagdi et al., 2014), this finding provides further support for that positive relationship.

Contrary to our hypotheses (H1.2-H1.5), our analyses did not indicate any significant correlations between the other constructs, these non-significant findings run counter to our

predictions and several existing studies (e.g., Degnan et al., 2018; Eack et al., 2010; Pallanti et al., 2004). While our findings did not meet significance, they did demonstrate the predicted directionality (e.g., negative symptoms and social cognition were negatively but non-significantly correlated), it is possible that failure to find significance is linked to several limitations in our study, see below for discussion.

To our knowledge no study to-date has examined the relationship between the subscale components of perceived social support and social cognition, social anxiety, and negative symptoms. Exploratory analyses were conducted in aim 2 to examine these relationships. First, we hypothesized (H2.1) that social cognition would be most strongly correlated to appraisal support when compared to the other subscales. Our analysis revealed a significant correlation between social cognition and appraisal support with no other significant correlations among the other subscales. This suggests that as social cognition increases, so does perceptions of appraisal support. Appraisal support is help in defining, understanding, and coping with problematic events, and parallels closely with emotional processing aspects of social cognition. Perhaps as an individual's ability to perceive and interpret emotion increases, their perception of available appraisal support is bolstered; many of the appraisal support items deal with advice seeking and trust pertaining to sensitive topics (e.g., "22. When I need suggestions on how to deal with a personal problem, I know someone I can turn to"). If one is better at managing emotions, it follows that they would be more open to seeking out and receiving advice regardless of the potential for evoking strong emotionality. Considering no other significant correlations among the perceived social support subscales, this medium strength correlation with appraisal support, $r(59) = .398, p = .002$, may drive the correlational effect seen in H1.1 between social cognition and ISEL total.

Second, we examined the relationship between social anxiety and the subscales of perceived social support. We hypothesized (H2.2) that social anxiety would be most strongly correlated to belonging support when compared with other the other subscales. Results revealed that social anxiety was not significantly correlated with either belonging support, appraisal support, or tangible support, however, there was a significant negative correlation with self-esteem support. This finding may suggest that as social anxiety increases perceptions of self-esteem support decreases, or vice versa. Self-esteem support is “communicating to persons that they are valued for their own worth and experiences and are accepted despite any difficulties or personal faults” (Cohen & Wills, 1985, p. 313). One possible explanation of this finding is an increase in negative interpretations of social events for those with social anxiety (Chen et al., 2020). As social anxiety increases, individuals have more negative judgments of social encounters, leading to a lower sense of value or self-worth—or perhaps, perception of self-esteem support. Many of the ISEL items for this subscale tap into the notion of self-worth, confidence, and/or acceptance among family and friends (e.g., “4. There is someone who takes pride in my accomplishments”).

Third, we examined the relationship between negative symptoms and the subscales of perceived social support. We hypothesized that negative symptoms would be most strongly correlated to self-esteem support when compared with the other subscales. Results revealed that negative symptoms were not significantly correlated with either belonging support, tangible support, or self-esteem support, but were significantly and negatively correlated with appraisal support. This may suggest that as negative symptoms increase, perception of appraisal support decreases, or vice versa. Similar to the previous discussion (H2.1), this effect may be driven by aspects of negative symptoms that influence emotion expression and

reduced engagement in close friendships (i.e., affect flattening/blunting and asociality). There is evidence to suggest that social exclusion is seen at higher rates for those with SMI, a phenomenon perhaps explained by artifacts of the illness such as negative symptoms (Reddy et al., 2019). For those experiencing emotional and social difficulties related to an increase in negative symptoms, perceptions of appraisal support may decrease due to limited friendships for this type of intimate advice support (e.g., “6. There is no one that I feel comfortable talking to about intimate personal problems”).

Finally, aim 3 investigated the theoretical relationship between negative symptoms, social cognition, social anxiety, and perceived social support. While our initial overall multiple regression model in H3.1 was significant, only social cognition was found to be a significant predictor. Our model accounted for 11% of the variance in perceived social support scores, a small to medium effect. In our second regression in H3.2 we predicted that the relationship between negative symptoms and perceived social support would be qualified by two two-way interactions between negative symptoms and social anxiety, as well as between negative symptoms and social cognition. Results revealed that neither the overall model nor the interaction terms were significant, thus our study did not support the hypothesized existence of a double-moderation effect for social cognition and social anxiety on the relationship between negative symptoms and perceived social support. While this model was not significant, an alternative interpretation is that the relationship between social cognition and perceived social support remained significant while controlling for negative symptoms, social anxiety, the interaction between negative symptoms and social anxiety, and the interaction between negative symptoms and social cognition. Several limitations in our study may have led to failure to detect moderation effects, but what is clear from our results

is the correlative relationship between social cognition and perceived social support across models.

Clinical Implications

The present findings may further support the importance of CET and other CRTs aimed at improving social cognitive abilities. Throughout our investigation we found strong evidence for a connection between social cognition and perceived social support. Extant CRTs have demonstrated the potential for improving social cognitive deficits in the context of these programs (Dodell-Federer et al., 2015; Eack et al., 2007; Hogarty et al., 2004). If indeed social cognition modulates perceived social support this could highlight another important downstream effect and further justify the implementation of longer-term therapies for individuals with SMI.

Limitations

The present study has several limitations which should be considered when interpreting these findings. As a secondary data analysis, the measures in this study were not selected specifically for these research questions. Namely, while the domains of social cognition are interconnected (Green et al., 2005), our measure of social cognition, MSCEIT-ME, may not encompass the full breadth of this construct. Additionally, the nature of our sample had several limiting elements. Principal among them is our small sample size which negatively influences our statistical power to detect small and medium effects and increases our risk of Type II error (i.e., failing to reject a null hypothesis which is false). For example, in aim 2 we found that statistically significant correlation coefficients were not statistically different from non-significant correlation coefficients (i.e., MSCEIT-ISEL AS correlation coefficient compared with MSCEIT-ISEL BS correlation coefficient, $z = 1.36, p = .09$). One

explanation is that this significant correlation is spurious, however, post-hoc power analysis indicates an acceptable power of .88 to detect this effect (two tailed test, $\alpha \leq .05$).

Alternatively, this somewhat strange statistical phenomenon may be an artifact of our limited sample size. Further, while our sample was derived naturalistically through a real-world community-based CET program, this may also impact the internal validity of the study through participant selection bias and lack of randomization in our sample. Our sample includes primarily stable outpatient individuals with SMI which may have influenced our findings. In our exploratory analyses, multiple Pearson correlations may have inflated the probability of Type I errors (i.e., rejecting a null hypothesis which is true), and while there are methods to control for this inflated risk, e.g., Bonferroni correction, doing so with a small sample may be overly conservative and increases the risk of Type II errors.

Conclusion and Future Direction

While the current study failed to provide evidence of any moderating effects in the relationship between negative symptoms and perceived social support, we did uncover associations among social cognition, social anxiety, negative symptoms, and the subdomains of perceived social support. Future research should continue to investigate these correlative relationships in a larger sample of individuals with SMI. Understanding how these determinants influence perceptions of social support— i.e., the relationship between appraisal support and both social cognition and negative symptoms, and the relationship between self-esteem support and social anxiety—may provide targets for recovery focused interventions in the future. In recent years social cognition has been of growing interest in the SMI research literature (Dodell-Feder et al., 2015; Green et al., 2005; Green, 2016; Pelletier-Baldelli & Holt, 2019). Notably in our results we see a consistent association between social

cognition and perceived social support, future studies may want to expand on this line of inquiry. Inclusion of measures which holistically capture the construct of social cognition (i.e., emotional processing, theory of mind, social perception, social knowledge, and attributional bias), as well as measures of both perceived *and* received social support may provide valuable information to elucidate this relationship.

APPENDIX

Table A1
Correlations Matrix Between All Variables

Variables	1	2	3	4	5	6	7
1. ISEL Total	-	-	-	-	-	-	-
2. ISEL BS	0.87**	-	-	-	-	-	-
3. ISEL SE	0.73**	0.55**	-	-	-	-	-
4. ISEL TS	0.86**	0.67**	0.53**	-	-	-	-
5. ISEL AS	0.84**	0.62**	0.42**	0.65**	-	-	-
6. SANS	-0.20	-0.09	-0.16	-0.16	-0.29*	-	-
7. MSCEIT	0.30*	0.16	0.18	0.25	0.40**	-0.11	-
8. LSAS	-0.20	-0.20	-0.29*	-0.11	-0.12	0.20	-0.18

Note: ISEL: Interpersonal Support Evaluation List; ISEL BS: Belonging Support; ISEL SE: Self-Esteem Support; ISEL TS: Tangible Support; ISEL AS: Appraisal Support; SANS: Scale for the Assessment of Negative Symptoms; MSCEIT: Mayer-Salovey-Caruso Emotional Intelligence Test; LSAS: Liebowitz Social Anxiety Scale.

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

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