Metacognition in Schizophrenia and Schizotypy: Relation to Symptoms of Schizophrenia, Traits of Schizotypy and Social Quality of Life

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ABSTRACT

Objective: The current study examined a mediation model in which symptoms of schizophrenia and schizotypy traits mediate the positive relations between metacognition and Social Quality of Life (SQoL) among persons with schizophrenia and persons without mental illness.

Method: 39 persons diagnosed with schizophrenia and 60 persons without a severe mental illness diagnosis participated in this study. Instruments included the Metacognition Assessment Scale-Abbreviated (MAS-A), the SQoL scale of the QLI-MH, the PANSS scale and the O-LIFE self-report questionnaire that assesses schizotypy traits.

Results: Persons with schizophrenia exhibit lower SQoL and metacognitive abilities than persons without mental illness. For persons with schizophrenia, negative symptoms mediate the positive relation between the ability to understand other persons’ minds and SQoL. However, for persons without mental illness, understanding other minds was found to correlate negatively with introvertive anhedonia and SQoL, a mediation model was not confirmed.

Discussion: Understanding of others’ minds seems relevant to the SQoL for both samples. In addition, negative symptoms of schizophrenia and introvertive anhedonia traits are also related to SQoL among persons with schizophrenia and among persons without mental illness respectively. The lack of support for a mediation model for persons without mental illness is consistent with the theories that claim schizotypy is not a mirror image of schizophrenia and, therefore, may not necessarily lead to schizophrenia. Limitations of this study and suggestions for future research are discussed.

INTRODUCTION

Deficits in social functioning have frequently been found to be associated with schizophrenia. Consequently, they are included in the list of the diagnostic signs of the illness (1, 2). These deficits involve difficulties in forming and preserving social interactions (3) and are thought to contribute significantly to the poor quality of life of persons with schizophrenia (4). The positive and negative symptoms of schizophrenia have also been found to impact negatively on the quality of life of persons with schizophrenia (5). Recent theories of schizophrenia attribute both positive symptoms such as delusions and hallucinations and negative symptoms of schizophrenia such as anhedonia and apathy, as well as the reduction in social functioning and quality of life associated with these symptoms, to metacognitive limitations that are considered a major aspect of schizophrenia (6-9).

The present study attempted to assess the process by which metacognition and symptoms contribute to social quality of life (SQoL) of persons with schizophrenia. In
particular, it combined the Indiana Psychiatric Illness Interview (IPII; 10) with the Metacognition Assessment Scale-Abbreviated (MAS-A; 11) to compare the role of self-reflectivity in the above specified relation to the role played by the understanding of others’ minds. In addition, on the basis of the assumption that measures of schizotypy assess schizophrenia proneness (12), it tested whether the findings for symptoms of schizophrenia in a sample of persons with a diagnosis of schizophrenia would be found for schizotypic traits in a sample of research participants without a mental illness diagnosis.

Theoretical and empirical research on the phenomena of metacognition have gone through an interesting process of change and development in which the term metacognition has come to encompass a variety of phenomena. At first the term referred to the ability of individuals to understand their own cognitive processes with regard to their desired actions, appraisals and self-awareness of these processes (13). Later, the concept of metacognition shifted from understanding oneself to include the understanding of the others’ minds (11). Metacognitive abilities enable persons to monitor and reflect upon their and other persons’ cognitive processes such as thoughts, desires, actions and anticipations regarding the world (14-17). These dual abilities of thinking about the self and thinking about others have been denoted by such terms as reflective awareness (18), metarepresentation (19, 20), mentalization (16), mind reading, and theory of mind (21). In this study we adopt the broad perspective on metacognition that are presented in this issue (22, 23). According to this perspective, metacognition can be defined as a spectrum of activities which includes discrete acts, such as noticing errors, memories or specific beliefs about other beliefs and more synthetic kinds of activities involved in integrating and bringing together any number of perceptions into complex ideas about the self and others as unique agents in the world. Semerari et al. (15) developed a narrative methodology, the MAS, to measure metacognition from an analysis of psychotherapy transcripts. Originally, this scale was divided into three sub functions: Understanding one’s own mind, the ability to comprehend one’s own mental states; Understanding others’ minds, the ability to comprehend other individuals’ mental states; and Mastery, the strategies a subject uses to regulate his/her own mental states. This division of metacognitive abilities measured by the scale into sub functions, facilitated the determination of the exact abilities that might be deficient due to such conditions as personality disorders. Thus, the scale could be used to assess whether psychotherapy had a positive influence on that particular metacognitive function of persons with a personality disorder (24, 25). In order to assess metacognitive abilities for a broad range of narratives, the MAS has been abbreviated and adapted for the study of IPII transcripts. This abbreviation and adaptation has been labeled the MAS-A (11).

Studies of the metacognitive processes of persons with schizophrenia, using the combined IPII and MAS methodology and other measures of metacognition (8, 26), have shown that persons with schizophrenia exhibit impaired self-reflectivity and understanding of others’ minds. This impairment has been found to increase progressively as the symptoms of the illness of schizophrenia become more prominent (6, 11, 18, 27-31). The metacognitive difficulties of this population involve low self-awareness (32, 33), difficulties in detecting the mental states of others (27), low mentalization which reflects deficits in the ability to attribute mental states to others (28), and deficient social cognition that underlies those cognitive processes and capacities of persons to understand the behavior of others and to react adequately in social situations (34).

Self-reflectivity and understanding of others’ minds are regarded as key elements required for the establishment and maintenance of social relationships (35). They allow a person to relate to the emotional states of her/himself and to the emotional states of the other and, thus, to predict future behavior and mental states (14, 36). These elements of metacognition also involve the detection and processing of social information (37) and, thereby, the knowledge of how to behave appropriately in a variety of social contexts. Thus, a deficit in metacognitive ability could play a major role in the difficulties in interpersonal relationships that affect the social quality of life (SQoL) of persons with schizophrenia (38-43).

A range of metacognitive deficits are also exhibited by persons with high levels of schizotypic traits. Schizotypic traits include predispositions for unusual experiences, cognitive disorganization, impulsive nonconformity, and introvertive anhedonia (44). These traits are regarded as being similar to, but less extreme than, the classical negative and positive symptoms of schizophrenia (45, 46). As pointed out above (12), according to a number of theoreticians, in a variety of circumstances, these traits can be precursors of schizophrenia (46, 47). Research has shown that self-awareness is negatively correlated with the level of the schizotypic traits (48). In addition, persons who exhibit high levels of these traits have been
found to have difficulty in engaging in “Theory of Mind” processes, which entail the understanding of others’ thoughts and emotions (48-50).

However, while these studies showed a high level of schizotypic traits to be related to metacognitive deficits, they have not produced consistent support for the impact of metacognitive deficits on the SQoL of persons without mental illness. Some studies indicate that persons who exhibit high levels of schizotypic traits show the same level of social functioning as those who exhibit low levels of these traits (51-54) while other studies indicate that the persons who exhibit high levels of schizotypic traits show significant deficiencies in forming close relationship as well as low emotional intelligence, difficulties in interpersonal perception and low social skills (55-61).

Theory and research have suggested that deficits in the metarepresentation of the self and the other may lead to and account for the development of schizotypic traits and the symptoms of schizophrenia (6, 62, 63). This assumption attributes both positive symptoms and negative symptoms, and the parallel traits of schizotypy to deficient metarepresentation. Thus, delusions of alien control or auditory hallucinations have been attributed to difficulties in metarepresenting and monitoring willed intentions (6). In addition, it has been suggested that impairment of the neurodevelopment of metacognitive abilities may contribute to the overall severity of schizophrenia, including such negative symptoms as deficient cognitive processing and social functioning (64). Clusters of both positive and negative symptoms may be the consequence of metacognitive deficits that could lead to lower SQoL.

The current study tested the hypothesis that persons with a diagnosis of schizophrenia will report statistically significant lower levels of SQoL than persons without mental illness. In addition, to the best of our knowledge, this is the first study that uses the MAS-A with a non-clinical population. Therefore, it was expected, in keeping with studies that used other scales of metacognition, that persons with schizophrenia will show lower metacognitive abilities in comparison to persons without mental illness when their narratives are analyzed according to the MAS-A.

In addition, this study examined the possibility that the positive and negative symptoms of schizophrenia and the two traits of schizotypy, exceptional experiences and introvertive anhedonia, that correspond respectively to the positive and negative symptoms of schizophrenia, will mediate the relation between metacognitive abilities and SQoL in populations of persons with schizophrenia and persons without mental illness. Thus, we expected that the symptoms of schizophrenia will mediate the relation between metacognition and SQoL of persons with schizophrenia and that schizotypic traits will mediate the relation between metacognition and SQoL of persons without mental illness. This putative similar pattern in both populations of the relations between metacognition, symptoms of schizophrenia/schizotypy traits and SQoL is based on theoretical and empirical research. This research suggests that deficits in the metacognition of persons without mental illness that exhibit high levels of schizotypy is a mirror of the metacognitive deficits of persons with schizophrenia (65).

According to Baron and Kenny’s (66) approach, in the present study, the following four findings are required to establish a mediation model: 1) symptoms of schizophrenia and traits of schizotypy will be found to be negatively correlated with SQoL; 2) these symptoms and traits will be negatively correlated with metacognition; 3) metacognition will be positively correlated with SQoL; 4) when the symptoms of schizophrenia and the schizotypic traits are controlled for, the relation between metacognition and SQoL will be significantly decreased. These hypotheses will be examined for this study’s sample of persons with a diagnosis of schizophrenia and for this study’s sample of persons without a psychiatric diagnosis.

**METHOD**

**PARTICIPANTS**

Two groups of research participants took part in the present study. One group included 39 persons with a diagnosis of schizophrenia. To be included in this group, a person had to meet the following criteria: 1) not to have another psychiatric diagnosis and 2) to have had the diagnosis of schizophrenia for at least one year. These participants were either being treated by the psychiatric unit of Soroka University Medical Center or the Beer Yaakov Mental Health Center. The second group consisted of 60 persons who meet the following criteria: 1) no psychiatric diagnosis and 2) no reported neurocognitive disorder. The latter criteria were assessed by self-report.

Significant differences in age, gender and years of education were observed between the two groups. The mean and standard deviation for age of the persons with a diagnosis of schizophrenia was 39.36 and 12.62 years, respectively with a range from 19–67 years; 57.9% of this group were male and 18.4% had more than 12 years of education. The
mean and standard deviation for the age of the participants without a psychiatric diagnosis were 22.23 and 2.00 years, respectively with a range from 19–26 years; 76.3 % of this group were female. All of the participants in this group had more than 12 years of education.

PROCEDURE
The present study was conducted after the ethical committee of the two participating medical centers provided approval. Metacognition, symptoms and SQoL were assessed individually during one meeting that lasted about an hour. Each of two researchers conducted interviews with approximately half of the research participants. The self-report measures were filled out with the help of the researchers only when the participants had difficulties reading the questionnaire. Whereas the schizotypic traits and SQoL of the participants without a psychiatric diagnosis were assessed by self-report questionnaires, psychiatric symptoms and SQoL of participants with schizophrenia were assessed by the research participants’ psychiatrists.

INSTRUMENTS
The Oxford–Liverpool Inventory of Feelings and Experiences (O-LIFE, 44) was used to measure the schizotypic traits. This inventory is a self-report measure of schizotypy in healthy populations. It consists of 159 yes-no items that have been shown to generate four schizotypy factors, “unusual experiences” (UE); “cognitive disorganization” (CD); “impulsive nonconformity” (IN); and “introverted anhedonia” (IA) (67). It also provides a global schizotypy score. For the purpose of the current study, the two subscales, “unusual experiences” and “introverted anhedonia” that respectively parallel the positive and negative symptoms of schizophrenia were used. Cronbach’s alpha for the each of the scales for the current study was 0.90.

The Positive and Negative Syndrome Scale (PANNS; 68). This 30 item questionnaire that was filled out by the treating psychiatrist was used to assess the symptoms of schizophrenia. For the purposes of the current study, only the Positive Symptoms and Negative Symptoms subscales were used. Persons are rated on these items on the basis of a structured clinical interview. For each item, a person can receive a rating of severity from between 1 to 7, when 1 represents the absence of the symptom and 7 represents an extremely severe symptom. Cronbach’s alpha for the total scale score, the positive symptoms and the negative symptoms were 0.81 and 0.92 respectively.

The Indiana Psychiatric Illness Interview (IPII; 10) and the Metacognition Assessment Scale- Abbreviated (MAS-A; 11). The IPII and the MAS-A were used jointly to assess metacognition. The IPII is a semi-structured interview that was developed to assess mental illness narratives. The interview that typically lasts from between 30 to 60 minutes was conducted by a research assistant who recorded the interviewee’s responses. The interview is divided into the following five sections. First, rapport is established between the interviewer and the research participants and the participants are asked to tell the story of their lives in as much detail as possible. Second, the participants are asked if they think they have a mental illness and how they understand it. Third, their response to this question is followed by questions concerning what has affected their interpersonal and psychological life activities. Fourth, they are asked if their condition “controls” their life and if they “control” their illness. They are also asked whether their illness is affected by others and how much others have been affected by their illness. Fifth, they are asked what they expect to stay the same and what will be different in the future with regards to their interpersonal and psychological functioning. In order to use the IPII with the healthy participants, the IPII was modified so that instead of asking about a psychiatric illness, participants were asked about an important life challenge. In all other respects, the interview was the same.

The responses to the IPII were analyzed according to the MAS-A. The MAS-A is a rating scale for assessing the metacognitive abilities manifested by an individual’s verbal responses. It was originally designed to assess changes in the ability of persons with severe personality disorders to think about their own thinking on the basis of psychotherapy transcripts. Later, the MAS was adapted for the assessment of IPII transcripts (11). The MAS-A conceptualizes metacognition as the set of abilities that allows persons to understand mental phenomena and to use that understanding to tackle tasks that are sources of distress.

The MAS consists of four scales. The first, self-reflectivity, refers to the ability to form increasingly complex and integrated representations of one’s self. The second scale, understanding of others’ minds, refers to the ability to form increasingly complex and integrated representations of other persons. The third scale, decentration, refers to the ability to see the world in which one finds oneself as understandable from a number of different perspectives. The final scale, mastery, refers to the ability to use knowledge of mental states to solve psychological problems. In the current study, only the two subscales, self-reflectivity and understanding of others’ minds were
used. Inter-rater reliabilities for the “Self-Reflectivity” subscale and for the “Understanding the Other’s Mind” subscale were found 0.87 and 0.95 respectively. Interviews were carried out by two interviewers. Prior to the present study, a pilot study was undertaken with 15 research participants from each group. Each of the interviewers rated the transcripts of the interviews independently. Inter-rater reliabilities were high, for self-reflectivity, 87 and for understanding of the other, .95. Therefore the task of rating the remaining transcripts was divided equally between the two interviewers.

Social Quality of Life (SQoL) was assessed by the Social Quality of Life subscale of the Hebrew translation and adaptation (69) of the Wisconsin Quality of life Index for Mental Health (QLI-MH) that was developed by Becker et al. (70). This index provides measures of quality of life in seven life domains. In each of these life domains, this index provides questionnaires for measuring quality of life from the perspective of the person with the psychiatric diagnosis, from the perspective of that person’s clinician, and from the perspective of a relative of the person with the diagnosis. In this study, only the measure of quality of life in the social domain was used from the clinician’s perspective. For the sample without a psychiatric diagnosis, SQoL was assessed from the perspective of the participants. Cronbach’s alpha in the current study was 0.68 for both the patient version and the psychiatrist version.

RESULTS

DESCRIPTIVE STATISTICS OF THE RESEARCH VARIABLES AND GROUP COMPARISONS

Descriptive statistics of the study variables for the two groups are presented in Table 1. As can be seen from this table, the ratings of the narratives of the participants with a diagnosis of schizophrenia indicated a lower capacity for metacognitive thinking on the MAS-A subscales of self-reflectivity and understanding others’ minds when compared to persons without a diagnosis of schizophrenia. In addition, individuals without a diagnosis of schizophrenia reported higher SQoL than persons with a psychiatric diagnosis as reported by their psychiatrists. Thus, persons with schizophrenia showed lower metacognitive ability and lower SQoL in comparison with persons without a mental illness.

Table 1. Mean, t-tests and standard deviation of SQoL and the metacognition for participants with schizophrenia and for persons without a psychiatric diagnosis (total N=99, N of schizophrenia sample= 39, N of non clinical sample=60).

<table>
<thead>
<tr>
<th></th>
<th>M (sd)</th>
<th>t-test (std. error difference)</th>
<th>Df</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self reflectivity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants with</td>
<td>4.73</td>
<td>5.68**</td>
<td>97</td>
</tr>
<tr>
<td>schizophrenia</td>
<td>(2.54)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants without a</td>
<td>6.76</td>
<td></td>
<td>97</td>
</tr>
<tr>
<td>psychiatric diagnosis</td>
<td>(0.90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Understanding of others’ minds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants with</td>
<td>3.43</td>
<td>7.34**</td>
<td>97</td>
</tr>
<tr>
<td>schizophrenia</td>
<td>(2.51)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants without a</td>
<td>5.72</td>
<td></td>
<td>97</td>
</tr>
<tr>
<td>psychiatric diagnosis</td>
<td>(0.97)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SQoL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>According to the</td>
<td>4.38</td>
<td>6.03 (0.18)**</td>
<td>97</td>
</tr>
<tr>
<td>psychiatrist’s report</td>
<td>(1.18)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported by participants</td>
<td>5.52</td>
<td></td>
<td>97</td>
</tr>
<tr>
<td>without a psychiatric</td>
<td>(0.69)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>diagnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05 **p<0.01 (1 tailed)

Table 2. Correlations between quality of life and the metacognition variables for persons with schizophrenia (N=39).

<table>
<thead>
<tr>
<th></th>
<th>Positive symptoms</th>
<th>Negative symptoms</th>
<th>Self reflectivity</th>
<th>Understanding of others’ minds</th>
<th>SQoL as assessed by the psychiatrist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Symptoms</td>
<td>1</td>
<td>0.70**</td>
<td>0.16</td>
<td>0.52**</td>
<td>0.59**</td>
</tr>
<tr>
<td>Negative symptoms</td>
<td>-</td>
<td>1</td>
<td>0.27*</td>
<td>0.50*</td>
<td>0.63**</td>
</tr>
<tr>
<td>Self reflectivity</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.60**</td>
<td>0.19</td>
</tr>
<tr>
<td>Understanding of others’ minds</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.48**</td>
</tr>
<tr>
<td>SQoL as assessed by the psychiatrist</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05 **p<0.01 (1 tailed)
others’ minds. Furthermore, only the negative symptoms were negatively correlated with both metacognitive abilities, while the positive symptoms were significantly correlated only with understanding of the others’ mind. Thus, symptoms of schizophrenia are significantly related to SQoL while only the negative symptoms were significantly related to both metacognitive abilities (understanding the self and understanding others’ minds), and positive symptoms were related only to understanding of others’ minds. Finally, SQoL was found only to be related to the understanding of others’ minds.

Therefore, to test the hypothesized mediation model according to which psychiatric symptoms mediates the relation between metacognition and SQoL for persons with schizophrenia. Accordingly, the capacity for understanding of others’ minds of the participants with schizophrenia appears to reduce the negative symptoms of schizophrenia and, thus, to increase these participants’ SQoL.

### CORRELATIONS BETWEEN VARIABLES AND REGRESSION ANALYSIS: GROUP OF PERSONS WITHOUT MENTAL ILLNESS

Correlations between study variables for the group without a mental illness diagnosis are presented in Table 4. As can be seen from this table, only introvertive anhedonia had a negative and significant correlation with SQoL. Unusual experiences did not show such correlation with SQoL. In addition, both metacognitive abilities were significantly correlated with introvertive anhedonia and unusual experiences. Finally, of the metacognitive subscales, only understanding of others’ minds was correlated with SQoL. The above pattern of results suggests that introvertive anhedonia, but not unusual experiences, mediates the positive relation between understanding the others’ minds,

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**Table 3. Hierarchical regression analysis for the research participants with schizophrenia (N=39).**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Understanding of others’ minds</th>
<th>Beta</th>
<th>Std. Error</th>
<th>B</th>
<th>R</th>
<th>R²</th>
<th>R² Change</th>
<th>F</th>
<th>Df</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.48***</td>
<td>0.07</td>
<td>0.23</td>
<td>0.48</td>
<td>0.23</td>
<td>0.23</td>
<td>10.95***</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

| Step 2 | Understanding of others’ minds | 0.17  | 0.07  | 0.08  | 0.62  | 0.46  | 0.23  | 9.81*** | 34 |
| Level of negative symptoms | 0.38* | 0.02  | 0.05- | 0.23  | 0.03  | 0.04- |

*p<0.05 **p<0.01 (1 tailed)

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**Table 4. Correlations between quality of life and the metacognition variables for persons without a psychiatric diagnosis (N=60).**

<table>
<thead>
<tr>
<th>Unusual Experiences</th>
<th>Introvertive Anhedonia</th>
<th>Self reflectivity</th>
<th>Understanding of others’ minds</th>
<th>SQoL as reported by the participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unusual Experiences</td>
<td>1</td>
<td>0.17</td>
<td>0.22-</td>
<td>0.33-</td>
</tr>
<tr>
<td>Introvertive Anhedonia</td>
<td>-</td>
<td>1</td>
<td>0.35-**</td>
<td>0.63-**</td>
</tr>
<tr>
<td>Self reflectivity</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.41-**</td>
</tr>
<tr>
<td>Understanding of others’ minds</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>SQoL as reported by the participant</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*p<0.05 **p<0.01 (1 tailed)
and SQoL. To test this hypothesized mediation model, a hierarchical regression was carried out for persons without a diagnosis of schizophrenia. Table 5 present the results of this regression analysis. In keeping with the results of the correlation analysis, at step 1, understanding of others’ minds contributed significantly and positively to the self-reported SQoL (β=0.42; P <.01) of persons without a psychiatric diagnosis. When level of introvertive anhedonia was added to the analysis at step 2, the statistically significant and positive contribution of understanding of others’ minds to SQoL was reduced and was no longer statistically significant (β=0.30; P>.05). However, the negative relation between introvertive anhedonia and SQoL was also not statistically significant (β = -0.18 P >.05). Thus, the results of the hierarchical regression are not consistent with a full mediation model.

### DISCUSSION

This study replicated the general finding that persons with a diagnosis of schizophrenia express significantly less SQoL than persons without such a diagnosis (4). This is also the first study to use the MAS-A to assess metacognition in a non-clinical sample. This study’s findings are also consistent with previous literature that shows that the metacognitive abilities of persons with schizophrenia are lower than the metacognitive abilities of persons without schizophrenia (71, 72). Subsequently, this study examined the extent to which and the manner in which the positive and negative symptoms of schizophrenia and two parallel traits of schizotypy mediate the relation between metacognition and SQoL.

With regard to both samples, correlations were found between self-reflectivity and the negative symptoms of schizophrenia, and the parallel schizotypal trait of negative anhedonia. However, in both samples, self-reflectivity was not found to be related to SQoL. While testing the mediation model, with regard to the sample of persons with schizophrenia, negative symptoms of schizophrenia were found to mediate the relationship between knowing the others’ minds and SQoL (assessed by the psychiatrist). Thus, knowing the others’ minds seems to increase the SQoL of persons with schizophrenia because it decreases the negative symptoms of the illness. Similar results were uncovered with regard to schizotypy. Regression analysis showed that the metacognitive capacity of understanding others’ minds was negatively related to self-reported SQoL. However, in step 2, while entering the introvertive anhedonia to the regression, neither the schizotypal trait, nor knowing the others’ minds, predicted SQoL.

This study’s finding that negative symptoms, but not positive symptoms, mediate the relation between metacognitive processes and SQoL is consistent with much research that shows negative symptoms to be a major source of the reduction in SQoL exhibited by persons with schizophrenia (73). It is also consistent with studies showing that negative symptoms of schizophrenia, and not positive symptoms are related to metacognition (74). In the current study, among participants with schizophrenia, the negative symptoms were found to be related to both metacognitive abilities, while the positive symptoms were found to be related only to knowing the others’ minds aspect of metacognition. In the non-clinical sample both schizotypal traits that are parallel to the negative and positive symptoms of schizophrenia, were found to be related to both metacognitive abilities.

As mentioned above, regression analyses were conducted only for the metacognitive ability of knowing the others’ minds, since self-reflectivity was not found to be related to SQoL. These analyses supported a mediation model among participants with schizophrenia, and not among the non-clinical sample of the study. With regard to schizophrenia, an impaired metacognitive ability of understanding others’ minds, could lead to such negative symptoms of schizophrenia as extreme anhedonia, apathy, and flattening of affect. These symptoms may reduce SQoL directly by interfering with the interpersonal behavior that is required for the initiation and maintenance of gratifying social relationships or indirectly by interfering with understanding of the other, thereby, producing mutual misunderstanding and frustration.

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**Table 5. Regression analysis for the participants without a psychiatric diagnosis (N=60).**

<table>
<thead>
<tr>
<th></th>
<th>Beta</th>
<th>Std. Error</th>
<th>B</th>
<th>R</th>
<th>R²</th>
<th>R² Change</th>
<th>F</th>
<th>Df</th>
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</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding of others’ minds</td>
<td>0.42**</td>
<td>0.08</td>
<td>0.30</td>
<td>0.42</td>
<td>0.18</td>
<td>12.45**</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding of others’ minds</td>
<td>0.30</td>
<td>0.11</td>
<td>0.21</td>
<td>0.44</td>
<td>0.20</td>
<td>0.02</td>
<td>6.99**</td>
<td>57</td>
</tr>
<tr>
<td>Introvertive Anhedonia</td>
<td>0.18-</td>
<td>0.03</td>
<td>0.04-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05 **p<0.01 (1 tailed)
As pointed out above, although similar patterns of correlations were found among both samples, full mediation of the schizotypal traits, between understanding of others’ minds and SQoL, was not found among the population without the illness. The results of the regression analyses among the non-clinical sample suggest that the schizotypal trait that parallel the negative symptoms of schizophrenia, and the metacognitive ability of understanding others’ minds, neutralize the effects of each other on SQoL. Although both correlate with SQoL, when entered together in the regression, none of them predicts SQoL. This multicollinearity suggests that both variables, the schizotypal trait of introverted anhedonia and the metacognitive ability of understanding others’ minds, explain congruent parts of SQoL among person without mental illness.

Therefore, the current study provides only partial support for the contention that schizotypy is a kind of a specific schizophrenia proneness or, in terms used by Rossi and Daneluzzo (75, p. 67), a “liability” to schizophrenia. Actually, Rossi and Daneluzzo (75), consider schizotypy to be a non-specific “psychosis-proneness” and claim that their comparison of schizotypal dimensions in persons without a psychiatric diagnosis to these dimensions in persons with either a diagnosis of schizophrenia, bipolar disorder, unipolar disorder, or an obsessive-compulsive disorder provides support for the above position.

Findings of a study conducted by Stirling et al. (62) on the relations between hallucination proneness, schizotypy, and metacognition can be interpreted as support for conceptualizing schizotypy as a “normally distributed multidimensional trait which reflects the extent to which an individual may be considered psychosis-prone” and “as a necessary (but not sufficient) condition for the subsequent development of schizophrenia” (62, p. 1406). These findings also suggest one way in which the phenomenology of schizotypy may overlap the phenomenology of schizophrenia and, given the right circumstances, lead to the symptoms and impaired function that are often a consequence of schizophrenia. Furthermore, Stirling et al. (62) contend that schizotypy may give rise to “heightened sensitivity towards, greater awareness of, and increased concern about both positive and negative aspects of thinking” (p. 1407). Such sensitivity, awareness, and concern could have both beneficial and harmful consequences.

This study’s results and the explanations that have been provided to explain them may have significant theoretical, empirical and clinical implications. First, this study has produced evidence of the relations between negative symptoms and metacognition among persons with schizophrenia consistent with previous studies that used the MAS-A (11, 31). Therefore, it supports the major role that negative symptoms play in relation to both SQoL and metacognition.

In addition, this study, to the best of our knowledge, is the first to use the MAS-A to show that these relations between metacognition and the schizotypy traits in normal populations parallel the relations between metacognition and negative symptoms of schizophrenia. Accordingly, this study’s results provide grounds for attributing an important role to self-reflectivity and understanding others’ minds for persons without mental illness, suggesting that this relation between metacognition and schizotypy traits may involve other processes than those that are involved in the manner in which the negative symptoms of schizophrenia mediate the relation between metacognition and SQoL.

However, the significance of this study’s results is limited by the small size and homogeneity of its samples, as well as by its cross-sectional design. Therefore, studies with larger and more heterogeneous samples, using a longitudinal approach should be carried out in order to support and validate the current study’s results.

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