How I see myself in you

Social Perception and Clinical Insight in Schizophrenia

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“Intrigued by that enigma, he dug so deeply into her sentiments that in search of interest he found love, because by trying to make her love him he ended up falling in love with her.”

— Gabriel García Márquez, One Hundred Years of Solitude
Abstract

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Title: How I See Myself in You. Social Perception and Clinical Insight in Schizophrenia

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Background: Schizophrenia is a severe mental disorder that leads to big functional impairments and debilitating symptoms in patients and that can be hard to treat sufficiently. One obstacle to sufficient treatment of schizophrenia, is lack of clinical insight as it is associated with poor treatment adherence and poor functioning. Clinical insight has been researched in relation to several aspects of schizophrenia, but the cause of insight deficits is still largely unclear. Research has, however, indicated that social cognition and/or psychotic symptoms may be central to insight deficits. The aim of this study, was to investigate clinical insight in relation to one less-researched domain of social cognition, social perception, as well as to schizophrenia symptoms. In addition, the study was to control for effects of non-social cognition as several studies have reported associations between social cognition and non-social cognition.

Methods: The participants were 55 patients with schizophrenia or schizoaffective disorder, all recruited from the Social Cognition Training in Schizophrenia study at NORMENT Centre for Psychosis Research. The student participated in data collection, and the dataset was extracted from the NORMENT database. Clinical Insight was measured with the Birchwood Self-report Insight Scale for Psychosis, Relationships across Domains was used to measure Social Perception, symptom level was measured with the Positive and Negative Syndrome Scale (PANSS) and non-social cognition was measured with the MATRICS Consensus Cognitive battery (MCCB). Results were analyzed using bivariate correlation analysis and hierarchical regression analysis.

Results: Bivariate correlation analyses showed moderate correlations between social perception and awareness of illness, between positive symptoms and total insight, and between disorganized symptoms and all domains except need for treatment. Non-social cognition correlated with total insight and awareness of illness. Hierarchical regression analyses showed that social perception predicted awareness of illness, while disorganized symptoms predicted total insight and relabeling of symptoms. None of the other variables individually contributed to clinical insight. The study
found a relationship between non-social cognition, social cognition, symptoms and clinical insight where different domains of insight had different predictors, and social perception and disorganized symptoms contributed uniquely to clinical insight. Implications of the study are that social cognition contributes to clinical insight together with symptoms, and that non-social cognition may contribute to clinical insight, but only indirectly through executive function that is also seem to be measured through disorganized symptoms. More research is needed in order to fully understand the relationship between social and non-social cognition and symptoms in relation to clinical insight.
Preface

My interest in this area of research began when I, as a fresh psychology student, started working in a forensic psychiatry unit, with patients with severe mental illness. In my work there as a milieu therapist, I experienced first-hand how important the ability of introspection and insight is in order to be able to work therapeutically with patients suffering from psychosis. In instances where patients suffered from severe psychotic episodes but were able to retain some form of insight into their condition, helping them emerge from the psychotic world of thought, in a gentle, non-invasive manner was an obtainable goal. In the case of patients experiencing severe lack of insight, psychotic episodes were likely to continue for extensive periods of time, making the task of caring for them and helping them to improve in a clinical setting strenuous.

The field of research into schizophrenia is characterized by how schizophrenia affects a wide range of human abilities, and how deficits in these abilities influence each other, making research into the interplay of schizophrenia deficits crucial. This thesis allows me to immerse myself in two aspects of the schizophrenia disorder that I believe to be of great importance to both treatment and functional outcome; namely social cognition and clinical insight. By investigating how social cognition, along with other factors, influence clinical insight, my hope is to be able to contribute to the research literature a further understanding of how the complexity of clinical insight interact with the domain of social cognition, and with schizophrenia in general.

I would like to thank my wonderful friends have gone through these six years of learning, maturation and character building together with me, and also to Andreas, who has been a wonderful bright spot in a challenging period.

Thank you so much to my supervisors, Anja and Stein, who have provided just the right amount of scaffolding and guidance throughout this project, from the moment I first walked in to Anja’s office with a vague idea about researching psychosis and insight, until their last comments and encouragement helped me cross the finish line.

Finally, a warm thank you to NORMENT and all the participants of the study that make this research possible.
# Table of Contents

1  **Theoretical Framework** .............................................................................................................................................. 1

   1.1  Schizophrenia .................................................................................................................................................. 1

       1.1.1  Core Symptoms of Schizophrenia ........................................................................................................ 1

   1.2  Cognition in Schizophrenia .......................................................................................................................... 2

       1.2.1  Cognitive Deficits; Prevalence, Nature and Course ............................................................................... 3

       1.2.2  Social Cognition .................................................................................................................................... 5

       1.2.3  Social Perception and Relationship Perception .................................................................................... 6

   1.3  Clinical Insight in Severe Mental Illness ......................................................................................................... 8

   1.4  Clinical Insight in Schizophrenia .................................................................................................................. 10

       1.4.1  Clinical Insight as a Psychotic Symptom .............................................................................................. 10

       1.4.2  Clinical Insight as a Coping Mechanism .............................................................................................. 11

       1.4.3  Clinical Insight as a Result of Cognitive Deficits ............................................................................... 12

   1.5  Social Cognition in Relation to Insight .......................................................................................................... 13

2  **Aims of the Study** .................................................................................................................................................... 15

   2.1  Hypothesis ......................................................................................................................................................... 16

3  **Method** ........................................................................................................................................................................ 17

   3.1  Source of Data and Authors Role in Collection .............................................................................................. 17

   3.2  Measures ............................................................................................................................................................ 17

       3.2.1  Birchwood Insight Scale (IS) .................................................................................................................. 17

       3.2.2  Relationships Across Domains - Short Version (RAD) ....................................................................... 18

       3.2.3  Positive and Negative Syndrome Scale (PANSS) .................................................................................. 19

       3.2.4  The MATRICS Consensus Cognitive Battery (MCCB) ........................................................................ 20

   3.3  Participants .......................................................................................................................................................... 21

   3.4  Method of Analysis ............................................................................................................................................. 22

   3.5  Ethical Considerations ...................................................................................................................................... 24

4  **Results** ......................................................................................................................................................................... 25

   4.1  Descriptive Analysis .......................................................................................................................................... 25

   4.2  Results from Bivariate Correlation Analyses ............................................................................................... 26

   4.3  Results from Multiple Regression Analyses .................................................................................................. 27

5  **Discussion** ................................................................................................................................................................. 30

   5.1  Results in relation to hypothesis .................................................................................................................... 30
5.2 Associations between Clinical Insight, Non-social and Social Cognition and Symptoms

5.2.1 Different Predictors for the Four Domains of Insight

5.2.2 The Influence of Non-social Cognition on Clinical Insight

5.2.3 Effects of Social Perception on Awareness of Illness

5.2.4 The Significance of the PANSS Disorganized Factor and the Five-Factor Model

5.2.5 An Integrated View on the Results

5.3 Implications for Treatment

5.4 Limitations of the Study and Future Directions

5.4.1 Participants

5.4.2 Birchwood and Self-Report as a Measure of Clinical Insight

5.4.3 The PANSS Five-Factor Model

5.4.4 Measuring Executive Functions

5.4.5 Methodology

5.5 Conclusion

References

List of tables and Figures:

Figure 1 Model of cognition, based on the MATRICS Initiative and SCOPE Study

Table 1: Demographical Data

Table 2: Clinical and Cognitive Descriptive Data

Table 3: Bivariate correlation analyses (Pearson’s r) between Birchwood Insight Scale and RAD Short, MCCB total and the PANSS Subscales

Table 4: Hierarchical multiple regression model for Birchwood Total Score (N = 55)

Table 5: Hierarchical multiple regression model for Birchwood Awareness of Illness (N = 55)

Table 5: Simple linear regression model for Birchwood Relabelling of Symptoms (N = 55)
1 Theoretical Framework

1.1 Schizophrenia

Schizophrenia is a severe mental disorder, affecting more than 51 million people worldwide (Beidel, Frueh, & Hersen, 2014, p.175). Individuals with this disorder have a 2-3 times large risk of suffering premature death than the general population, and have severely reduced social and occupation functioning (World Health Organization, 2018). Although schizophrenia has, historically, been considered to be relatively stable across time and cultures, the number of annual incidences of new cases of schizophrenia range from 8 to 40 per 100 000 persons (Beidel et al., 2014, p.175). Schizophrenia has it onset in early adulthood, frequently when patients are around 22-24 years (Johannessen, 2005, p.39). While 25% of patients only experience one episode of psychosis, 75% will have multiple episodes. Of these, 25% will have a chronic, lifelong struggle with their illness (Johannessen, 2005, p.34). A disorder that has an early onset, a sometimes chronic course and functional impairments, has societal consequences. Young people on the verge of becoming stable contributors through careers and social involvement, instead become disabled and dependent upon health services and financial support.

Several pharmacological and psychological interventions have been developed to relieve symptoms and increase social and occupational function in schizophrenia, but despite this, functional impairment continues to be a characteristic of the disorder. Psychosocial interventions targeting the cognitive deficits, an important determinant of functioning (Green, Kern, & Heaton, 2004), hold promise as interventions that may improve functioning.

1.1.1 Core Symptoms of Schizophrenia

Schizophrenia is characterized by three core symptoms: positive, negative and cognitive symptoms. At the center of the disorder is a deficit in the ability to differ between oneself and the environment, i.e. a rupture in the perception of reality, with distorted though patterns, perceptions and delusions (Johannessen, 2005, p.30). The first description of schizophrenia that closely resemble today’s definition, was made by Emil Kraepelin under the name of
“dementia praecox”, around 1919. In his book *Dementia Praecox and Paraphrenia*, Kraepelin draws an image of a disease of the mind, “a peculiar destruction of the internal connections of the psychic personality” (Kraepelin, 1919, p.3). The positive psychotic symptoms of schizophrenia were outlined already in this first description, and further when Eugen Bleuler coined the term “schizophrenia” in 1950, which means “splitting of the mind” (Green, 2001).

Positive symptoms include hallucinations, delusions and disorganization. Hallucinations are “perception-like experiences that occur without an external stimulus”, and delusions are “fixed beliefs that are not amenable to change in light of conflicting evidence” (American Psychiatric Association, 2013, p.87). Disorganization refers to incoherence of thought and speech that occurs in addition to hallucinations and delusions. However, statistical procedures have shown that symptoms of disorganized speech and behavior can be combined into a separate group of symptoms, making them a separate recognizable feature of the disorder (Green, 2001).

A second category of symptoms, one that was described by Kraepelin, although not conceptualized as an independent dimension until many years later (Galderisi, Färden, & Kaiser, 2017), is the negative symptoms. Negative symptoms include lack of normal emotional expression, reduction in speech and thought and lack in need for social interaction (Green, 2001). These symptoms are a central and separate part of the schizophrenia disorder (Shergill et al., 2014). Depressive symptoms can be divided into two factors; experiential negative symptoms and expressive negative symptoms, where experiential symptoms include decreased motivation, social engagement and interest, and expressive symptoms include decreased emotional expressivity and reduction in speech (Blanchard & Cohen, 2005; Llerena, Reddy, & Kern, 2018).

The final category of symptoms experienced by patients with schizophrenia, is cognitive deficits. Between 75% - 90% of patients suffer from deficits in one or more cognitive domains (Green et al., 2004).

### 1.2 Cognition in Schizophrenia

Four principles can be outlined as basis for research into cognition in schizophrenia; (1) cognitive deficits are core features of schizophrenia, and may occur independently of symptoms (Braff, 1993; Green et al., 2004; Kahn & Keefe, 2013; Ueland, Øie, Inge Landrø,
(2) these cognitive deficits are common, and affect a majority of patients (Heinrichs & Zakzanis, 1998; Schaefer, Giangrande, Weinberger, & Dickinson, 2013) (3) cognitive deficits are related to, and predict, daily function (Green et al., 2004; Tolman & Kurtz, 2012) (4) patients performance on cognitive tasks can be improved through treatment (e.g. Paquin, Wilson, Cellard, Lecomte, & Potvin, 2014). These four premises will be used as a basis for the discussion of cognition in this thesis.

1.2.1 Cognitive Deficits; Prevalence, Nature and Course

Cognitive deficits in schizophrenia are present particularly in the domains of processing speed, attention, memory, planning and social cognition, indicating an emphasis on temporal and frontal areas of the brain as well as deep structures (Green et al., 2004; Shahab et al., 2018). These cognitive deficits have negative consequences for day-to-day life and social interaction, and schizophrenia patients with these deficits benefit less effect from psychosocial treatments and psychotherapy (Sundet, 2005, p.105). An early review of the literature concluded that deficits in information processing are prominent and cannot be explained by “interference” from psychotic symptoms alone (Braff, 1993). These findings have since been replicated in several studies (e.g. Mohamed, Paulsen, O'Leary, Arndt, & Andreasen, 1999; Ventura, Thames, Wood, Guzik, & Hellemann, 2010), and support the view that cognition is a separate core symptom of schizophrenia.

A familial link can be seen for these cognitive deficits. Individuals with a high genetic risk of schizophrenia have a higher occurrence of cognitive impairments (Seidman et al., 2005). Cognitive deficits are also present before illness onset in patients (Liu et al., 2019). A longitudinal study from 2013 compared the cognitive function of schizophrenia patients, relatives and healthy controls over a five-year period, and showed that patients with schizophrenia are globally impaired across neurocognitive domains compared to relatives and healthy controls, but also that the relatives were impaired in specific domains compared to healthy controls (Roalf et al., 2013). These studies exemplify how cognitive deficits are part of the genetic vulnerability seen in schizophrenia.

There have also been several studies into the trajectory of cognitive functioning in schizophrenia during the past thirty years. A meta-analysis from 2008 investigated the longitudinal course of cognitive deficits, and showed how patients with schizophrenia
improved on most cognitive tasks over time, but that practice effects were more likely to explain this, than cognitive remediation (Szöke et al., 2008). Another meta-analysis investigated whether age of onset was significant for cognitive deficits, and found that individuals with youth-onset schizophrenia had more severe deficits, and fewer preserved functions than individuals with late-onset schizophrenia (Rajji, Ismail, & Mulsant, 2009). Another study from 2012 found similar levels of executive dysfunction in early-onset schizophrenia and adult onset schizophrenia at the time of first treatment, and suggested that the more severe cognitive deficits previously found in early-onset schizophrenia compared to adult onset, may be due to an interaction between the illness and the cognitive development process (Holmén et al., 2012). This is consistent with a 13-year follow-up study from 2010, where cognitive functioning in early-onset schizophrenia patients were compared to patients with ADHD and normal controls. Here, there early-onset schizophrenia group showed a significant decline or arrest in neurocognitive abilities compared to the other groups through the 13-year period (Øie et al., 2010).

In a ten-year follow-up study from 2016, researchers found that cognitive functioning after ten years was better in patients who experienced remission during the first year of the illness, and that neurocognitive scores were stable throughout the ten-year period. This indicates that individuals who quickly achieve stable remission constitutes a less severely ill group, reflected in their cognitive functioning, and that schizophrenia is not a degenerative disorder leading to gradual decline in neurocognitive functioning (Rund et al., 2016). In a recent study from 2018, investigating first episode psychotic patients after six years, Fu, Czajlkowski and Torgalsbøen found that compared to healthy controls, patients scored significantly lower on all cognitive domains at baseline, but had improvement in almost all cognitive domains over a six-year period, with improvement in problem solving/reasoning being larger than that of the control group, and improvement in working memory being smaller (Fu, Czajkowski, & Torgalsbøen, 2018).

In 2004, the National Institute of Mental Health (NIMH) established an initiative called “The Measurement and Treatment Research to Improve Cognition in Schizophrenia” (MATRICS). The ultimate purpose of this initiative was to identify cognitive domains to be represented in a consensus cognitive battery for schizophrenia and to encourage the development of new pharmacological treatments to treat cognitive deficits in schizophrenia. Through factor analysis and consensus discussions, the research group of MATRICS came up with seven
cognitive domains thought to constitute the core elements of cognitive function in schizophrenia; (1) working memory, (2) attention, (3) verbal learning and memory, (4) visual learning and memory, (5) reasoning and problem solving, (6) speed of processing (7) social cognition. Social cognition was not initially included as a domain but was included after initial data showed that social cognition is closely related to functional outcome and may mediate or moderate the relation between non-social cognition and outcome (Green et al., 2004). The battery constructed to measure these seven domains, is called The MATRICS Consensus Cognitive Battery (MCCB) and will be used as part of this thesis, although the seventh domain, social cognition, will be the most central.

1.2.2 Social Cognition

Social cognition defined in the context schizophrenia research, refers to “the mental operations that underlie social interactions, including perceiving, interpreting, and generating responses to the intentions, dispositions, and behaviors of others.” (Green et al., 2008). This definition was formulated in 2006, when NIMH arranged a consensus meeting to develop consensus on the domains of social cognition. From this, a panel of 11 experts on social cognition, called the RAND panel, in 2012 came together to discuss which areas of social cognition to establish as the different domains of social cognition. The expert panelists landed on four domains of social cognition: (1) emotion processing, decoding and utilizing emotional information (2) social perception, perceiving and interpreting social cues in others (3) theory of mind, infer about the beliefs of others and (4) attributional style, perceiving and interpreting positive and negative social events in the world (Pinkham et al., 2014). A follow-up initiative, The Social Cognition Psychometric Evaluation Study (SCOPE) sought to identify the best measures to assess social cognition (Pinkham et al., 2014). The domain social perception will be central later on in this project description.

Individuals with schizophrenia have impaired performance on tests that assess (1) emotion recognition; both for facial emotion and body language (Chan, Li, Cheung, & Gong, 2010; Engelstad, Sundet, Andreassen, & Vaskinn, 2017) (2) social perception (Savla, Vella, Armstrong, Penn, & Twamley, 2012) (3) theory of mind (Bora, Yucel, & Pantelis, 2009; Sprong, Schothorst, Vos, Hox, & Van Engeland, 2007) (4) attributional style (Harris, Oakley, & Picchioni, 2014). These can be seen as early as during the prodromal phase, are found to be stable over time (Pinkham, 2014) and are separate from symptom expression (Green, Horan,
& Lee, 2015). Deficits in all domains of social cognition are present in individuals at clinical high risk of psychosis (Lee, Hong, Shin, & Kwon, 2015) and these social cognitive deficits can, as with non-social cognition, be found in healthy relatives of patients with schizophrenia as well (Lavoie et al., 2013). It is also an important finding that social cognition is a separate factor from non-social neurocognitive factors in schizophrenia (Allen, Strauss, Donohue, & van Kammen, 2007; Bliksted, Fagerlund, Weed, Frith, & Videbech, 2014).

These social cognitive deficits have a large impact on everyday function in persons with schizophrenia as with non-social cognition. A meta-analysis showed that while both non-social cognition and social cognition was correlated with functional outcome, social cognition was a stronger predictor (Fett et al., 2011). Further, social cognition mediates between non-social cognition and functional outcome (Schmidt, Mueller, & Roder, 2011). Social cognition is also associated with negative symptoms, especially theory of mind and attributional bias (Lincoln, Mehl, Kesting, & Rief, 2011) and social cognitive deficits are related to positive symptoms, although moderated by negative symptoms (Bliksted, Videbech, Fagerlund, & Frith, 2017). These findings further points to the importance of investigating the effects of different types of deficits in social cognition.

1.2.3 Social Perception and Relationship Perception

Social perception is comprised of decoding and interpreting social cues in others, as well as integrating this information with contextual information and social knowledge (Pinkham, 2014). Compared to healthy controls, patients with schizophrenia perform worse across all domains of social cognition, with a large mean effect for social perception (Savla et al., 2012). Social perception is significantly associated with social behavior, community functioning and social problem solving (Couture, Penn, & Roberts, 2006), mediates the relationship between non-social cognition and interpersonal problem-solving in early psychosis (Addington, Saeedi, & Addington, 2006) and between early visual processing and functional outcome in established schizophrenia (Sergi, Rassovsky, Nuechterlein, & Green, 2006). Together, these studies make the social perception domain an interesting subject for further investigation.

A more recent effort to examine social perception in schizophrenia, builds on a paradigm called relational models theory, introduced by Alan Fiske (1992). The model shows that sociality is based on the process of establishing, strengthening, repairing and adjusting
relationships. A premise is that human-beings generally are oriented towards relationships. Furthermore, Fiske posed four implicit relationship models that an individual utilizes when processing relationships:

The first relationship model, is the relationship of *communal sharing*. This is an equivalence relation where the group of people see each other as undifferentiated and treat each other as equals. This kind of relationship is common among people who are very close, in families for example, where goods and responsibilities are divided among ‘community members’ based on need and ability. The second relationship model is the *authority ranking*. Here, there is an asymmetrical relation based on a linearly organization along a hierarchical dimension. This means that a higher ranked person, for example a leader, would be entitled to more or better resources than someone further down, but would also have an increased responsibility for taking care of his subordinates. *Equality matching*, the third relationship model, covers relations based on reciprocity and even balance. Here, there is a principle of repaying or returning resources, but it is loosely defined. *Market pricing*, the last relation model, is similar to *equality matching*, but is more formalized. This entails relations based on ratios and proportions, e.g. cost-benefits rations and rational calculations (Fiske, 1992).

The social cognitive ability of using these four models to organize and analyze relationships, can be summed up as relationship perception, a sub-domain of social perception. According to relational models theory, humans use these four principles to understand and interpret the world around us through relationships. For example, *authority ranking* may categorize the relationship to our boss, and *communal sharing* describes interactions in a group of close friends. Fiske (1992) investigated this theory of relational models empirically, through studies of social errors, and found that the common social errors that people make, are strongly connected to the above mentioned models of relationships. The cross-cultural generality of relational-models theory was tested in four cultural groups, and the results where replicated (Fiske, 1993). Relationship perception is a useful measure of social perception, as it is validated and theoretically grounded, and include the primary part of social perception. This consists of decoding and interpreting social cues in others and integrating this with pre-existing information (relationship models). This makes relationship perception an ideal measure of social perception in schizophrenia. Figure 1 illustrate how this thesis utilize and connect to the frameworks mapped by the MATRICS Initiative and the SCOPE Study (M.
Green et al., 2004; Pinkham et al., 2014), in order to investigate social cognition and clinical insight in schizophrenia.

1.3 Clinical Insight in Severe Mental Illness

The term “insight” is used in several different fields of psychology research. In the field of psychopathology, insight is a term used to describe a deficit occurring in some psychiatric illnesses. In the paper “The psychopathology of Insight” from 1934, insight is defined as “the correct attitude to morbid change in oneself, and moreover, the realization that the illness is mental” (as cited in David, 1999). The field of neuropsychology often concerns itself with the subject of insight, as many patients with traumatic brain injury suffers from a lack of insight into the changes that occur in their behaviour and function after the injury. Insight, however has also been studied in relation to psychiatric illnesses. One of the first mentions of insight in the field of psychology, is concerned with lack of insight in psychosis. In 1893, Krafft-Ebing states “…in the later stages of insanity, where delusions have become organized or mental disintegration has ensued, the patient is completely insightless about his disease state.” (as cited in David, 1999).
Insight can be conceptualized as clinical and cognitive insight; one describing the ability to realize that one is suffering from a mental illness, the other one the ability to realize that one’s cognitive abilities are compromised (Beck, Baruch, Balter, Steer & Warman, 2004). A study from 2009 showed that the two kinds of insight are separate constructs, but still correlating; patients lacking clinical insight did not necessarily lack cognitive insight, but lack in cognitive insight does not occur without lack in clinical insight (Donohoe et al., 2009). As clinical insight is a premise for lack in cognitive insight, it becomes an especially interesting phenomenon to study, because both cognitive and clinical insight are important parts of functional outcome and life satisfaction in schizophrenia.

A systematic review conducted in 2007 showed that poor clinical insight is associated with poor treatment adherence, and improved clinical insight correlates with better long-term functioning, although the causation is unclear (Lincoln, Lüllmann, & Rief, 2007). Insight into illness, and insight into positive and negative symptoms also correlates significantly with quality of life measures (Boyer et al., 2012).

An aspect of clinical insight that has large consequences, both to the individual and to society, is lack of compliance to treatment. A literature review from 2012 showed that treatment non-compliance is the most important contributor to relapse and re-hospitalization, and that this is costing patients in the UK up to 1.5 times more than compliant patients in direct medical costs annually (Sun, Zhang, & Yu, 2012). On a societal level, several studies have investigated how depot medication is cost efficient compared to oral medication in patients with high risk of non-compliance (e.g. Lam & Heeg, 2010) illustrating the benefits of patients complying with treatment.

One proposed model for clinical insight by David (1990) proposes that complete clinical insight for patients with schizophrenia, can only be achieved by having insight into three different aspects of the illness. The first dimension is having awareness of illness, attributing struggling and strange experiences to psychosis, without necessarily being able to differentiate between psychotic and non-psychotic symptoms, and without necessarily accepting need for or benefits of treatment. The second dimension is relabelling of psychotic experience, where the patient distinguishes his psychotic symptoms correctly from other experiences, without necessarily attributing them to a psychotic illness or realizing the need
for treatment. The third and last dimension is treatment compliance, where the patient accepts help, without necessarily seeing his struggling as due to psychosis, or being able to distinguish out the psychotic symptoms. A patient may have achieved insight into one or more of these three dimensions, but total insight is not possible without having insight into all three (David, 1990). This model of insight will be the basis for investigating insight in this study.

1.4 Clinical Insight in Schizophrenia

Although lack of clinical insight can be present in many mental disorders, it has been especially studied in schizophrenia (Marková & Berrios, 1995). Birchwood et al. (1994) outlines three ways of regarding clinical insight: as an unawareness of mental symptoms where ownership to symptoms is not felt, as faulty attributions of symptoms, interpreting the origin as being external, not internal, and as a psychological defense, protecting against the experienced psychosis. Following this, there are three models for understanding poor clinical insight in schizophrenia: (1) impaired clinical insight as a psychotic symptom (2) impaired clinical insight as a cognitive deficit, and (3) impaired clinical insight as a coping mechanism. It has been pointed out that lack of clinical insight is best seen as a multidimensional deficit made up of primary symptoms, neurocognitive deficits and cognitive style (Williams, Olfson, & Galanter, 2015), which suggests that the three proposed models all have merit.

1.4.1 Clinical Insight as a Psychotic Symptom

The model of clinical insight where lack of clinical insight is part of positive symptoms, sees it as “a delusion of health” (Osatuke, Ciesla, Kasckow, Zisook, & Mohamed, 2008) where the patient is incapable of accepting ownership of the disorder, despite being faced with compelling evidence. If lack of clinical insight were to be explained as a positive symptom one would expect to see a strong correlation between symptomatology and clinical insight in schizophrenia. In a study from 2012, Chan et al. investigated clinical and cognitive correlates of insight in a group of schizophrenia patients with their first psychotic episode. They found moderate significant correlations between both positive, negative and disorganized symptoms and poor insight, in addition to a correlation between executive functions and poor insight (Chan et al., 2012). Another study, investigating insight in patients with auditory hallucinations found that patients with persistent auditory hallucinations had significantly
poorer insight than patients without (Lera et al., 2011). As auditory hallucinations are common in schizophrenia, this supports the theory of psychotic symptoms as correlated to poor clinical insight. A meta-analysis by Mintz, Dobson and Romney showed only a small negative relationship between clinical insight and positive, negative and global symptoms in schizophrenia (Mintz, Dobson, & Romney, 2003). Together, these findings yield mixed results.

1.4.2 Clinical Insight as a Coping Mechanism

Although improved clinical insight in general has been shown to have positive effects on both functioning and life quality for people with schizophrenia (e.g. Boyer et al., 2012; Lincoln et al., 2007), some studies have found that patients with schizophrenia who have more clinical insight actually experience negative consequences as well. One study from 2007 found that awareness of illness and problems in patients with schizophrenia led to more experienced distress (Cooke et al., 2007) another study found that patients without deficits in clinical insight have a poorer quality of life than patients with poor clinical insight (Pyne, Bean, & Sullivan, 2001). In addition, several articles have shown a link between increased clinical insight and suicidal behavior (Foley et al., 2008; Kao & Liu, 2011), other studies have however failed to replicate this (Ayesa-Arriola et al., 2018; Salgado, Estallo, Mane, & Berge, 2010). One study found that clinical insight at baseline increased suicidality, while clinical insight at one-year follow-up decreased the risk, indicating that gaining insight during treatment decreases the risk of suicide (Barrett et al., 2015).

Some researchers have, as a consequence of these findings, argued that improving clinical insight is not entirely beneficial, as poor insight may serve as a protection against damage to their self-concept when experiencing grave mental illness (Beck-Sander, 1998). They established the experience of stigma as a possible link between clinical insight and low self-esteem and life quality, and found that whether higher insight led to low self-esteem and hope depended on whether the patient also accepted stigmatizing beliefs about the illness (Lysaker, Roe, & Yanos, 2007). These studies imply that low clinical insight may serve as a protection against negative outcomes, i.e. as a coping mechanism. It is, however, difficult to define clinical insight as a specific coping mechanism in schizophrenia, as many factors contribute to the functioning of the patients, and working out the sequence of events may be hard. It seems to be the case that lack of clinical insight serves as a protective mechanism to some
individuals, but as evidence points to clinical insight being a contributor to improved quality of life and functioning in many cases, it is likely that other factors contribute to this effect.

1.4.3 Clinical Insight as a Result of Cognitive Deficits

Many studies have found links between clinical insight and cognitive function. A study of 40 schizophrenia patients, half with and half without impairments in clinical insight, showed that clinical insight is closely linked to the area of self-monitoring in the brain, through impairment in clinical insight correlating with activation deficits in brain regions related to self-monitoring (Sapara, Ffytche, Cooke, Williams, & Kumari, 2015). Another study, using resting-state MRI scanning, found that poor clinical insight in youth with high risk of psychosis was associated with stronger default mode network connectivity, which in turn is associated with schizophrenia (Clark et al., 2018). The previously mentioned study looking at positive, negative and general symptoms connected to clinical insight, also found a correlation between executive functions and poor insight in patients (Chan et al., 2012). These findings imply that there are structural factors associated with cognitive deficits in schizophrenia patients that are closely linked to degree of clinical insight, supporting the view of cognitive deficits as contributing to poor clinical insight.

To summarize, both symptom severity, cognitive deficits and cognitive coping mechanisms may be contributing to loss of clinical insight in schizophrenia. Although the idea of loss of clinical insight as a coping mechanism is interesting, it is a theory that is difficult to conceptualize and investigate. The evidence indicating that clinical insight contributes to negative outcomes, suggesting that clinical insight has a function as a coping mechanism, is sparse compared to the evidence suggesting clinical insight is important for life satisfaction and functional outcome. Clinical insight as linked to symptom severity and/or cognitive function, on the other hand, has gained a lot of support throughout the years, with many studies showing that both psychotic symptoms and cognitive impairment affect clinical insight. Therefore, focusing on whether cognitive functioning or psychotic symptoms is the best predictor of clinical insight, appears to be a constructive question to ask, in order to further understand the lack of clinical insight so often seen in schizophrenia.
1.5 Social Cognition in Relation to Insight

Several studies have examined insight in relation to social cognition, and all four domains of social cognition have been explored. Vaskinn et al. (2013) investigated the relationship between clinical insight and emotion perception in schizophrenia and bipolar disorder. They found that clinical insight was moderately associated with emotion perception (auditory and visual) in schizophrenia, as well as being associated with fewer negative symptoms. Emotion processing have been found to predict clinical insight in patient groups from different cultures (Pijnenborg, Spikman, Jeronimus, & Aleman, 2013). Empathy, which is closely related to this domain of social cognition, has also been linked to clinical insight (Atoui et al., 2018). This points to the importance of social cognition in clinical insight. Seen from a cognitive, neuropsychological point of view, deficits in clinical insight could be due to a lacking ability to see oneself from the same perspective that others see us (Langdon & Ward, 2008). This makes research into the relation between clinical insight and social cognition interesting.

Theory of mind has been a popular field of study during the last decade, and has been investigated in relation to both clinical and cognitive insight. Two studies published in 2016 found a positive correlation between theory of mind and insight, but while one found that only cognitive insight correlated significantly (Popolo et al., 2016), the other found that only clinical insight was of importance (Zhang et al., 2016). This emphasizes the complex relationship between factors in cognition research in schizophrenia. A meta-study from 2017, including 16 studies, found a significant association between theory of mind and clinical insight, but not cognitive insight in schizophrenia (Bora, 2017). This shows that there seems to be a relationship between insight and theory of mind.

Researchers have also found that there is a correlation between attributional style (personalizing bias) in patients with persecutory delusions and clinical insight. The attributional bias was not brought on by theory of mind deficits (Langdon, Corner, McLaren, Ward, & Coltheart, 2006). This indicates that several social cognitive domains affect insight.

One study by Béland and Lepage (2017) studied the relative contribution of three social cognitive domains; theory of mind, emotion recognition and affective empathy, to clinical insight. These three domains correspond to the domains theory of mind and emotion processing. The study sought to investigate how these domains of social cognition relate to clinical insight when including an ability that is not part of social cognition, the ability of self-
reflectiveness, that entails reflecting on one’s own thoughts and integrating different perspectives. The results of the study showed that after controlling for known predictors of clinical insight, self-reflectiveness explained the most of the variance in clinical insight, while affective empathy was a significant contributor as well; theory of mind and emotion recognition was not. The results from the Béland & Lepage study may indicate that the connection between theory of mind and clinical insight is a result of the need in both capacities for recognizing and incorporating relevant social information (Béland & Lepage, 2017) thereby indicating that the ability to process social information, social perception, is a relevant factor to investigate.

To the author’s knowledge, only one study has investigated social perception and clinical insight (Bhagyavathi, Mehta, & Thirthalli, 2014). The study showed that empathy, emotion recognition and social perception all correlated significantly with clinical insight, but only empathy and emotion recognition emerged as significant predictors in a multiple linear regression analysis. However, the evidence on social perception and clinical insight limits itself to only one study, with participants in remission from schizophrenia or schizoaffective disorder. With the knowledge that theory of mind as well as emotional perception and attributional bias, although shown to be predictors of clinical insight in several studies, does not appear to be a sufficient predictor of all variance in clinical insight, and the assumption that the ability for recognizing relevant social information is important for both theory of mind and clinical insight (Béland & Lepage, 2017), social perception is an interesting variable to study further in relation to clinical insight.
2 Aims of the Study

Through the review of the theoretical framework of this thesis, clinical insight has emerged as a separate and important concept within schizophrenia research, an important factor for functional outcome as well as treatment effect. The reasons for lack of clinical insight in schizophrenia are not fully understood, but cognition and psychotic symptoms are two possible contributors to poor clinical insight.

The relevance of social cognition within the field of schizophrenia research has become apparent, as well as the need of an expansion of the database containing results from research into the different domains of social cognition. The relationship between clinical insight and non-social cognition, as well as clinical insight and three of the four domains of social cognition; theory of mind, emotion processing and attributional style have been extensively researched, while social perception as the fourth domain has been less investigated in relation to clinical insight. Consequently, the purpose of this study is to identify such a relationship. This is based on the hypothesis that social perception encompasses the ability of identifying subjects in social settings, and observing a situation through the eyes of others, thereby tapping into the same mental resources as clinical insight.

As psychotic symptoms are the other possible contributor to lack in clinical insight, this study will also investigate the relationship between clinical insight and psychotic symptoms, in addition to examining the relationship between clinical insight and social perception. The aim is to understand whether social cognition or psychotic symptoms have impact on deficits in clinical insight in people with schizophrenia.

Several studies have reported associations between social cognition and non-social cognition (e.g. Sergi & Green, 2003) and in the MATRICS Initiative both social and non-social cognition are included. This underlines the usefulness of controlling for neurocognitive abilities when researching a possible link between social perception and clinical insight. Therefore, The MATRICS Consensus Cognitive Battery (MCCB) will be included in analyses.
2.1 Hypothesis

This study will explore a proposed association between social perception and/or psychotic symptoms and clinical insight. The hypotheses underlying this study, supported by the theoretical framework outlined above, is the following:

(1) Social perception correlates significantly with clinical insight

(2) Psychotic symptoms correlate significantly with clinical insight

(3a) Level of clinical insight can be predicted by variation in social cognition

Or

(3b) Level of clinical insight can be predicted by variation in psychotic symptoms
3 Method

3.1 Source of Data and Authors Role in Collection

The data for this study comes from the Social Cognition Training in Schizophrenia study (Vaskinn et al, 2019) at NORMENT Centre for Psychosis Research, where the author served as one of the social cognitive trainers.

The author of this thesis has had a part-time research assistant position at NORMENT since 2015, working on several sub-projects in the Centre. The dataset used in this study was extracted from the NORMENT database, and the data file was further prepared for analysis by the author. All statistical analyses were conducted by the author.

3.2 Measures

3.2.1 Birchwood Insight Scale (IS)

Clinical insight in this study was measured using the Birchwood Self-report Insight Scale for Psychosis, created by Birchwood et al. (1994). The scale was developed for a research program on cognitive and psychosocial contributors to recovery from psychosis, with the purpose of being an effective tool that is both easy to administer and to replicate. The tool was developed just as the field was starting to move towards a continuum view of clinical insight, where insight no longer was thought of as an ability that you either lacked or possessed, but rather as a trait of thought and feeling that could be experienced to a larger or smaller degree (Marková & Berrios, 1992).

The scale is based on the conceptualization from the model of insight by David (1990) with the three separate domains; awareness of illness, awareness of need for treatment and relabeling of symptoms, and the questions are centered on these three domains. The Birchwood Insight Scale consists of eighth items in total, four items related to need for treatment (“you do not need medication”, “your stay in the hospital is necessary”, “the doctor is right in prescribing medication for you” and “you do not need to be seen by a doctor or psychiatrist”), two items related to awareness of illness (“you are mentally well” and “if someone said you have a nervous or mental illness, they would be right”), and relabeling of
symptoms consists of two items (“Some of your symptoms are made by your mind” and “none of the unusual things you are experiencing are due to an illness”).

The reliability of the scale was tested by its developers using both Cronbach’s alpha and the test-retest method, both of which yielded good results, indicating that the scale is measuring a stable, underlying trait (Birchwood et al., 1994). The scale was translated to Norwegian as part of a previous study conducted on participants from the database of NORMENT, by Jónsdóttir et al. (2008). The translation at the time was welcomed by the authors of the original scale and has been used extensively since. A study from 2019 found that the Norwegian translation have construct validity in schizophrenia, and that patient’s self-report on the Norwegian version of the Birchwood Insight Scale correspond to observer-based ratings (Buchmann et al., 2018).

3.2.2 Relationships Across Domains - Short Version (RAD)

Relationships across Domains (RAD) is a measure of relationship perception, developed by Sergi et al. in 2007. It is grounded in Relational Models Theory and consists of 25 vignettes; these are four sentence long texts, describing the interpersonal behaviors of a man and a woman, consistent with one of the four relational models. The subject is to answer three questions about each vignette, establishing whether the subject have implicit knowledge of relational models, or relationship perception (Sergi et al., 2009). RAD was developed because of a lack of measures of relationship perception, and so is the only test that measures this domain of social cognition exclusively. Scores from the RAD test are associated with daily functioning, measured as independent living/self-care and relationships with family and spouses (Sergi et al., 2009). The impairments measured by RAD appear to be relatively stable across illness phase (Green et al., 2012) and over time (Horan et al., 2012).

The version of RAD used in this thesis, has been shortened and translated to Norwegian by the team in NORMENT/TOP, and its good psychometric properties have been upheld in this version (Vaskinn, Fiske, & Green, 2017). The reason for using an abbreviated version is its improved tolerability.
3.2.3 Positive and Negative Syndrome Scale (PANSS)

The Positive and Negative Syndrome Scale (PANSS) was developed by Kay, Fiszbein, and Opler in 1987, as a tool for mapping schizophrenia, especially the positive and negative symptoms of the disorder. Their motivation for developing the PANSS, was a lack of psychometrically standardized scales to use in schizophrenia research (Kay, Fiszbein, & Opler, 1987). The PANSS consists of 30 items, measured on a 7-point rating scale, and was constructed with items adapted from the Brief Psychiatric Rating Scale (BPRS) and the Psychopathology Rating Schedule (PRS). To secure valid and consistent rating, each item on the PANSS is accompanied by a complete definition and criteria for scoring. The scale takes around 40-50 minutes to administer. From the original PANSS, four scales are computed; a positive scale, a negative scale, a general psychopathology scale and a composite scale that presents the direction and magnitude of difference between the positive and negative symptoms (Kay et al., 1987). From their initial study of the developed scale, Kay et al found that all the fours subscales were normally distributed, and had satisfying scores on validity and reliability indicators, making it a satisfying measure of schizophrenia symptomatology. Kay expanded upon these conclusions in 1990, showing how PANSS, as most clinical measures, suffer from issues relating to conceptualization of symptoms, but stating that these hurdles may be manageable with strict operational criteria and standards for validation (Kay, 1990).

In a systematic meta-analysis from 2015, a group of researchers from the University of Cagliari investigated the use of PANSS in randomized clinical trials during the past 25 years. The study included 363 articles, all randomized controlled trials using PANSS as a measure of symptomatology in schizophrenia. The study found that the PANSS measure generally was a suitable psychometric instrument to investigate efficacy of pharmacological interventions (which constituted a majority of the studies using PANSS). The study, however, underlines the importance of proper application and reporting of scores when using PANSS in research, as a majority of the included articles contained weaknesses in reporting of scores (Nicotra, Casu, Piras, & Marchese, 2015).

In recent years, the traditional three-factor model of PANSS, created by Kay at al. while developing the scale, has been challenged by a five-factor model. This five-factor model resulted for several years of factor analyses where different studies have yielded a different number of factors (Emsley, Rabinowitz, & Torreman, 2003; Van Den Oord et al., 2006;
Wallwork et al. sought to resolve this issue in 2012, by conducting a confirmatory factor analysis. A “consensus” model had been constructed by investigating how PANSS item assignment to factors had been determined in articles reporting on five-factor models (Wallwork et al., 2012). Results from this study showed that the original three-factor model fit the data poorly, while a five-factor model consisting of the factors positive factor, negative factor, concrete/disorganized factor, excited factor and depressed factor fit the best. Here, factor loadings for the individual items are strong, and bivariate factors are small. This model, however, includes only 20 of the original 30 items of PANSS (Wallwork et al., 2012).

This five-factor model has gained a lot of support during the past years. A study from 2013, especially concerned with the cognitive factor (described as concrete/disorganized factor in the Wallwork et al. model) showed that the five-factor model explained more of the variance than the original three-factor model and that higher cognitive factor scores was associated with poorer performance on an executive performance test (Rodriguez-Jimenez et al., 2013). This attests to the usefulness of the five-factor model of PANSS when assessing patients with schizophrenia, and also when emphasizing cognitive function as an important aspect of this.

Finally, a study using a Norwegian and Danish sample, Langeveld et al (2013) investigated the statistical fit of five different PANSS factor models in a sample of first-episode psychosis patients. Here, the Wallwork five-factor model was showed to yield the best results, and was recommended in future research on first-episode psychosis (Langeveld et al., 2013). Together, these studies show PANSS as a robust scale for measuring symptoms of schizophrenia, but with the new five-factor model as model for interpretation, rather than the original three-factor model. Therefore, the current study will utilize the five-factor model of Wallwork et al. when measuring symptoms and their relation to social cognition and clinical insight.

### 3.2.4 The MATRICS Consensus Cognitive Battery (MCCB)

The Measurement and Treatment Research to Improve Cognition in Schizophrenia Initiative’s selected battery of cognitive tests, or simply the MATRICS Consensus Cognitive Battery (MCCB), is a battery consisting of 10 tests, representing 7 underlying cognitive domains, meant to assess cognitive change in schizophrenia patients (Nuechterlein et al., 2008). The seven domains include: speed of processing, attention, working memory, verbal learning and memory, visual learning and memory, reasoning and problem solving and social cognition.
has become one of the most widely used cognitive test batteries within schizophrenia research, (Green, Harris, & Nuechterlein, 2014) and studies have found it to be an effective measure of differences on non-social cognition between schizophrenia patients and healthy controls (e.g. Holmén, Juuhl-Langseth, Thormodsen, Melle, & Rund, 2010). Its purpose in this study, will be to measure of neurocognitive effects when looking into the relationship between social perception and clinical insight. The MATRICS Battery has been chosen as the measure of neurocognitive deficits in this study because of its good psychometric properties, and because it has been used extensively in previous studies, making it a good basis for comparison.

3.3 Participants

The data used in this study consists of data from 55 patients, who have all completed the measures of clinical insight (IS) and RAD Short at baseline testing, in addition to the MCCB battery. Exclusion criteria for participants in the NORMENT database, is history of traumatic brain injury, neurological disease, IQ < 70, and age below 18 years or above 55 years.

Table 1: Demographical Data

<table>
<thead>
<tr>
<th>Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 55</td>
<td></td>
</tr>
<tr>
<td>Age Mean = 29.93 SD = 8.61</td>
<td></td>
</tr>
<tr>
<td>Sex 38 male</td>
<td></td>
</tr>
<tr>
<td>17 female</td>
<td></td>
</tr>
<tr>
<td>Living condition a</td>
<td>5 inpatients</td>
</tr>
<tr>
<td></td>
<td>45 outpatients</td>
</tr>
<tr>
<td>IQ (WASI) Mean = 101.7 SD = 12.96</td>
<td></td>
</tr>
<tr>
<td>Education level (years) Mean = 12.5 SD = 2.61</td>
<td></td>
</tr>
<tr>
<td>Illness duration (years) b Mean = 7.9 SD = 7.80</td>
<td></td>
</tr>
<tr>
<td>GAF-F Mean = 44.2 SD = 10.56</td>
<td></td>
</tr>
<tr>
<td>GAF-S Mean = 44.1 SD = 11.61</td>
<td></td>
</tr>
</tbody>
</table>

a = 5 missing. b = 1 missing.
3.4 Method of Analysis

All statistical analyses were performed using IBM Statistical Package for the Social Sciences 25 for Windows, alpha level was set to 0.05 and two-tailed tests were applied for all statistical tests. Preliminary analyses were conducted to investigate the distribution of the sample and to test assumptions of multicollinearity, homoscedasticity, the presence of outliers and normality.

Test of normality was done using the Kolmogorov-Smirnov test of normality, this test showed that most of the variables were normally distributed, but a few were not. IS, RAD Short, MCCB and IQ all yielded non-significant values (p > .05) on the Kolmogorov-Smirnov test of normality, but three of the five subscales of PANSS, the negative factor, the concrete/disorganized factor and the excited factor, obtained significant test results (p < .05), which imply that the variables are not normally distributed. Field (2013, p.184) points out that in large samples, tests of normality, including the Kolmogorov-Smirnov test of normality, tend to yield significant results, even for unimportant effects, while in small samples, they may lack power to detect violations of assumptions. In a clinical perspective, the sample of 55 participants in this study is quite a large sample, and only three of five subscales on one of five measures to be used in the analyses turned out with significant test results on the Kolmogorov-Smirnov test. As non-parametric designs, although being the appropriate choice for non-normally distributed data, tend to have less power than parametric tests, the general recommendation is to use parametric tests over non-parametric tests when possible. As neither of the main variables in this study obtained significant test results, and the sample size is relatively large, the analyses used in this study will be parametric.

Descriptive statistics was used to characterize the demographical and clinical characteristics of the participants, as well as to explore the three main variables; IS (clinical insight measure), RAD Short (social perception measure) and PANSS (symptom severity/psychotic symptoms) and the additional variable MCCB Total (neurocognitive function). A semi-exploratory approach was utilized, where bivariate correlation analyses was conducted to assess the relationship between clinical insight and the three other variables, breaking the clinical insight measure down to its three subscales and total score, to investigate a possible difference in relation to social perception and psychotic symptoms. In addition, a bivariate correlation analysis was conducted between MCCB level and clinical insight, to investigate whether this
variable contribute significant effects on clinical insight that should be controlled for. Findings from these analyses were further investigated using hierarchical multiple regression to establish whether relationships were causational in nature, and which variable was the best predictor. Variables that yielded correlations of medium strength, defined as above 0.30 in accordance with Cohen’s conventions (Cohen, 1988, p.77-81), were used in further hierarchical multiple regression analysis.

Hierarchical regression analysis was chosen as a method based on the following assumption: non-social cognition can be seen as the basic foundation of most or all human behavior, and social cognition is widely regarded as dependent upon non-social cognition (e.g. Green et al., 2004), psychopathology, and psychotic symptomatology in particular, on the other hand, is not a fixed variable, but rather a shifting and fluctuating concept in some individuals. Therefore, when investigating the effect of these different predictive variables on clinical insight, it is reasonable to account for the other variables, and this is best done by building a hierarchical framework, where the most basal functions are entered first, followed by the secondary and tertiary functions. This way the optimal regression equation is established based on a sound theoretical foundation.

The reason for the use of correlation size instead of alpha level as inclusion criteria, is the sample size, typical for a clinical sample, and also that too strict an inclusion criterion would fail to account for the theoretic foundation of this thesis; that social cognition, symptomatology and clinical insight are intertwined. Alpha levels, however, are reported, and due to multiple comparisons being done for the same dependent variable, adjustments of the significance level have been done, using the Bonferroni correction to decrease chances of committing a type I error. As bivariate correlation analyses are done between the Birchwood Insight scale and 7 variables (RAD short, MCCB total, PANSS positive, negative, disorganized, excited and depressed) the correction was done by dividing the set alpha level (p < 0.05) by seven, yielding a new, corrected alpha level of p < 0.007.

Before conducting the hierarchical multiple regression analysis, the assumptions of multiple regression were tested. This included assumptions regarding normality, multicollinearity, singularity, heteroscedasticity and the presence of outliers. As previously mentioned, normality was tested using the Kolmogorov-Smirnov test of normality on all variables initially. The three variables included in the multiple regression analysis correlated with the dependent variable, and from 0.08 to 0.55 with each other (cut-off for intercorrelations set to
0.8), which indicates that the correlations between independent variables are not too high. Collinearity diagnostics showed tolerance values of 0.65 to 0.85, and variance inflation factor values of 1.38 to 1.5, this indicates no multicollinearity or singularity. An investigation of standardized residuals showed that the heteroscedasticity assumption was satisfied, and no outliers were detected.

Regarding sample size, Stevens (2002) recommends 15 participants per predictor in a multiple regression analysis. With three variables used as predictors, this equals 45 participants. With the sample size of this study being 55, this should suffice to conduct the analysis. Other several other sample size guidelines have been suggested in the methodical literature, but as the sample size in this study is clinical in nature, N = 55 is regarded as a robust sample.

3.5 Ethical Considerations

As this research is conducted on a clinical population, it requires approval from the Regional Ethics Committee. This was received for the entire NORMENT study, and for the current research project in 2009. It can be found at www.clinicaltrials.gov, identifier NCT01206842, or at the Regional Ethics Committee, identifier 2010/1538.

Participation in the study was voluntary, and the participants gave written informed consent. They could withdraw from the study at any point, which was communicated both orally and in written statements. The NORMENT study is approved by the Norwegian Data Inspectorate and the study follows clear data security and handling procedures.
4 Results

4.1 Descriptive Analysis

Table 2 outlines the descriptive data for the five variables and their subscales used in the analyses. As can be seen from the table, no data was missing from any of the variables, and all minimum, maximum and mean values were in the expected range.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RAD Short Total:</strong></td>
<td>55</td>
<td>24.8</td>
<td>4.72</td>
<td>14.0</td>
<td>35.0</td>
</tr>
<tr>
<td><strong>Birchwood Insight Scale:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>55</td>
<td>8.0</td>
<td>1.98</td>
<td>4.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Awareness of Illness</td>
<td>55</td>
<td>2.5</td>
<td>0.88</td>
<td>0.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Relabeling of symptoms</td>
<td>55</td>
<td>2.7</td>
<td>0.78</td>
<td>1.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Need for Treatment</td>
<td>55</td>
<td>2.8</td>
<td>0.85</td>
<td>0.0</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>PANSS:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive factor</td>
<td>55</td>
<td>10.2</td>
<td>4.00</td>
<td>4.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Negative factor</td>
<td>55</td>
<td>13.4</td>
<td>5.40</td>
<td>6.0</td>
<td>26.0</td>
</tr>
<tr>
<td>Disorganized factor</td>
<td>55</td>
<td>5.8</td>
<td>2.64</td>
<td>3.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Excited factor</td>
<td>55</td>
<td>5.4</td>
<td>1.82</td>
<td>4.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Depressed factor</td>
<td>55</td>
<td>7.8</td>
<td>2.90</td>
<td>3.0</td>
<td>14.0</td>
</tr>
<tr>
<td><strong>MCCB T-score:</strong></td>
<td>55</td>
<td>40.80</td>
<td>7.53</td>
<td>25.78</td>
<td>55.11</td>
</tr>
</tbody>
</table>
4.2 Results from Bivariate Correlation Analyses

Results from the bivariate correlation are outlined in Table 3 below, showing the correlations between RAD Short, PANSS, MCCB and IQ, and the Birchwood Insight Scale. The results from this analysis were also used to determine which variables to include in the multiple regression analysis.

Table 3: Bivariate correlation analyses (Pearson’s r) between Birchwood Insight Scale and RAD Short, MCCB total and the PANSS Subscales

<table>
<thead>
<tr>
<th>Birchwood Insight Scale</th>
<th>Total score</th>
<th>Awareness of illness</th>
<th>Relabeling of symptoms</th>
<th>Need for treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAD short</td>
<td>0.25</td>
<td>0.37**</td>
<td>0.13</td>
<td>0.08</td>
</tr>
<tr>
<td>MCCB total</td>
<td>0.30*</td>
<td>0.33*</td>
<td>0.27</td>
<td>0.14</td>
</tr>
<tr>
<td>PANSS positive</td>
<td>-0.30*</td>
<td>-0.27*</td>
<td>-0.27*</td>
<td>-0.19*</td>
</tr>
<tr>
<td>PANSS negative</td>
<td>-0.14</td>
<td>-0.17</td>
<td>-0.11</td>
<td>-0.10</td>
</tr>
<tr>
<td>PANSS disorganized</td>
<td>-0.41**</td>
<td>-0.40**</td>
<td>-0.44**</td>
<td>-0.16</td>
</tr>
<tr>
<td>PANSS excited</td>
<td>-0.07</td>
<td>-0.22</td>
<td>-0.22</td>
<td>0.05</td>
</tr>
<tr>
<td>PANSS depressed</td>
<td>0.17</td>
<td>0.10</td>
<td>0.26</td>
<td>0.09</td>
</tr>
</tbody>
</table>

* = significant at the 0.05 level. (2-tailed) ** = significant at the corrected alpha level p < 0.007 (2-tailed).

A positive correlation of medium strength was found between Awareness of Illness and RAD Short, with significance meeting the standard of the corrected alpha level. None of the other Birchwood Insight Subscales correlated with RAD Short on a significant level, and no other had correlations of above 0.30.

MCCB total correlated above 0.30 with the Birchwood total score and Awareness of Illness, both significant at the 0.05 level, but not meeting the standard of the corrected alpha level.

Of the PANSS subscales, only the PANSS disorganized and positive factors correlated significantly with clinical insight. A small negative correlation was found between PANSS positive symptoms and all of the insight subscales (p<0.05), with correlations above 0.30 for Birchwood Total Score. The PANSS disorganized factor correlated positively and above 0.30 with the Total Insight Score, as well as with Awareness of Illness and Relabeling of Symptoms, all significant at the corrected alpha level.
4.3 Results from Multiple Regression Analyses

Of the four subscales of Birchwood, three were selected for further analysis (Total Score, Awareness of Illness, and Relabeling of Symptoms) all of these correlated above .30 with one or more of the predictive variables, as was the chosen cut-off for inclusion into regression analysis.

For Birchwood total score, MCCB total, PANSS positive and PANSS disorganized were selected as independent variables to enter into the hierarchical regression analysis, with correlations of respectively 0.30, -0.30 and -0.41. For Birchwood Awareness of Illness, RAD Short, MCCB total, and PANSS Disorganized were included, with correlations of 0.37, 0.33 and -0.40. For Birchwood Relabeling of symptoms, only PANSS Disorganized met the criteria of correlations above 0.30 (correlation of -0.44) and this was the only independent variable included in this analysis. As all three analyses included three or less independent variables, the analyses concord with the premise of needing 15 participants per predictor variable in a multiple regression analysis to ensure cross-validity (Stevens, 2002).

The results of the hierarchical multiple regression analyses (Birchwood Total Score and Birchwood Awareness of Illness) can be seen in Tables 4 and 5 and the linear regression for the Birchwood Relabeling of symptoms in Table 6.

Table 4: Hierarchical multiple regression model for Birchwood Total Score (N = 55)

<table>
<thead>
<tr>
<th>Block 1</th>
<th>β</th>
<th>Partial</th>
<th>Sig.</th>
<th>R²</th>
<th>R² change</th>
<th>F (df)</th>
<th>F change</th>
<th>Sig. of F change</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCCB total</td>
<td>0.30*</td>
<td>0.30</td>
<td>0.027</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 2</td>
<td>β</td>
<td>Partial</td>
<td>Sig.</td>
<td>R²</td>
<td>R² change</td>
<td>F (df)</td>
<td>F change</td>
<td>Sig. of F change</td>
</tr>
<tr>
<td>MCCB total</td>
<td>0.07</td>
<td>0.07</td>
<td>0.636</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANSS Positive</td>
<td>-0.17</td>
<td>-0.17</td>
<td>0.220</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANSS Disorganized</td>
<td>-0.24*</td>
<td>-0.28</td>
<td>0.045</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = significant at the 0.05 level. ** = significant at the 0.01 level.

In the hierarchical regression analysis for Birchwood Total Score (see Table 4), MCCB total was entered as the sole predictor in the first block. Here, the model was statistically significant F (1, 53) = 5.160; p < 0.05 and explained 8.9% of variance in insight score. In
block 2, \textit{PANSS Positive} and \textit{Disorganized} was entered, and amount of variance explained by the model as a whole increased to 19.9\%, $F\ (3,\ 51) = 4.232; \ p < 0.01$. This meant a change in explained variance of 11\% ($R^2$ Change = 0.111; $F\ (2,\ 51) = 3.523; \ p < 0.05$). Of the factors entered in the model in block 2, only \textit{PANSS Disorganized} made a significant unique contribution to the model ($\beta = -0.24\ p < 0.05$).

| Table 5: Hierarchical multiple regression model for Birchwood Awareness of Illness (N = 55) |
|---|---|---|---|---|---|---|
|  | $\beta$ | Partial | Sig. | $R^2$ | $R^2$ change | F (df) | F change | Sig. of F change |
| **Block 1** | | | | 0.106 | - | 6.316 (1, 53) | 6.316 | 0.015* |
| MCCB total | 0.33* | 0.33 | 0.015 |
| **Block 2** | | | 0.184 | 0.078 | 5.870 (2, 52) | 4.953 | 0.030* |
| MCCB total | 0.23 | 0.24 | 0.083 |
| RAD Short | 0.29* | 0.30 | 0.030 |
| **Block 3** | | | 0.240 | 0.056 | 5.379 (3, 51) | 3.772 | 0.058 |
| MCCB total | 0.09 | 0.08 | 0.570 |
| RAD Short | 0.27* | 0.28 | 0.045 |
| PANSS Disorganized | -0.29 | -0.26 | 0.058 |

* = significant at the 0.05 level. ** = significant at the 0.01 level.

The hierarchical regression analysis for \textit{Birchwood Awareness of Illness} (see Table 5) also included \textit{MCCB Total} as sole predictor in block 1. The model was statistically significant $F\ (1,\ 53) = 6.316, \ p < 0.05$, and explained 10.6\% of variance in awareness of illness. After entering \textit{RAD Short} as predictor additional in Block 2, explained variance by the model as a whole was 18.4\% ($F\ (2,\ 52) = 5.870, \ p < 0.005$). The increase in explained variance of 7.8\% was significant ($R^2$ Change = 0.078; $F\ (1,\ 52) = 4.953; \ p < 0.05$). When entering \textit{PANSS Disorganized} as predictor in Block 3, the amount of variance explained by the whole model increased to 24\%, $F(3,\ 51) = 5.379, \ p < 0.005$. Although increase in contribution for Block 3, was not significant ($R^2$ Change = 0.056; $F\ (1,\ 51) = 3.772; \ p = 0.058$) the increase in R2 from 0.184 to 0.240 is worth noticing.
Table 5: Simple linear regression model for Birchwood Relabelling of Symptoms (N = 55)

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>Sig. (p)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>0.19**</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PANSS Disorganized</td>
<td>-0.13</td>
<td>0.04</td>
<td>-0.44</td>
<td>-3.52</td>
<td>0.001</td>
<td></td>
</tr>
</tbody>
</table>

* = significant at the 0.05 level. ** = significant at the 0.01 level.

As only one variable correlated above 0.30 with Birchwood Relabeling of Symptoms, a simple linear regression was calculated to predict the variance explained by the predictor PANSS Disorganized. The amount of variance explained by the model was 19%, F(1, 53) = 12.407, p < 0.001, with PANSS Disorganized recording a beta value of -0.44.
5 Discussion

5.1 Results in relation to hypothesis

Hypothesis 1: Social perception correlates with clinical insight.

This hypothesis received support, albeit limited to one of three dimensions of insight, i.e. awareness of illness.

Hypothesis 2: Psychotic symptoms correlate significantly with clinical insight

Disorganized symptoms correlated moderately with three of the dimensions of illness, i.e. awareness of illness, relabeling of symptoms and total insight, while positive symptoms correlate moderately only with total insight (not significant at the corrected alpha level). The other three dimensions of symptoms did not correlate with clinical insight. This yields some support to the hypothesis.

A discussion into the connection and differences between the two correlating dimensions of symptoms, as well as possible explanations will ensue in Section 6.2.

Hypothesis 3a and 3b: Level of clinical insight can be explained by variation in social perception or by variation in psychotic symptoms.

Both hypothesis 3a and 3b received support, as relationship perception predict awareness of illness, while disorganized symptoms predict total insight and relabeling of symptoms. Disorganized symptoms also had a trend-level contribution to awareness of illness. Non-social cognition did not appear as a single predictor for any dimension of insight.

A discussion of these findings, and the significance of non-social cognition will be a central part of Section 6.2.
5.2 Associations between Clinical Insight, Non-social and Social Cognition and Symptoms

5.2.1 Different Predictors for the Four Domains of Insight

Based on the results from the bivariate correlation analyses, Birchwood Awareness of illness correlates with social perception, non-social cognition and PANSS disorganized, Birchwood Total Score correlates with non-social cognition, PANSS Disorganized and PANSS positive, Birchwood relabeling of symptoms correlate with PANSS Disorganized, while none of the measures correlated with Need for Treatment.

These results suggest that there is a difference between the four domains of insight that influence how different variables connected to social cognition, non-social cognition and symptomatology correlate with them. The conceptualization of clinical insight underlying this division into subdomains, as mentioned in Section 3.3.1, can be utilized to make some preliminary assumptions about the mechanisms behind correlations between the four subscales and the variables social perception, symptomatology and non-social cognition, which will be discussed in the following sections.

5.2.2 The Influence of Non-social Cognition on Clinical Insight

In analyses, non-social cognition was a significant predictor of awareness of illness and total insight, but not when other variables (namely relationship perception and symptoms) were taken into account. Possible explanations for this will be discussed below.

Non-social cognition is a domain that taps in to many other abilities, and is often described as a foundation for higher order, or more fluctuating, functions. This can make understanding relationships between abilities that may be mediated or moderated by non-social cognition difficult. By including non-social cognition as a measure in analyses, it is possible to investigate and control for effects from non-social cognition. Non-social cognition correlated with two of the four domains of clinical insight, but did not provide significant contribution to the hierarchical regression analyses. This indicates that non-social cognition plays a role in several aspects of clinical insight, but that non-social cognition is not the best predictor of any of the domains. This finding concurs with other studies, that find that non-social cognition correlates significantly, but weakly with clinical insight, or that only some aspects of non-
social cognition correlate with clinical insight, (Aleman, Agrawal, Morgan, & David, 2006; Shad, Tamminga, Cullum, Haas, & Keshavan, 2006) opening for the possibility that these effects are better explained through higher-order or more fluctuating aspects of functioning.

**5.2.3 Effects of Social Perception on Awareness of Illness**

Relationship perception was found to be a significant predictor of one of the four domains of clinical insight, namely awareness of illness. Relationship perception did not correlate with any of the other domains of insight, which makes the relationship between social perception and awareness of illness interesting to look at.

The dimension awareness of illness describes an understanding that strange and distressing experiences are due to some sort of illness, but without necessarily being able to identify and distinguish specific psychotic symptoms (relabeling of symptoms) or seeing treatment as a solution to the distress (need for treatment). It is possible to speculate that this realization, that an illness is underlying experienced distress, comes from an understanding that something is markedly different in the patient’s experience, compared to the experience of the surrounding environment. This would entail that awareness of illness is dependent upon the ability to see oneself in the context of one’s surroundings and being able to identify deviations in one’s own experience, without necessarily being able to pin point the exact nature of these deviations. If this is the case, then intact social cognition would be an important premise for awareness of illness.

The term “autonoetic awareness” has been used to describe a lack of insight characterized by difficulties in taking the perspective of an observer in the viewing of themselves (Larøi, Barr, & Keefe, 2004, p.120). These difficulties in turn, according to Larøi, Barr and Keefe, stem from a disturbance in identifying events as internally or externally generated. One proposed cognitive deficit resulting in such difficulties, is difficulty in perceiving context, a deficit in placing information in the proper context, in order to create meaning. According to the authors, such a deficit could be causing both deficits in insight, as well as delusions and hallucinations (Larøi et al., 2004, p.120). In this light, a link between social perception and clinical insight, specifically awareness of illness, is plausible. Social perception is a premise for understanding the social context of the world, it enables us to understand and interpret the world around us through relationships. A deficit in social perception will complicated the
process of using social cues as a guide to understanding what is part of the external context, and what is internally generated.

**5.2.4 The Significance of the PANSS Disorganized Factor and the Five-Factor Model**

Only two of the five domains of schizophrenia symptoms correlated with clinical insight. Of these, disorganized symptoms predicted total insight and relabeling of insight, and contributed to explaining variance in awareness of illness. Positive symptoms, although correlating moderately with the domain, did not appear as a predictor of total insight. The following discussion will look at possible explanations for these results.

Firstly, it is important to note that of the five factors of PANSS, only Disorganized and Positive correlated with clinical insight. PANSS Positive had a moderate correlation with total insight score, but in further analysis, did not seem to uniquely contribute. It therefore seems that the PANSS factor most relevant to clinical insight, is PANSS Disorganized. This variable made a significant unique contribution to both total score and relabeling of symptoms, and, although not significant, made an increase in amount of explained variance in awareness of illness when entered into analysis. Is therefore seems to be an important factor in relation to clinical insight. This is in line with the prior research that has shown that disorganized symptoms are negatively associated with clinical insight (e.g. Rossi, Santarelli, Marucci, Pizziconi, & Pacitti, 2017; Smith, Hull, & Santos, 1998; R. M. Xavier, Pan, Dungan, Keefe, & Vorderstrasse, 2018).

To understand why disorganized symptoms are important for clinical insight, it can be useful to look at the items included in this factor in the Five-factor model of PANSS. In this model, three items are included as part of the subscale, namely conceptual disorganization, poor attention and difficulty in abstraction. These three items can be described as closely linked to neurocognitive abilities, which may be some of the reason why this factor correlates with clinical insight. One proposed explanation of why disorganized symptoms are so closely linked with insight, can be found in studies of brain regions involved in cognitive deficits in schizophrenia patients. In a systematic review from 2016, researchers reviewed 26 articles related to the biological basis of insight, and found evidence that insight in schizophrenia has a neurobiological basis, and that different forms of insight (clinical versus cognitive, as well as the three dimensions of clinical insight) have different neural correlates. (Xavier &
Vorderstrasse, 2016) Overall, frontal lobe dysfunction emerged as a possible basis for several aspects of insight, with prefrontal cortex dysfunction (working memory, cognitive control, executive functions) and orbitofrontal cortex dysfunction (decision-making) as two sub areas of this dysfunction. One of the studies cited in the review, a meta-analysis from 2006, found that executive function correlated significantly with insight, and this relationship was stronger than the association between IQ and insight. (Aleman et al., 2006) This meta-analysis organized executive functions into to variables; one general measure of executive function (consisting of the trail making test B, verbal fluency and Wisconsin Card Sorting Test (WCST)) and one measure of only WCST. It was this last measure that had the strongest correlation with insight.

The link between these findings and the importance of disorganized symptoms in clinical insight, is that conceptual disorganization, poor attention and difficulty in abstraction, the three areas of disorganization measured in PANSS, may also be related to executive dysfunction as assessed with neuropsychological tests. Executive functions entail all higher-order processes that regulate goal-directed action and adaptive responses to a complex environment (Hughes, Graham, & Grayson, 2004, p.208) and is therefore essential for navigating through daily life with an understanding of the self in context of the world. Within this domain, the WCST can be seen as a measure of perseveration, a lack of flexibility needed in order to evaluate perception, thoughts and behavior in relation to existing knowledge of the world. (Aleman et al., 2006) Performance on the WCST is relevant to clinical insight (e.g. Drake & Lewis, 2003). In would be reasonable to think that WCST is sensitive to a failure to pick up on changes and failures and to change cognitive set in response to this, thereby affecting the ability of insight into illness.

The MCCB battery used in this study, although it contain a subtest that tap into executive function, does not contain the WCST or similar tests, which may explain why the MCCB does not correlate with clinical insight when controlling for other variables in this study. In a study from 2012, researchers looked at the MCCB battery test for assessing executive function (Mazes, seven timed mazes of gradually increasing difficulty) and compared it to other commonly used tests to measure executive function, the D-KEFS Color Word Interference Test (Stroop), a test of color naming and word reading centered on inhibition and switching, and WCST. Here, researchers found Stroop to be the test that best separated schizophrenia patients from healthy controls, followed by Mazes and then WCST. Based on
these findings, the researchers argued that Mazes is a satisfying measure of executive function in clinical settings, but for a more extensive evaluation of executive function, it would be sensible to include Stroop (Holmén, Juuhl-Langseth, et al., 2012). It may therefore seem that PANSS Disorganized tap into the effects of executive dysfunction on clinical insight that is not fully covered by the MCCB. The finding that disorganized symptoms are connected to clinical insight is in line with findings from an article by Minor and Lysaker (2014) that found disorganized symptoms to be a moderator of the link between social cognition and metacognition (the ability to think about thinking).

In conclusion, positive and disorganized symptoms are somewhat related to clinical insight. For positive symptoms, this relation disappears when controlling for disorganized symptoms, while disorganized symptoms contribute to both overall insight and to relabeling of symptoms, with a trend-level contribution to awareness of illness. The explanation for this contribution is likely to be the element of executive deficit that disorganized symptoms entails, a prerequisite for maintaining clinical insight.

5.2.5 An Integrated View on the Results

This study found a relationship between non-social cognition, social cognition, symptoms and clinical insight in patients with schizophrenia. It is natural to base this integrated view in the same framework that was used in the hierarchical regression analysis: non-social cognition as the most basal function, with social cognition as its sub-domain, and symptomatology as a more fluctuating variable. The different aspects of clinical insight are predicated by different variables, with non-social cognition contributing to several aspects, without being the best predictor of any. Social perception was the best predictor of one of the insight domains, awareness of illness, while disorganized symptoms was the best predictor of total insight and relabeling of symptoms and had a trend significant contribution to awareness of illness.

The possible explanation for these findings, is that social perception is an important factor in awareness of illness, because of its role in “autonoetic awareness” (Larøi et al., 2004, p.120) needed to see the context of the world and evaluate symptoms in this context. Furthermore, disorganized symptoms contribute to total score, relabeling of symptoms and, to some degree, awareness of illness, because it is an indirect measure of executive functions, which are needed to navigate life through goal-directed action and adaptive responses. The reason why non-social cognition, although contributing, is not a significant predictor of any of the aspects
of clinical insight, may be because the test battery used to measure non-social cognition in this study does not contain subtests that measure executive function elaborately enough.

With the underlying explanation beneath the effects of both social perception and disorganized symptoms on clinical insight lying in the area of abilities that enables the individual’s abilities to see themselves in the context of the surrounding world, it is interesting to view these results as evidence that clinical insight is a more complex ability than solely a function of symptoms from a specific neurocognitive deficit. One model of understanding that has been proposed that supports this view, comes from a review article by Vohs, George, Leonhardt, and Lysaker (2016). In their article, they propose an integrative model of understanding insight that involves an interaction between symptoms, neurocognitive deficits, social cognition, metacognition and stigma. They propose that poor social cognition and poor metacognitive abilities contribute to poor reflectivity, or the lack of ability to create complex representations of self and others, and that this deficit, together with symptoms, reduced neurocognitive abilities and social factors contribute to poor insight. (Vohs et al., 2016) The concept of reflectivity closely resembles the functional deficits created by poor executive function and reduced social perception as outlined in the previous section; to see and understand complex contexts in the surroundings, and to use this understanding in order to create ideas about self and others. The two parts of reflectivity outlined by Vohs et al, also closely resembles executive function and social perception by themselves; metacognition is seen as closely linked to executive function (Lysaker et al., 2008) and social perception is, as mentioned earlier, an aspect of social cognition.

In conclusion, it appears that clinical insight largely is predicted by social perception and executive function, or metacognition, with the variable of neurocognitive ability as a prerequisite for the higher order cognitive abilities. In addition, it seems as though the different aspects of clinical insight, as proposed by David (1990), load on different predictors. Awareness of illness is best predicated by social perception, although influenced by executive function, while total score and relabeling of symptoms is predicted by executive function. Interestingly, awareness of need for treatment is not predicated by neither social perception nor executive function and was not predicated by any of the other variables entered in to the study.
5.3 Implications for Treatment

Firstly, previous studies have shown links between clinical insight and emotion processing, theory of mind and empathy, but only one study has investigated social perception. The current study establishes that social perception should be included as a social domain that relates to clinical insight in patients with schizophrenia. This means that when researching ways to improve clinical insight in schizophrenia patients by improving social cognition, social perception should be included as a variable. A review study from 2018, investigating interventions targeting social cognition in schizophrenia, looked at the different psychosocial and pharmacological therapies developed to improve social cognition in order to improve functional outcome. (Javed & Charles, 2018) The study found that most of the eleven psychosocial therapies (three interventions targeting multipole domains, and nine targeting specific domains) offered improvements in their targeted areas of social cognition. There were, however, big variations in the number of interventions targeting each social domain. Of the eleven interventions researched, nine targeted emotion recognition, either by itself or in combination with others, seven targeted Theory of Mind, two targeted attributional bias, and only one targeted social perception. (Javed & Charles, 2018) The proportion of interventions dedicated to each domain of social cognition, is quite similar to the proportion of studies investigating the same domains. It is a reasonable speculation that the amount of interventions developed to target each of the social cognitive domains, to some extent reflects the amount of research done into each.

Secondly, this study illustrates how different domains of clinical insight is predicted by different factors and highlights a need to look at clinical insight as a multifaceted concept. This is in line with a study from 2010 that investigated whether insight fractionates between domains. (Gilleen, Greenwood, & David, 2010) Here, insight (conceptualized as awareness in the study) was investigated both in the three dimensions awareness of illness, need for treatment and relabeling of symptoms, but also as awareness of behavioral and executive dysfunctions, and awareness of memory impairment. They found that impairment in one aspect of awareness did not automatically entail impairment in another aspect, thereby showing that different aspects of insight is influenced by different mechanisms. (Gilleen et al., 2010) Together, the current study and the study by Gilleen et al. suggest that it would be possible to work to improve one aspect of insight without changing another, by working with certain predictive variables.
Finally, this study strengthens the model of a hierarchical relationship between clinical insight and other factors, where non-social cognition is the foundation, while social cognition and symptomatology have an impact, respectively. By having this information, it could be possible to help people with schizophrenia by tailoring a treatment program where non-social cognition is targeted, followed by social cognition and symptomatology.

5.4 Limitations of the Study and Future Directions

5.4.1 Participants

Firstly, as can be seen from Table 1, the participants in the current study had a mean IQ of 101.7. As the schizophrenia population generally show 1-2 SD deficits on most cognitive abilities, (Heinrichs & Zakzanis, 1998) this mean IQ is higher than what would be expected. It is plausible that the reason for this is a selection bias, where the likelihood of participating in the study increase with increased intellectual ability, thereby somewhat skewing the sample entered into the study, although the effect may be caused by the exclusion of participants with IQ < 70. Another possible reason for this, is that the scores on the WASI IQ measure are skewed in the Norwegian population. In a report from 2014, Siqveland, Dalsbø, Harboe and Leiknes found that as there has not been constructed Norwegian norms for use with WASI, nor has there been conducted studies on the use of the American norms on the Norwegian population. There is a possibility that the IQ scores of Norwegian individuals tested with the American norms are overestimated (Siqveland, Dalsbø, Harboe & Leiknes, 2014). The potential issue, if the inflated IQ scores are not a case of measurement error, is that it may affect the external validity of the study, if the sample used in this study is not representative for the general population with schizophrenia. However, a study from 2014 including patients from the same research Centre, investigated neurocognitive deficits, clinical characteristics and social functioning in intellectually low- normal- and high functioning individuals with schizophrenia. Here, they found neurocognitive decrements of the same magnitude across all three groups, as well as similar levels of clinical symptoms, and of deficits in social functioning (Anja Vaskinn et al., 2014). This indicates that there are similar processes taking place in schizophrenia patients with different levels of functioning, and therefore increases the likelihood that findings on the current sample are transferable to the rest of the schizophrenia population.
The problem of selection bias does not limit itself to intellectual abilities. A study from 2000 showed that schizophrenia patients are more likely to reject inclusion into a research study if they lack clinical insight, and also if they are men with little drug compliance (Wiedemann, Klingberg, Wittorf, Fischer, & Buchkremer, 2000). This shows how studies of clinical insight might actually fail to include the patients with the biggest deficits in clinical insight because of selection bias, which is important to be aware of when interpreting the results.

**5.4.2 Birchwood and Self-Report as a Measure of Clinical Insight**

This study has used the Birchwood Insight Scale as a measure of clinical insight in patients with schizophrenia. Although both the original scale and the Norwegian translation are scales with good psychometric properties, the choice of Birchwood as insight measure is not the only option, as several different insight measures have been used in schizophrenia research. Some, like the item G12 of PANSS (Kay et al., 1987), has been frequently used as it is already part of the PANSS, and therefore easy to administer. Others, like *The Insight and Treatment Attitude Questionnaire* (McEvoy et al., 1989) have been developed as part of a study, in order to investigate insight as the need has risen. There is a division between measures that have been developed in relation to rising scientific questions, and measures that have been developed as a result of specific a theoretical framework. *The Birchwood Insight Scale* was, as previously mentioned, developed based on the theory of David (1990). While generally a good thing to have theoretical backing for measures, a case could also be made that this may threaten the validity of a scale, as theoretical dimensions may not in fact represent the actual factors that a scale is supposed to measure. In the case of Birchwood however, its validity has been shown through studies (e.g. Birchwood et al., 1994).

The most prominent limitation of *the Birchwood Insight Scale* is the fact that it is a self-report scale. It is not inherently evident that self-report would be a functional measure of lack of insight, as lacking insight might impair one’s ability to self-report. To investigate lack of insight by self-report, a conclusion about the nature of illness in a patient must be established, and the responses of the patient measured up against that knowledge. As giving deceiving answers in this kind of self-report is quite easy, and misunderstandings are common, an alternative would be for a therapist to rate the insight of the patient, as is done in the G12 of PANSS. There are two problems with this, however; firstly, it is costly to have examiners do all the assessments, and secondly, one may lose an important dimension by not involving the
patient in the assessment. In order to create the “gold standard” of insight measuring, it is probable that the best procedure would be to compare patient self-report, with therapist assessment of insight through a structured or semi-structured interview. This was not done in this study, but in their paper from 1994, Birchwood et al. concluded that the self-report measure had a high concurrence with the assessment of a clinical rater.

Regarding the subscale *Relabeling of symptoms* in the Birchwood Scale, this subscale, as with awareness of illness, consists of only two items: “Some of your symptoms are made by your mind” and “None of the unusual things you are experiencing are due to an illness.” A study from 2014, investigating the factor structure of the Birchwood Insight Scale, found that seven of the eight items of Birchwood loaded on a single factor that fit well with the original structure of the scale, the item “Some of your symptoms are made by your mind”, however, did not load significantly on any one factor (Cleary et al., 2014). As this item constitutes one of the two items of *Relabeling of symptoms*, it is tempting to question whether this dimension of the insight measure is really a useful measure. It did however not stand out in the original study of reliability, validity and sensitivity (Birchwood et al., 1994) and has therefore been considered a useful part of the measure by prior studies.

### 5.4.3 The PANSS Five-Factor Model

A challenge when discussing the findings of this study, is the transition that has happened in the field, from the PANSS three-factor model to the five-factor model. While conducting the initial literary review for this thesis, the symptomatology of schizophrenia was systematically researched in relation to clinical insight. Results from previous studies, indicate a relationship between positive, negative and global symptoms and clinical insight, but this relationship has been of a moderate character (e.g. Mintz et al., 2003) indicating that other variables are of higher interest. These studies, however, have utilized the PANSS three-factor model, using the positive, negative and global symptom scales, not the five-factor model. Only a handful of studies have used the five-factor model of PANSS to look at clinical insight (e.g. Zhou et al., 2015 mentioned above), while most of the studies investigating clinical insight and social cognition in schizophrenia utilize the three-factor model (e.g. Atouie et al., 2018; Sapara et al., 2015; Vaskinn et al., 2013). This complicates the task of comparing the results from the current study to previous findings, as this new factor model may have influenced the findings of contribution from PANSS on clinical insight. It would be of interest to go back and
investigate the studies finding different levels of contribution of symptom severity based on
the PANSS three-factor model and see whether this relationship changes when utilizing the
five-factor model.

5.4.4 Measuring Executive Functions

As stated in Section 6.2.3, PANSS Disorganized can be understood as measure of executive
dysfunction, while MCCB Total does not contain a robust measure of executive abilities. It
would have been interesting to be able to look at results from measures of executive function
in relation to disorganized symptoms and clinical insight, to be able to say with a degree of
certainty that the effects of disorganization on clinical insight stems from executive deficits.
As both the Wisconsin Card Sorting Test and Stroop has been proposed as good measures of
executive function (Aleman, Agrawal, Morgan, & David, 2006; Holmén, Juuhl-Langseth, et al., 2012) it would be interesting to include them in a study of clinical insight,
symptomatology and social cognition in order to understand the relation between insight,
symptoms and executive function.

5.4.5 Methodology

As mentioned in Section 3.4 when deciding upon hierarchical regression analysis as method
of data analysis, the order of variables entered into analysis was based on the assumption of
(1) non-social cognition as a basic foundation, (2) social cognition as dependent upon non-
social cognition and (3) symptomatology as a fluctuating phenomenon. This assumption,
although based on a solid foundation of previous research (e.g. Green et al., 2004; Pinkham,
2014; Smith et al., 1998) is a largely theoretical one, and so it is important to reflect on the
fact that this assumption needs to be correct in order for the hierarchical regression analysis to
be valid.

A second point of caution, is the fact that although several of the models tested in the
regression analyses in this study explained a significant amount of variance in the dependent
variables, none of the models explained above 24% of the variance. This result is valuable
because it is a clear indicator that clinical insight is indeed influenced by both social
perception and symptom level in schizophrenia patients, but there is still a lot of unexplained
variance, and so, to fully understand the causal mechanisms of deficits in clinical insight,
more research is still needed.
5.5 Conclusion

The aim of this study was to explore a proposed association between social perception and/or psychotic symptoms and clinical insight. Based on the theory that deficits in clinical insight are either caused by poor social cognition or psychotic symptoms, the study looked at social perception, a domain of social cognition, and psychotic symptoms and their relation to clinical insight, conceptualized as awareness of illness, relabeling of symptoms and awareness of need for treatment. In addition, the study controlled for effects caused by non-social cognition. The study found that social perception was the best predictor of awareness of illness, while disorganized symptoms was the best predictor of total insight and relabeling of symptoms and had a trend significant contribution to awareness of illness. Non-social cognition was not the best predictor of any of the sub-domains of insight. These findings give support to both the hypothesis that social perception predict clinical insight, and that symptoms, here disorganized symptoms, predict clinical insight. A proposed view on these results, is that social cognition predict awareness of illness through the process of “autonoetic awareness”, or the ability to see one self through the eyes of an observer. In order to see illness in themselves, patients with schizophrenia need to be able to perceive the context of the surrounding world. In this view, disorganized symptoms predict clinical insight because disorganized symptoms entail a level of executive dysfunction. This dysfunction hinders an effective understanding of the surrounding world.

These findings provide evidence that social perception, a domain of social cognition that has been researched less than the three others, is also predictive for clinical insight. Implications of this is that social perception should be a target for social cognitive training for schizophrenia patients together with the other social cognitive domains, in order to improve clinical insight. In addition, this study gives support to the existing research showing that higher executive functions are important for clinical insight, and that non-social and social cognition as well as symptomatology are intertwined predictors in patients with deficits in clinical insight. More research is needed in order to investigate the relationship between symptoms, executive function and clinical insight in schizophrenia, as well as to see all four domains of social cognition together in relation to clinical insight.
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