



LOMA LINDA UNIVERSITY

Loma Linda University
**TheScholarsRepository@LLU: Digital
Archive of Research, Scholarship &
Creative Works**

Loma Linda University Electronic Theses, Dissertations & Projects

9-2019

Education and Social Support as Mediators of Function and Cognition in Patients with Schizophrenia

Spring Flores Johnson

Follow this and additional works at: <https://scholarsrepository.llu.edu/etd>



Part of the [Clinical Psychology Commons](#)

Recommended Citation

Johnson, Spring Flores, "Education and Social Support as Mediators of Function and Cognition in Patients with Schizophrenia" (2019). *Loma Linda University Electronic Theses, Dissertations & Projects*. 1881.
<https://scholarsrepository.llu.edu/etd/1881>

This Dissertation is brought to you for free and open access by TheScholarsRepository@LLU: Digital Archive of Research, Scholarship & Creative Works. It has been accepted for inclusion in Loma Linda University Electronic Theses, Dissertations & Projects by an authorized administrator of TheScholarsRepository@LLU: Digital Archive of Research, Scholarship & Creative Works. For more information, please contact scholarsrepository@llu.edu.

LOMA LINDA UNIVERSITY
School of Behavioral Health
in conjunction with the
Faculty of Graduate Studies

Education and Social Support as Mediators of Function and Cognition in Patients with
Schizophrenia

by

Spring Flores Johnson

A Dissertation submitted in partial satisfaction of
the requirements for the degree
Doctor of Philosophy in Clinical Psychology

September 2019

© 2019

Spring Flores Johnson
All Rights Reserved

Each person whose signature appears below certifies that this dissertation in his/her opinion is adequate, in scope and quality, as a dissertation for the degree Doctor of Philosophy.

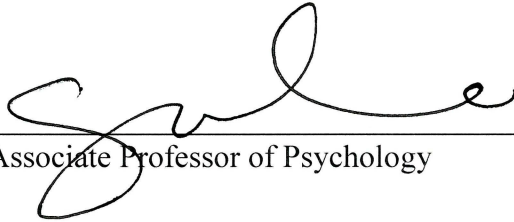


Chairperson

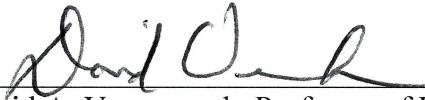
Colleen A. Brenner, Associate Professor of Psychology



Kyrstle D. Barrera, Assistant Professor, Physical Medicine and Rehabilitation



Grace J. Lee, Associate Professor of Psychology



David A. Vermeersch, Professor of Psychology

ACKNOWLEDGEMENTS

I would like express my sincerest gratitude to Dr. Brenner for her ongoing support, knowledge, patience, and guidance throughout this project. I would also like to thank my committee members, Dr. Barrera, Dr. Lee, and Dr. Vermeersch. Each one of you have made a great impact on my professional growth.

To my husband and our children, your love and support made all of this possible. To my family near and far who have believed in me, supported me, and created the space for me to reach for and achieve my dreams. Lastly, thank you to all of the amazing brave, strong, and brilliant women that have mentored and supported me. You make the pathway for all of us to grow and reach for the stars.

CONTENT

Approval Page.....	iii
Acknowledgements.....	iv
List of Figures	vi
List of Tables	vii
Abstract	viii
Chapter	
1. Introduction.....	1
Symptom Severity.....	4
Functional Capacity	5
Cognitive Impairment	7
Social Support.....	10
Level of Education.....	13
Hypothesis.....	15
2. Methods.....	17
Participants.....	17
Materials	18
Demographic Variables	18
Functional Capacity	18
Social Support.....	18
Symptom Severity.....	19
Cognitive Ability	19
Procedure	20
3. Conclusion	21
Results.....	21
Discussion	23
References.....	30

FIGURES

Figures	Page
1. Mediation Model.....	24
2. Mediation Model.....	25

TABLES

Tables	Page
1. Results of Multiple Mediation Analysis Predicting Functional Capacity from Symptom Severity	22
2. Results of Multiple Mediation Analysis Predicting Functional Capacity from Total Cognitive Ability	22
3. Mean scores per variable in comparison to corresponding variables in the available literature	26

ABSTRACT OF THE DISSERTATION

Education and Social Support as Mediators of Function and Cognition in Patients with
Schizophrenia

by

Spring Flores Johnson

Doctor of Philosophy, Graduate Program in Psychology

Loma Linda University, September 2019

Dr. Colleen A. Brenner, Chairperson

Schizophrenia affects an estimated 1% of the population worldwide and the devastating symptoms impact a patient's daily functioning, social and interpersonal relationships, cognitive abilities, and overall quality of life (American Psychiatric Association, 2000). Additionally, patients with schizophrenia can struggle to maintain employment and live independently due to low cognitive ability and functional capacity. Given the pervasive and deleterious impact of schizophrenia, it is imperative to address the functional toll this diagnosis can have on those suffering with the disorder to develop helpful strategies that increase functional capability. The goal of this study is to determine the impact symptom severity has on functional capacity in the presence of education level and perceived social support as mediators, and then, whether cognitive ability impacts functional capacity, and how much of this effect is mediated by perceived social support and level of education. Adults ($N = 11$) diagnosed with schizophrenia will complete a neuropsychological battery, measures of symptom severity, social support and functional capacity at two medical centers in Southern California. **Results:** There was no significant relationship between symptoms severity, functional capacity and cognitive ability. Level of education and perceived social support were also not significant

mediators of these relationship. **Conclusions:** Results suggest that symptom severity and cognitive ability are not associated with functional capacity which is not reflective of the available literature. However, unique characteristics of the participants (e.g., low symptom severity, higher level of education and functional capacity) could be impacting the results. Therefore, it is important to conduct additional research to replicate and extend the current findings, to confirm and assess possible reasons why there is no relationship between symptom severity, cognitive ability, and functional capacity and to uncover pathways that do impact an individual's ability to live independently and increase overall quality of life for those with schizophrenia.

CHAPTER ONE

INTRODUCTION

Schizophrenia affects an estimated 1% of the population worldwide and its impact on patient's daily functioning, quality of life, social and interpersonal relationships, and cognitive abilities are devastating (American Psychiatric Association, 2000).

Schizophrenia is a neuropsychiatric disorder and is characterized by a range of positive symptoms (i.e. hallucinations, delusions, racing thoughts) and negative symptoms (i.e. diminished emotional expression and avolition). Specifically, a diagnosis of schizophrenia is based on clinical observation of two or more of the above mentioned characteristic symptoms, (e.g., delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, flat affect, lack of speech, or avolition). Additionally, a significant deterioration in interpersonal relationships, self-care, and/or vocation compared to premorbid levels must be present, and symptoms must persist for at least six months. However specific etiology and pathophysiology of schizophrenia remains largely unknown. The current assumption is that schizophrenia is neurodevelopmental and heritability of the disorder is approximately 80% (Bilder, Howe, Novak, Sabb, & Parker, 2011). Neuroanatomically, it has been noted that those with schizophrenia can display a relative reduction in brain matter (i.e., grey matter reduction and loss of white matter integrity) and cerebral spinal fluid resulting in enlarged ventricles (Nar et al., 2004) in addition to less activation in the frontal lobe regions relative to healthy controls (Andreasen et al., 1992; Buchsbaum et al., 1992; Gurand Pearlson, 1993). Furthermore, according to the DSM-5, a range of symptoms such as cognitive, behavioral, and

emotional dysfunctions make up the characteristics of schizophrenia; however, no one symptom is considered pathogenic of the disorder; therefore, making a diagnosis is a process that requires grouping of symptoms that often vary from individual to individual.

Given the pervasive nature of the symptoms, individuals often suffer from low functionality in daily living (Aubin, Stip, Gelinas, Rainville, & Chapparo, 2009; Kurtz, Olfson, & Rose, 2013). Those with schizophrenia often have difficulty finding and keeping jobs, going to school, and paying bills. Additionally, patients with schizophrenia show significant impairment on measures of instrumental activities of daily living (ADLs) such as grocery shopping or bill paying (Evans et al., 2003). These challenges often result in a patient's inability to support him or herself and a reliance on care givers or social support which decreases patient's perceived quality of life (QOL) (Walker, Spring, Travis, 2001). Additionally, patients with schizophrenia typically rate their QOL not only lower than that of the general population, but also lower than those who are chronically physically ill (Bechdolf et al., 2003). The World Health Organization Quality of Life (WHOQOL) characterizes QOL as subjective, multidimensional, and consists of both positive and negative aspects, and is conceptualized as a sense of well-being that is both a subjective and objective evaluation of psychological, social, and emotional well-being in conjunction with personal development and purposeful activity (Narvaez et al., 2008; Yamauchi et al., 2008). Given the impact schizophrenia has on the multiple domains of living such as cognitive ability and functional capacity, it is important to analyze different variables that impact this relationship to improve the lives of those suffering with the disorder. This study aims to look at ways to explain the relationship between symptom severity, cognitive ability and functional capacity through the potential

mediating impact of education and perceived social support in hopes of finding ways to mitigate the deleterious impact the disorder has on peoples' lives.

Symptom Severity

The most debilitating factor in regard to schizophrenia is the recurrent and pervasive nature of the positive and negative symptoms that impact all aspects of a patient's life. For example, negative symptoms, such as depression, are associated with poorer long term functional outcomes, greater danger to self, substance abuse, challenging interpersonal relationships, lower level of medication adherence, and overall lower life satisfaction (Conley, 2009). Additionally, negative symptoms have been found to decrease drive and motivation to seek out social contacts (Mitchell & Pistrang, 2011). Furthermore, symptom burden is also seen as a strong predictor for functional outcome (Norman et al., 1999). Some researchers even argue that symptom burden is a stronger predictor for functional capability than neurocognitive functioning (Perlick, Rosenheck, Kaczynski, Bingham, & Collins, 2008). Furthermore, due to the debilitating nature of the symptoms, the overall mortality rate is two to three times higher for patients with schizophrenia than for the general public (Bushe et al., 2010) and between 4% to 13% of patients attempt suicide (Carlborg et al., 2010).

Homelessness is also a big problem for those diagnosed with schizophrenia, and the estimated prevalence of schizophrenia in homeless people is estimated to be approximately 11% (Salkow & Fichter, 2003). Additionally, those that are homeless typically receive little to no treatment (Folsome & Jeste, 2002). Overall, the symptoms that those with schizophrenia experience negatively impact almost all domains of an individual's life, and can have serious enduring consequences even including fatality.

Functional Capacity

Functional capacity is commonly defined as the ability to perform necessary desirable tasks in life, and above all, addresses a patient's ability to live independently (Patterson & Mausbach, 2010). Overall functional ability is measured by performance on competency measures and addresses the real-world functioning of a patient within his or her community, such as the ability to communicate with others and maintain employment. Specifically, the multiple areas that are addressed in functional capacity include everyday living skills (Velligan et al., 2007), social skills (Patterson et al., 2001b), and vocational ability (Twamley et al., 2006).

Additionally, there has been substantial research analyzing the impact of both positive and negative symptoms on functional ability. In a meta-analysis by Ventura, Helemann, Thames, Koellner, and Neuchterlein, (2009) both positive and negative symptoms were found to mediate the relationship between functional capacity and real word outcomes. Additionally, Leifker, Bowie, Harvey (2009) expanded upon the previous study by finding that both negative and positive symptoms are predictors of real-world outcomes specifically for specific psychotic symptoms (Bowie et al., 2006).

Given that functional ability determines an individual's ability to engage in activities that are necessary for normal care, the concept of functional capacity encompasses biological, psychological, social, and cognitive domains. Furthermore, in regards to neurocognitive abilities, multiple studies have indicated how deficits in the domains of working memory, attention, and processing speed impact psychosocial functioning (Green, 1996; Green, Kern, Braff, & Mintz, 2000; Green, Kern, & Heaton,

2004; Heinrichs & Zakzanis, 1998; Fett, et al., 2011). These deficits in neurocognitive domains are widely accepted core features of schizophrenia (Green et al., 2004; Bellack et al., 2007; Harvey et al., 2006) and maintain a stable presentation in acutely ill patients, when patients are experiencing symptom remission, and in patients experiencing their first episode (Saykin et al., 1994; Albus et al., 1996; Bilder et al., 2000; Hoff and Kremen, 2003; Hoff et al., 2005). Furthermore, cognitive ability is a predictor for functional capacity within the ability to function in social and work situations. (Green, 1996; Green et al., 2000). Symptom type such as positive, negative or disorganized can also have a significant impact on cognitive and functional ability, with some arguing that negative symptomatology has the largest impact (Carlsson et al., 2006); however, this has not been widely accepted (Simon et al., 2003; Brazo et al. 2002; Bozikas et al., 2004). Furthermore, functional capacity in areas of self-care, interpersonal functioning, and vocational ability are predicted by prodromal and early stage poor neurocognitive functioning and negative symptom expression (Stouten, Veling, Laan, Helm, & Gaag, 2014). However, negative symptoms, more so than positive symptoms have been associated with deficits in social and work functioning; although, both symptoms groups do affect ability to function within a community (Herbener & Harrow, 2004).

The World Health Organization (WHO) developed a revised working disability model that classifies functioning across three levels: the body, the person as a whole, and the person in social contexts. Disability is classified by dysfunction in one of these three levels, and a diagnosis of schizophrenia can involve dysfunction in one or more of these levels. Specifically, physical differences in brain structure (e.g., frontal lobes), cognitive, and psychiatric deficits make up impairments at the body level; the ability to produce

fluent speech and calculate change can make up impairments at the person as a whole level, and the ability to maintain employment and find/join community activities make up the social context (McKibbin et al., 2004). Furthermore, early onset of the disorder, negative symptom presentation (Cardenas et al., 2008), drug abuse, and lack of environmental support (Velligan et al., 2000) can all contribute to greater functional impairment (Patterson & Mausbach, 2010). Given the many areas of functioning impacted by a diagnosis of schizophrenia, it is imperative that efficacious treatments are found to decrease the level of disability within this group.

Cognitive Impairment

In addition to the pervasive symptoms, low functioning in multiple dimensions, and low quality of life, individuals diagnosed with schizophrenia suffer marked cognitive impairment, and these cognitive impairments serve as a significant predictor of functional impairment (Brown & Velligan, 2016). Furthermore, these cognitive impairments affect almost every domain, but are particularly marked in the areas of working memory, attention, processing speed, reasoning and problem solving, social cognition, visual learning and memory, and verbal learning and memory, and are now considered a central feature of schizophrenia (Walker, Spring, & Travis, 2016). In a foundational meta-analysis conducted by Heinrichs and Zakzanis (1998), a diagnosis of schizophrenia was associated with global cognitive impairment affecting virtually all domains with greater deficits for episodic memory, complex attention and ideational fluency, and conversely mostly intact semantic and visual perception.

Cognitive deficits were initially considered as diagnostic criteria in the DSM-5 for schizophrenia. However, the limited specificity and information regarding the impact of such deficits resulted in it being excluded from the formal diagnostic criteria (Bach & Keefe, 2010). However, cognitive deficits are still considered a key aspect of the pathology as well as a dimension of the disorder that should be measured (American Psychiatric Association, 2013). Additionally, the age of onset is also associated with the severity of cognitive deficits. Specifically, earlier the onset is predictive of more severe deficits especially in verbal abilities (Bilder et al., 1991).

Typically, a pattern of generalized impairment across multiple domains is evident within a diagnosis of schizophrenia, especially for more fluid forms of intelligence such as verbal fluency, executive ability, and attentional function. However, typically crystalized types of intelligence such as basic reading and writing, vocabulary, and general information remain largely intact (Parsons & Hammeke. 2014). Additionally, all patients (from less severe to more severe) exhibit relative weaknesses on learning and memory, with the more severe patients exhibiting more deficits in executive functioning (Bilder et al., 2000). Furthermore, some patients may not perform within the impaired range on neuropsychological assessment; however, their deficits are in comparison to their potential ability had they not been diagnosed with schizophrenia (Goldberg et al., 1995). In regards to neuroanatomical expression of the disorder, functional imaging has noted that schizophrenia is specifically related to frontal lobe dysfunction which in turn is associated with marked deficits in executive, learning and memory domains. More specifically, imaging indicated patients either failed to appropriately activate these

regions, or they excessively activated these regions (Guimond, Chakravarty, Bergeron-Gagnon, Patel, & Lepage, 2016).

Through a competitive application process sponsored by The National Institute of Mental Health (NIMH) to address the measurement of cognitive ability in the cognitive domains most commonly affected by schizophrenia, the Measurement and Treatment of Research to Improve Cognition in Schizophrenia (MATRICS) Consensus Cognitive Battery (MCCB) was developed. Overall impairment in the 7 domains assessed by the MCCB was found in schizophrenia patients, and specifically, speed of processing and working memory were found to be the most impaired. Additionally, speed of processing, visual learning, and attention was a deciding factor in employment status (Kern et al., 2011). Furthermore, work and educational status has been found to be related to working memory performance and negative symptoms, the ability to live independently is related to verbal memory scores more so than negative symptom severity, and social cognition, attention, and negative symptoms are associated with the ability to function socially (Shamsi et al., 2011).

In sum, cognitive impairments widespread, are more strongly associated with reduced QOL and disability than other symptoms of schizophrenia (Green, 1996; Green et al., 2000), and are often viewed as the best predictor of functional outcomes for patients (Bowie & Harvey, 2006). As mentioned above, deficits in memory, executive functioning, concentration, and attention impact an individual's functional capacity (Barnett & Fletcher, 2008). For example, the ability to solve day to day novel problems relies on performance in these domains, and deficits within these domains creates difficulties in maintaining employment, paying bills, attending to and remembering

directions (Bellack, Gold, & Buchanan, 1999). Additionally, in two studies; one conducted by Evans et al. (2004) that analyzed the association between cognitive ability, symptom severity, and vocational outcomes in an outpatient population, and the other conducted by McGurk et al. (2000) studying adaptive functioning in a geriatric population, found that cognitive ability was more predictive of functional outcome than symptoms.

Although the above mentioned cognitive deficits in those with schizophrenia are typically regarded as stable from the time of symptom onset until middle age (Rund, 1998), there have been studies that suggest cognitive ability in those with schizophrenia may be influenced by other factors such as sociodemographics (Talreja, Shah, & Kataria, 2013), cognitive and psychosocial rehabilitation (Ripsaud, Rose, & Kurtz, 2016), and antipsychotic medications (Bilder et al, 2002; Keefe et al 2004). Given the impact reduced cognitive abilities have on those suffering with the disorder, it is imperative to further examine factors that may offset the impact of these reduced abilities to increase functional capacity for those suffering with schizophrenia.

Social Support

In the last 30 years, research has demonstrated the benefit of social support on longevity, mental, and physical health (Cohen and Janicki-Deverts 2009; Cohen and Wills 1985; Ertel, Glymour, and Berkman 2009; S. E. Taylor 2007; Thoits 1995; Turner and Turner 1999; Uchino 2004; Umberson and Montez 2010). Furthermore, the concept of social support can be divided into primary and secondary groups. Primary groups encompass small intimate and enduring relationships such as family members, significant

others, or friends, and secondary social support groups are typically made up of larger less intimate groups that may have a short or long term duration such as occupational groups or religious affiliations (Thoits, 2011). In a foundational study by House and Kahn (1985), social support is defined as functions or services provided by a primary or secondary support group that support an individual. Furthermore, this support can be classified as emotional (e.g., love, encouragement, sympathy), informational (e.g., advice, problem solving, feedback), or instrumental (e.g., material or behavior assistance). Additionally, in a foundational study by Cohen (1988), perceived social support can affect health through stress buffering and promotion of positive psychological states.

In regards to schizophrenia, there is a relative dearth of recent research exploring the impact of perceived social support on outcomes for those with schizophrenia. However, in a review by Judith Buchanan (1995), it was noted that patients with schizophrenia who were supported both socially and instrumentally experienced better health outcomes than those who were not supported. Additionally, she posited that social support involves the assumption that these supportive social interactions are perceived as beneficial and desirable by the recipients. Furthermore, she reviewed two widely accepted models that illustrate the influence of social support on stress; the direct (main) effect and the buffering effect model. The direct effect model posits that social support fulfills a basic need for general life satisfaction (Sandler & Barrera, 1984) and can prevent exposure to specific stressors (Gottlieb, 1981) by serving as a means of primary prevention or inoculation to stress.

Consequently, the buffering effect model theorizes that social support acts as more of a mediator essentially buffering the negative effects of stress (Cohen & Willis, 1985). Additionally, the buffering effect is often associated with perceived support for those suffering with severe mental illness (Callaghan & Morrissey, 1993). Moreover, Buchanan supports the idea that social support, in regards to schizophrenia, fits more aptly into the buffering effect model, and can potentially influence the course of the illness (Beels et al., 1984). However, Buchanan also noted that unfortunately, those suffering with schizophrenia struggle to maintain personal relationships and thereby experience a lack of perceived social support.

Furthermore, social isolation or living without social support or social connectedness is associated with higher health risks and even mortality within the general population (Holt-Lunstad, Smith, & Layton, 2010; Pantell, et al., 2013). Moreover, social isolation may have even more deleterious effects for those with severe mental disorders and can impact their ability to cope with stress (Sias, Bartoo, Friendship, 2007). Additionally, Giacco, et al., (2016) found that patients with psychotic disorders have fewer social contacts and were less likely to seek out social support potentially due to underreporting of feelings of loneliness. Most recently, in a study specifically addressing social support as a method of proactive coping, it was suggested that social support can enhance functional capability by influencing the stress appraisal process and increasing motivation to actively cope with difficulties in patients with schizophrenia (Davis & Brekke, 2014).

Ultimately, social support has been shown to serve as a protective factor and not only positively affects QOL, but also decreases the severity of psychiatric symptoms in

those with schizophrenia (Lamber & Naber, 2004). Therefore, social support is an important variable to address when analyzing the relationship between symptom burden and distress. More recently, Uchino (2006) defined social support as comprised of interpersonal relationships, whether family, friends, or even health-care members, that provide emotional sustenance in an individual's life. As stated above, a lack of social support has been found to adversely affect health (Wang et al., 2003). Furthermore, in a study by Hamaideh, AlMagaireh, Abu-Rarksakh, & Alomari (2014) specifically looking at the role of social support and QOL in patients with schizophrenia, QOL of life was found to correlate positively with social support and negatively with severity of psychiatric symptoms. However, as mentioned above, patients with schizophrenia can struggle to maintain social relationships due to poor social functioning and this isolation inhibits their ability to live independently and socially integrate (Melle, Friis, Hauff, & Vaglum, 2000). Furthermore, the lack of social relationships and desire for social relationships are reported by approximately 50 percent of individuals with schizophrenia (Perese & Wolf, 2005). Additionally, the social isolation experienced by those with schizophrenia can contribute to perceived stigma, lack of empowerment, depression, and ultimately lower QOL (Sibitz et al., 2011). Given that functional capacity, QOL, and cognitive ability are so deeply affected by schizophrenia, it is important to address factors that could positively impact the lives of those suffering with the disorder, such as the role of perceived social support.

Level of Education

Additionally, an individual's level of education can have a distinct impact on the course of the disease. In the foundational longitudinal study conducted by Wieselgren &

Lindstrom (1996) that analyzed the outcomes of admitted and readmitted schizophrenic patients, education level was found to have a significant positive correlation with outcome scores one year after admission. More specifically, education was the sole predictor that remained consistent over the course of the study, even after five years, and was also associated with lower incidences of hospitalization. Additionally, higher levels of education even predicted better social contacts, employment, and symptoms across both genders; therefore, increasing the likelihood that an individual's level of education can potentially mediate the impact symptom burden and cognitive ability have on functional capacity. Furthermore, levels of premorbid cognitive functioning are associated with more severe cognitive impairment and symptoms (Rabinowitz et al., 2002). Additionally, low childhood IQ is significantly predictive for higher incidences of adult psychiatric disorders diagnosis and specifically for schizophrenia (Koenen, et al., 2009). In a study conducted by Melle, Friis, Hauff, and Vaglum (2000) assessing social functioning in patients with schizophrenia, level of education was predictive of social adjustment and functioning, with higher education leading to increased functioning. Furthermore, in a neurodevelopmental model of schizophrenia, premorbid IQ levels are often used to determine later development of the disorder (Murray and Lewis, 1987; Weinberger, 1987). A meta-analysis conducted by Khandaker, Barnett, White and Jones (2011) found that IQ was strongly associated with age of onset and specifically that the greater the IQ deficits, the earlier illness onset could be expected. In addition, a higher level of cognitive reserve could potentially be considered a protective factor. Furthermore, in a study that expanded upon this meta-analysis, the findings suggested that the risk of developing schizophrenia was lowest for those with higher premorbid IQs

even in the presence of genetic risk factors (Kendler, Ohlsson, Sundquist, & Sundquist, 2015). Overall, the research suggests that higher levels of education and IQ are associated with later symptom onset, higher levels of sustained cognitive ability, and better functional outcomes for those diagnosed with schizophrenia. However, there is a relative dearth in available research addressing level of education and its impact on perceived social support in addition to cognitive ability and functional capacity. Thus, leading to the importance of analyzing level of education and its impact on the relationship between symptom burden, cognitive ability, and functional capacity.

Hypothesis

Schizophrenia and its pervasive symptomology can have a devastating impact on an individual's functional capability, cognitive ability, social experience, and overall quality of life. Additionally, given the predictive nature cognitive impairment has on functional capacity, as well as the impact social support and level of education can have on health outcomes, it is imperative to further address the relationship between these variables to potentially lessen their impact on functional capacity for those diagnosed with schizophrenia. Additionally, analyzing the relationship between cognitive ability and functional capacity through the lens of social support and level of education is a novel approach to assessing potential treatment modalities and potential health outcomes.

Therefore, in current study I aim to examine whether perceived social support and level of education mediate the relationship between a patient's symptom severity and functional capacity. In addition, I will also examine whether perceived social support and education mediate the relationship between a patient's functional capacity and their

cognitive ability. Our hypothesis is that there will be a significant negative relationship between symptom severity and level of functional capacity and that this relationship will be mediated by perceived social support and level of education. Essentially, as a participant's total symptom burden increases, his or her level of functional capacity will decrease. Furthermore, social support and level of education will be associated with lower levels of symptom burden and higher levels of functional capacity. In addition, we hypothesize that there will be a significant positive relationship between functional capacity and cognitive ability and that this relationship will also be mediated by perceived social support and level of education. Specifically, that as a patient's functional capacity increases, his or her level of cognitive ability will also increase. Additionally, social support and education will be associated with higher levels of functional capacity and cognitive ability.

CHAPTER TWO

METHODS

Participants

Participants included 11 adults between the ages of 20 and 53 years from various racial and socioeconomic backgrounds who have been diagnosed with schizophrenia based on DSM – 5 criteria. A three predictor variable equation was used for statistical power analyses and the following effect size cut-offs were employed: small ($f^2 = .02$), medium ($f^2 = .15$), and large ($f^2 = .35$). The alpha level used for this analysis was .05. The statistical power for this study was .80 for detecting a medium effect with 59 participants, and a large effect with 36 participants. Thus, there was more than adequate power (i.e., power $\geq .80$) at the moderate to large effect size level. Furthermore, utilizing a large effect size will allow the impact of the mediating variables to be more easily distinguished. Additionally, I predicted a significant difference between the groups given the previous literature on the relationship between symptom severity and functional capacity and cognitive ability and functional capacity; therefore, justifying the use of a large effect size as opposed to a small or medium effect size. Furthermore, a large effect size lends itself to more practical significance given the purpose of the study is more clinical in nature and reflective of previous research (Pracher & Kelley, 2011).

Materials

Demographic variables

Patients were asked to report their age, gender, ethnicity, marital status, education level, and duration of diagnosis.

Functional Capacity

Participants' functional capacity was assessed by the Brief International Functional Capacity Assessment (BIFCA). This measure was developed out of the National Institute of Mental Health (NIMH) initiative in sponsorship by a government-industry-academic collaboration (MATRICS-CT) and provides a detailed assessment for individual facets relating to quality of life. The BIFCA is considered a valid and reliable instrument that is sensitive to health-related QOL in subjects with psychotic illnesses ($\alpha = 0.70$) (Herman et al., 2002)

Social Support

Participants' level of perceived social support was assessed by the BASIS-24 (Eisen, Normand, Belanger, Spiro, & Esch, 2004). This measure was developed to give health care professionals a way to gather pertinent patient information in a brief amount of time. The BASIS-24 is a 24-item measure that consists of six scales; Depression and Functioning, Relationships, Self-Harm, Emotional Lability, Psychosis, and Substance abuse. For this study, only the scale of Relationships will be used. This scale consists of six questions ($\alpha = 0.75$) such as "During the PAST WEEK, how much of the time did you... 'Get along with people in your family?', 'Get along with people outside your family?', 'Feel like you had someone to turn to if you needed help', etc. All questions are

rated on a 5-point Likert scale with a time frame of the past week ranging from 1 ('None of the time'), to 5 ('All of the time') (Cameron et al.'s, 2007).

Symptom Severity

Participants level of symptom severity was measured by the Positive and Negative Syndrome Scale (PANSS). The PANSS is a 30-item brief semi-structured interview which rates the participant's current positive (7 items), negative (7 items), and general symptom (16 items) presentation. The PANSS has been found to be valid (Kay, 1990) and to have high test-retest reliability ($\alpha = 0.71$) (Kay et al., 1987).

Cognitive Ability

Participant's cognitive ability was assessed by the MATRICS Consensus Cognitive Battery (MCCB) (Neuchterlein and Green, 2006). This measure was developed to provide a relatively brief evaluation of the seven cognitive domains mostly affected by a diagnosis of schizophrenia and related disorders. Specifically, the MCCB assesses speed of processing, attention/vigilance, working memory, verbal and visual learning, reasoning and problem solving, and social cognition (Kern et al., 2008). Performance on the MCCB has been found to be very sensitive to the specific impairments and severity found in schizophrenic patients (August, Kiwanuka, McMahon, & Gold, 2012). Additionally, the MCCB has been found to have a high test-retest reliability of approximately .88 to .95, and low practice effects (Green, Harris, & Neuchterlein, 2014). Results will be summed across the 7 domains to obtain a total score that will be used to indicate overall cognitive ability.

Procedure

All participants were adults (over the age of 18) men and women diagnosed with schizophrenia and were recruited from two outpatient mental health clinics in Loma Linda, California. Specifically, the participants were recruited from Loma Linda University Behavioral Medicine Center (BMC) and the VA Loma Linda Healthcare System (VALLHS). The BMC is a university based community medical center offering both inpatient and outpatient treatment for individuals with mental health diagnoses. The VALLHS provides mental health treatment on an outpatient basis to Veterans with mental health diagnoses. To be eligible, participants must be able to read and write in English, and cannot be suffering with neurological and endocrine disorders, diagnosed with current substance abuse/dependence or mental retardation, or who have severe somatic disorder.

CHAPTER THREE

CONCLUSION

Results

Bivariate Pearson correlations were run to determine which demographic variables (age, gender, and ethnicity) would be included as covariates in a multiple mediation model. Age ($p > .05$), gender ($p > .05$), and ethnicity ($p > .05$) were not significantly associated with levels of functional capacity or cognitive ability. Therefore, no covariates were added in the multiple mediation model.

Using bootstrapping to conduct a multiple mediation analysis, we tested whether total symptom severity and cognitive ability would predict a participant's level of functional capacity and whether this effect would be mediated by level of education and/or perceived social support. The overall mediation model exploring the relationship between symptom severity and functional capacity was not significant, $F(1,9) = .62$, $R^2 = .06$, ($p > .05$) nor was the relationship between cognitive ability and functional capacity, $F(1,9) = 1.15$, $R^2 = .11$, ($p > .05$). Furthermore, there was no significant direct effect of symptom severity or cognitive ability on functional capacity in the presence of the two mediators (level of education and perceived social support), ($p > .05$). Level of education and perceived social support were not significant mediators in either of the relationships between symptom severity and functional capacity or cognitive ability and functional capacity, ($p > .05$), (see Table 1 & 2).

Table 1. *Results of Multiple Mediation Analysis Predicting Functional Capacity from Symptom Severity*

Mediated Effect	Point Estimate	SE	95% BCI	<i>t</i>
Total Indirect Effect	-0.0044	0.2929	[-.3565, .6825]	
Level of Education	-0.0051	0.2136	[-.3278, .5321]	0.0437
Perceived Social Support	0.0007	0.2054	[-.2476, .5194]	0.5763

Note. No significant effects were found

Table 2. *Results of Multiple Mediation Analysis Predicting Functional Capacity from Total Cognitive Ability*

Mediated Effect	Point Estimate	SE	95% BCI	<i>t</i>
Total Indirect Effect	-0.1987	4.5863	[-.9584, .4819]	
Level of Education	0.0036	5.7197	[-.2068, .3897]	0.7327
Perceived Social Support	-0.2024	2.8633	[-1.0456, .3207]	1.4662

Note. No significant effects were found

A post hoc power analysis was conducted using the software package GPower (Erdfelder, Faul, & Buchner, 1996). The sample size of 11 was used for the statistical power analyses and a three predictor variable equation was used as a baseline. The recommended effect sizes used for this assessment were as follows: small ($f^2 = .02$), medium ($f^2 = .15$), and large ($f^2 = .35$). The alpha level used for this analysis was .05. The post hoc analyses revealed the statistical power for this study was .06 for detecting a small effect, .12 for a medium effect, and .23 for a large effect. Thus, there was less than adequate statistical power in this study to detect a small, medium, or large effect (i.e., power $\geq .80$).

Discussion

The goal of the current study was to examine whether the relationship between functional capacity and symptom severity as well as functional capacity and cognitive ability was mediated by level of education and perceived social support in a population of patients diagnosed with schizophrenia. Contrary to the hypothesis, there was no significant relationship between any of the variables.

As mentioned above, no significant relationship was found between symptom severity and functional capacity. This is surprising given the amount of literature attesting to higher symptom severity being associated with lower functional capacity (Normal et al., 1999, Perlick, Rosenheck, Kaczynski, Bingham, & Collins, 2008). The results of the current study suggest that symptom severity ($M = 64.00$, $SD = 16.13$) is not associated with functional capacity ($M = 29.00$, $SD = 9.84$). A review of average scores for the PANSS shows that a total score of 58 is classified as mildly ill, a PANSS of 75 is moderately ill, a PANSS of 95 is considered markedly ill, and a PANSS of 116 is considered severely ill (Leucht et al., 2005). Given this information, it is possible that our insignificant findings are due to our population having closer to mildly ill symptomology which did not greatly impact functional capacity. Participants in this study reported positive symptom severity ($M = 17.91$) typical for what is found in the current literature ($M = 18.20$).

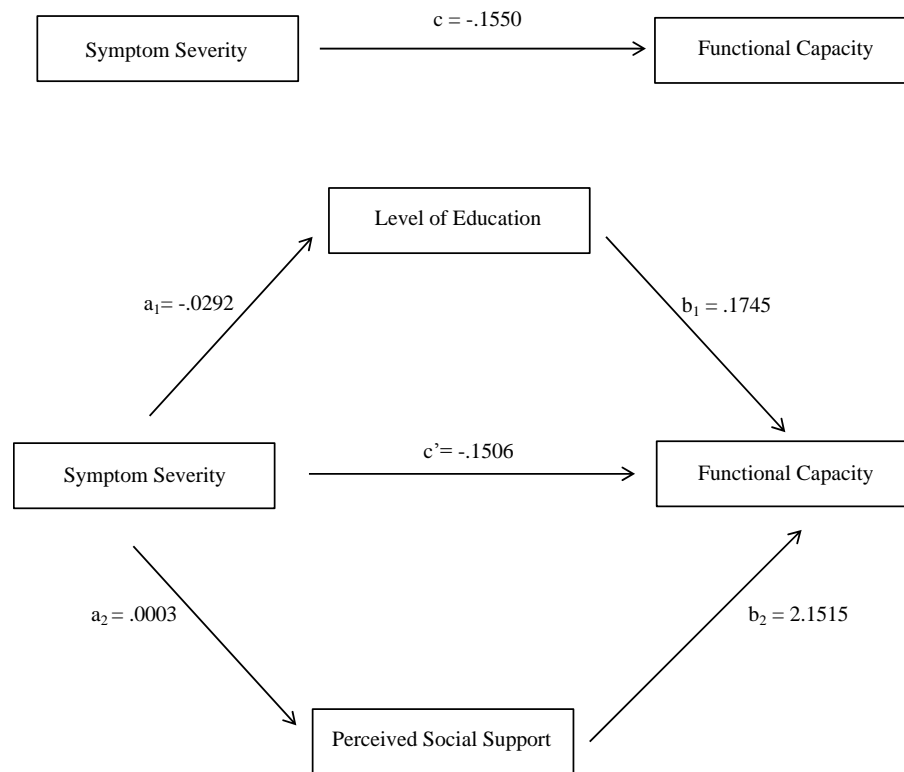


Figure 1. Results of analysis testing level of education and perceived social support as mediators of the relationship between symptom severity and functional capacity among patients with a diagnosis of schizophrenia.

However, participants reported lower negative symptom severity ($M = 15.73$) than is typically reported in the literature ($M = 21.01$) leading to a unique presentation of symptom severity within the sample that possibly influenced the overall significance of the statistical model (Kay, 1990). The lower negative symptom severity is also not reflective of current literature connecting negative symptoms with poor long-term functionality (Conley, 2009, Mitchell & Pistrang, 2011, Perlick, Rosenheck, Kaczynski, Bingham, & Collins, 2008). It is likely that by adding more participants with more varied symptom severity a significant relationship will be found similar to the current available literature.

Further there was also no relationship between cognitive ability ($M = 28.36$, $SD = 11.25$) and functional capacity. Therefore, the severity of a person's symptoms or the initial decline in cognitive ability does not appear to impact their ability to function in their lives. Of note, the average score for participants in our study was indicative of a severely impaired score which is reflective of the available literature (Kern et al., 2011).

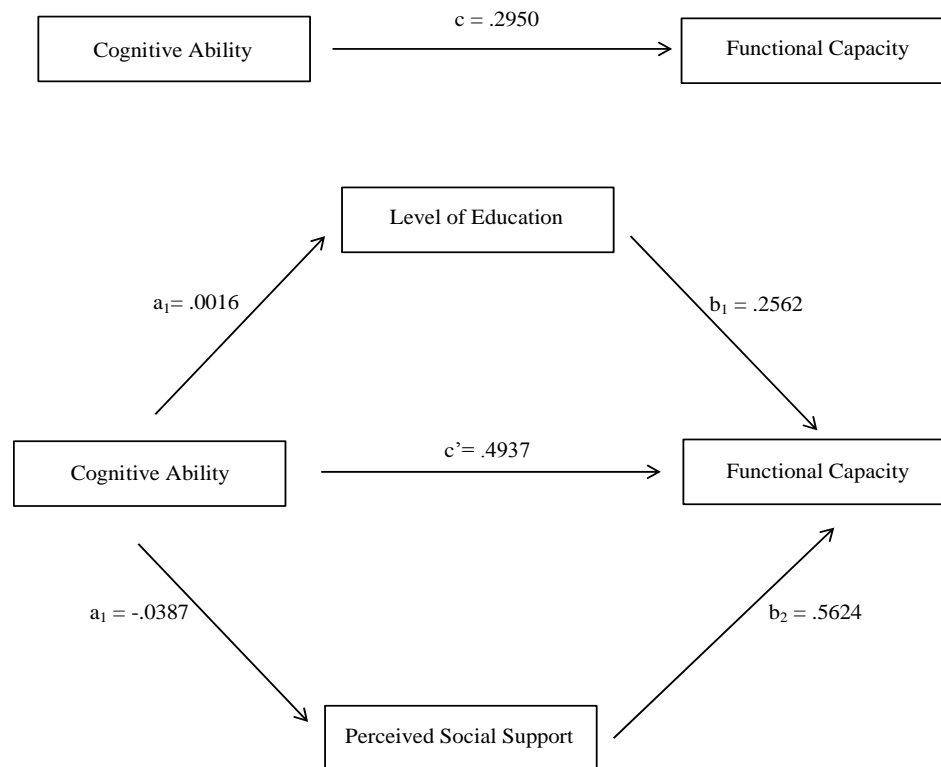


Figure 2. Results of analysis testing level of education and perceived social support as mediators of the relationship between cognitive ability and functional capacity among patients with a diagnosis of schizophrenia.

Additionally, the average functional capacity score for our participants was in the high average range ($t = 58.17$). Which is unexpected for a population with a diagnosis of schizophrenia. Available literature projects that individuals with a diagnosis of schizophrenia, will on average have lower functional capacity specifically in conjunction with lower cognitive ability (Green, 1996; Green, Kern, Braff, & Mintz, 2000; Green,

Kern, & Heaton, 2004; Heinrichs & Zakzanis, 1998; Fett, et al., 2011). Additionally, level of education and social support were also not predictive of an individual's ability to function in their lives. However, given the relatively large effect size ($b_2 = 2.15$) of the relationship between perceived social support and functional capacity, it is possible that the included participants may be receiving more social support than samples within the available literature. Given this information, it is likely that our small number of participants have unusual properties (e.g., low symptom severity and higher than average functional capacity) that, as mentioned above, is not reflective of the literature. It can also be postulated that there is another unknown third variable that is impacting functional capacity of those struggling with schizophrenia increasing the need for further investigation. A comparison of this studies mean findings per variable compared to the current available literature can be found in Table 3.

Table 3. Mean scores per variable in comparison to corresponding variables in the available current literature

Variable	Current Study	Descriptor	Literature	Descriptor
Symptom Severity	64.00	Mildly Ill	75	Moderately Ill
Cognitive Ability	28.36	Severely Impaired	30	Mild-Mod Impaired
Functional Capacity	58.17	High Average	33.2	Mild-Mod Impaired
Level of Education	13	Some College	11 - 12	High School
Perceived Social Support	1.62	Impaired	n/a*	Impaired

* Analysis of literature presents a variety of measures used and the overall consensus is impaired for those with schizophrenia

The results of the current study should be interpreted in light of several limitations. First, the low sample size limited the statistical power in this study to detect a large effect. A large effect size was planned to allow the impact of the mediating variables to be more easily distinguished. It is also likely that the low sample size is contributing to the lack of significance throughout the tested relationships. Given the power analysis, non-significant effects might be the result of Type II error due to low power for detecting a large effect. It is likely that as subjects are added to the current and ongoing study, patterns will emerge regarding our hypotheses.

Additionally, there was a relative lack of diversity within the study sample. The participants of this study were primarily Caucasian and recruited from one geographic location. The lack of diversity within the population could affect the overall generalizability of the study which is an overall problem facing multiple studies focusing on schizophrenia (Shennach-Wolf et al., 2009; Moore et al., 2015; Kendler, Ohlsson, Sundquist, & Sundquist, 2015). Furthermore, the overall homogeneity of the subjects likely influenced the lack of statistical significance specifically in regards to the above mentioned and higher than expected functional capacity and education level. Specifically, participants had an average education level of 13 years reflective of a high school diploma and some college which is higher than what is typically found in the literature (Vargas et al., 2014). In addition, the cross-sectional design of this study only allows us to make inferences about association and not causation between symptom severity, cognitive ability and functional capacity and the corresponding mediators. Furthermore, the lack of a longitudinal design precludes drawing conclusions about the influence of level of education and perceived social support over time for those with schizophrenia.

Another limitation is the use of a self-report measure (social support, BASIS-24) as using self-report measures introduces the possibility of response bias.

These findings suggest that functional capacity is possibly influenced by something other than severity of symptoms, education level, perceived social support, and cognitive ability. Because schizophrenia so greatly impacts an individual's capacity to function, overall emotional wellbeing, and quality of life, it is imperative to investigate this area further. Identifying significant factors to increase functional capacity will likely improve overall wellbeing and in the long run increase the effectiveness of treatment modalities.

Overall, the results of this study emphasize the importance of finding significant pathways to increase functional capacity for those with a diagnosis of schizophrenia. Given the current small number of participants, ongoing testing and analyses are needed to fully understand the relationship of the proposed variables and replicate/explore the findings of this study in a larger and more diverse sample. Further, with a greater number of participants, specific domains of cognitive ability (e.g., attention, executive functioning, processing speed, language, memory) will be assessed to see their potential impact on the other variables. In addition, even though our findings regarding the relationship between symptom severity, cognitive ability, and functional capacity were not statistically significant, the findings still have clinical implications to aid clinicians when assessing helpful modalities to use for those with schizophrenia. However, it is important to conduct additional research to replicate and extend the current findings, to confirm and assess possible reasons why there is no relationship between symptom severity, cognitive ability, and functional capacity and to uncover pathways that do

impact an individual's ability to live independently and increase overall quality of life for those with schizophrenia.

REFERENCES

- Aubin, G., Stip, E., G  linas, I., Rainville, C., & Chapparo, C. (2009). Daily activities, cognition and community functioning in persons with schizophrenia. *Schizophrenia Research*, 107, 313–318. <http://dx.doi.org/10.1016/j.schres.2008.08.002>
- August, S. M., Kiwanuka, J. N., McMahon, R. P., & Gold, J. M. (2012). The MATRICS Consensus Cognitive Battery (MCCB): Clinical and cognitive correlates. *Schizophrenia Research*, 134(1), 76-82. doi:10.1016/j.schres.2011.10.015
- Barnett, B. H., & Fletcher, P.C., (2008). Cognition in schizophrenia. *Cognitive Neurology*, 419- 437.
- Bechdorf A., Klosterk  tter J., Hambrecht M., (2003). Determinants of subjective quality of life in post acute patients with schizophrenia. *European Archive of Psychiatry and Clinical Neuroscience*, 253, 228–235.
- Bellack, A. S., Gold, J. M., & Buchanan, R. W. (1999). Cognitive Rehabilitation for Schizophrenia: Problems, Prospects, and Strategies. *Schizophrenia Bulletin*, 25(2), 257- 274. doi:10.1093/oxfordjournals.schbul.a033377
- Bilder R. M., Goldman R.S., Volavka J., (2002). Neurocognitive effects of clozapine, olanzapine, risperidone, and haloperidol in patients with chronic schizophrenia or schizoaffective disorder. *American Journal of Psychiatry*, 159, 1018–28.
- Bowey, C. R., & Harvey, P. D., (2006). Cognitive deficits and functional outcomes in schizophrenia. *Neuropsychiatric Disease and Treatment*, 2(4), 531-536.
- Bushe C.J., Taylor M., Haukka J., (2010). Mortality in schizophrenia: a measurable clinical endpoint. *Journal of Psychopharmacology*, 24(4),17-25.
- Carlborg, A., Winnerb  ck, K., J  nsson, E.G., Jokinen, J, Nordstr  m, P., (2010). Suicide in schizophrenia. *Expert Review Neurotherapeutics*, 10(7),1153-64.
- Conley, R. R. (2009). The Burden of Depressive Symptoms in People with Schizophrenia. *Psychiatric Clinics of North America*, 32(4), 853-861. doi:10.1016/j.psc.2009.09.001
- Evans, J. (2004). Cognitive and clinical predictors of success in vocational rehabilitation in schizophrenia. *Schizophrenia Research*, 70(2-3), 331-342. doi:10.1016/j.schres.2004.01.011
- Evans, J. D., Heaton, R. K., Paulsen, J. S., Palmer, B. W., Patterson, T., & Jeste, D. V. (2003). The relationship of neuropsychological abilities to specific domains of functional

- capacity in older schizophrenia patients. *Biological Psychiatry*, 53(5), 422-430. doi:10.1016/s0006-3223(02)01476-2
- Green, M.F., Harvey, P.D., (2014). Cognition in schizophrenia: past, present, and future *Schizophrenia Research*, 1(1), 1-9
- Green, M. F., Harris, J. G., & Nuechterlein, K. H. (2014). The MATRICS Consensus Cognitive Battery: What We Know 6 Years Later. *American Journal of Psychiatry*, 171(11), 1151–1154. doi:10.1176/appi.ajp.2014.14070936
- Guimond, S., Chakravarty, M., Bergeron-Gagnon, L., Patel, R., & Lepage, M. (2016). Verbal memory impairments in schizophrenia associated with cortical thinning. *NeuroImage: Clinical*, 11, 20-29. doi:10.1016/j.nicl.2015.12.010
- Heinrichs, R.W., & Zakzanis, K.K., (1998). Neurocognitive deficit in schizophrenia: a quantitative review of the evidence. *Neuropsychology* 12, 426–445.
- Kaberi B., (2015). Cognitive Function in Schizophrenia: A Review. *Journal of Psychiatry*, 18, 187.
- Kay, S.R., (1990). Positive–negative symptom assessment in schizophrenia: psychometric issues and scale comparison. *The Psychiatric Quarterly*, 61, 163–178.
- Kay, S.R., Fiszbein, A., Opler, L.A., (1987). The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophrenia Bulletin* 13, 261–276.
- Keefe R.S., Seidman L. J., Christensen B. K., (2004). Comparative effect of atypical and conventional antipsychotic drugs on neurocognition in first-episode psychosis: a randomized, double-blind trial of olanzapine versus low doses of haloperidol. *American Journal of Psychiatry*, 161, 985–95.
- Kendler, K. S., Ohlsson, H., Sundquist, J., & Sundquist, K. (2015). IQ and schizophrenia in a Swedish national sample: their causal relationship and the interaction of IQ with genetic risk. *American Journal of Psychiatry*, 172(3), 259-265. doi:10.1176/appi.ajp.2014.14040516
- Kern, R. S., Gold, J. M., Dickinson, D., Green, M. F., Nuechterlein, K. H., Baade, L. E., & ... Marder, S. R. (2011). The MCCB impairment profile for schizophrenia outpatients: Results from the MATRICS psychometric and standardization study. *Schizophrenia Research*, 126(1-3), 124-131. doi:10.1016/j.schres.2010.11.008
- Kern, R.S., Nuechterlein, K.H., Green, M.F., Baade, L.E., Fenton, W.S., Gold, J.M., Keefe, R.S., Mesholam-Gately, R., Mintz, J., Seidman, L.J., Stover, E., Marder, S.R., (2008). The MATRICS consensus cognitive battery, part 2: conforming and standardization. *American Journal of Psychiatry* 165, 214–220.

- Khandaker, G. M., Barnett, J. H., White, I. R., & Jones, P. B. (2011). A quantitative meta-analysis of population-based studies of premorbid intelligence and schizophrenia. *Schizophrenia Research*, 132, 220-227.
- Koenen, K. C., Moffitt, T. E., Roberts, A. L., Martin, L. T., Kubzansky, L., Harrington, H., . . . Caspi, A. (2009). Childhood IQ and Adult Mental Disorders: A Test of the Cognitive Reserve Hypothesis. *American Journal of Psychiatry*, 166(1), 50-57. doi:10.1176/appi.ajp.2008.08030343
- Kurtz, M. M., Olfson, R. H., & Rose, J. (2013). Self-efficacy and functional status in schizophrenia: Relationship to insight, cognition and negative symptoms. *Schizophrenia Research*, 145, 69-74. <http://dx.doi.org/10.1016/j.schres.2012.12.030>
- Leucht, S., Kane, J., Kissling, W., Hamann, J., Etschel, E., & Engel, R. (2005). What does the PANSS mean? *Schizophrenia Research*, 79(2-3), 231-238. doi:10.1016/j.schres.2005.04.008
- Mcgurk, S. R., Moriarty, P. J., Harvey, P. D., Parrella, M., White, L., & Davis, K. L. (2000). The longitudinal relationship of clinical symptoms, cognitive functioning, and adaptive life in geriatric schizophrenia. *Schizophrenia Research*, 42(1), 47-55. doi:10.1016/s09209964(99)00097-3
- Melle, I., Friis, S., Hauff, E., & Vaglum, P. (2000). Social functioning of patients with schizophrenia in high-income welfare societies. *Psychiatric Services*, 51(2), 223-228. doi:10.1176/appi.ps.51.2.223
- Mitchell, G., & Pistrang, N. (2011). Befriending for mental health problems: Processes of helping. *Psychology and Psychotherapy: Theory, Research and Practice*, 84(2), 151-169. doi:10.1348/147608310x508566
- Murray, R. M., & Lewis, S. W. (1988). Is schizophrenia a neurodevelopmental disorder? *British Medical Journal*, 296(6614), 63-63. doi:10.1136/bmj.296.6614.63
- Narvaez J., Twamley E., McKibbin C., (2008). Subjective and objective quality of life in schizophrenia. *Schizophrenia Research*, 98, 201-208.
- Norman, R.M.G., Malla, A.K., Cortese, L., Cheng, S., Diaz, K., McIntosh, E., McLean, T.S., Rickwood, A., Voruganti, L.P., 1999. Symptoms and cognition as predictors of community functioning: a prospective analysis. *Am. J. Psychiatry* 156, 400-405.
- Perese, E. F., & Wolf, M. (2005). combating loneliness among persons with severe mental illness: social network interventions characteristics, effectiveness, and applicability. *Issues in Mental Health Nursing*, 26(6), 591-609. doi:10.1080/01612840590959425

- Perlick, D. A., Rosenheck, R. A., Kaczynski, R., Bingham, S., & Collins, J. (2008). Association of symptomatology and cognitive deficits to functional capacity in schizophrenia. *Schizophrenia Research*, 99(1-3), 192-199.
doi:10.1016/j.schres.2007.08.009
- Preacher, K. J., & Kelley, K. (2011). Effect size measures for mediation models: Quantitative strategies for communicating indirect effects. *Psychological Methods*, 16(2), 93-115. doi:10.1037/a0022658
- Rabinowitz, J., Smedt, G. D., Harvey, P. D., & Davidson, M. (2002). Relationship Between Premorbid Functioning and Symptom Severity as Assessed at First Episode of Psychosis. *American Journal of Psychiatry*, 159(12), 2021-2026.
doi:10.1176/appi.ajp.159.12.2021
- Rispaud, S.G., Rose, J., Kurtz, M.M. (2016). The relationship between change in cognition and change in functional ability in schizophrenia during cognitive and psychosocial Rehabilitation *Psychiatry Research*, 22, 145-150.
- Rund, B. R., (1998). A review of longitudinal studies of cognitive functions in schizophrenia patients. *Schizophrenia Bulletin*, 24, 425–35.
- Salkow, K., & Fichter, M. (2003). Homelessness and mental illness. *Current Opinion in Internal Medicine*, 2(5), 503-507. doi:10.1097/00132980-200310000-00012
- Shamsi, S., Lau A., Lencz, T, Burdick, K.E., DeRosse, P., Brenner, R., Lindenmayer, J.P., Malhotra, A.K., (2011). Cognitive and symptomatic predictors of functional disability in schizophrenia. *Schizophrenia Research*, 126(1–3), 257–64.
- Sibitz, I., Amering, M., Unger, A., Seyringer, M., Bachmann, A., Schrank, B., . . . Woppmann, A. (2011). The impact of the social network, stigma and empowerment on the quality of life in patients with schizophrenia. *European Psychiatry*, 26(1), 28-33.
doi:10.1016/j.eurpsy.2010.08.010
- Talreja, B. T., Shah, S., & Kataria, L. (2013). Cognitive function in schizophrenia and its association with socio-demographics factors. *Industrial Psychiatry Journal*, 22(1), 47–53.
- Uchino B., (2006). Social support and health: a review of physiological processes potentially underlying links to disease outcomes. *Journal of Behavioral Medicine*, 29, 377–387.
- Vargas, G., Strassnig, M., Sabbag, S., Gould, F., Durand, D., Stone, L., . . . Harvey, P. D. (2014). The course of vocational functioning in patients with schizophrenia: Re-examining social drift. *Schizophrenia Research: Cognition*, 1(1).
doi:10.1016/j.scog.2014.01.001

Yamauchi K., Aki H., Tomotake M., (2008). Predictors of subjective and objective quality of life in outpatients with schizophrenia. *Psychiatry and Clinical Neuroscience*, 62, 404-411.

Walker, A. E., Spring, J. D., & Travis, M. J., (2016). Addressing cognitive deficits in schizophrenia: toward a neurobiologically informed approach. *Biological Psychiatry*, 81, 67-69.

Wang, H., Wu, S., & Liu, Y., (2003). Association between social support and health outcomes: meta-analysis. *Kaohsiung Journal of Medical Science*, 19, 345–351.

Weinberger, D. R. (1987). Implications of Normal Brain Development for the Pathogenesis of Schizophrenia. *Archives of General Psychiatry*, 44(7), 660.
doi:10.1001/archpsyc.1987.01800190080012

Wieselgren, I., & Lindström, L. H. (1996). A prospective 1 – 5 year outcome study in first admitted and readmitted schizophrenic patients; relationship to heredity, premorbid adjustment, duration of disease and education level at index admission and neuroleptic treatment. *Acta Psychiatrica Scandinavica*, 93(1), 9-19.
doi:10.1111/j.16000447.1996.tb10613.x

World Health Organization Quality of Life Group (1998). Development of the world health organization WHOQOL-BREF quality of life assessment. *Psychological Medicine*, 28, 351-558.