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Association of stigma resistance with emotion regulation—functional magnetic resonance imaging and neuropsychological findings

Tuukka T. Raija^{a,b,*}, Jyrki Korkeila^{c,d}, Kaisla Joutsenniemi, Samuli I. Saarni^{a,e}, and Tapani J.J. Riekkilä^f

^aDepartment of Psychiatry, Helsinki University Central Hospital, Finland ^bBrain Research Unit, O.V. Lounasmaa Laboratory and Advanced Magnetic Imaging Centre, Aalto University, Finland

^cDepartment of Psychiatry, University of Turku ^dHarjavalta Hospital, Satakunta Hospital district, Finland ^eNational institute for health and welfare, department of mental health and substance abuse services, Helsinki, Finland ^fInstitute of Behavioural Sciences, University of Helsinki, Finland

Abstract

Background—Personal characteristics contribute to whether negative attitudes in society are internalized as deteriorating self-stigma. Studies in healthy subjects suggest that resilience is associated with the regulation of amygdala activation by the medial prefrontal cortex (mPFC), but little is known about the factors that contribute to individual stigma resistance in psychiatric patients.

Methods—We assessed stigma (by measuring association strengths between social inferiority and schizophrenia by an implicit association test) in 20 patients with schizophrenia and in 16 age- and sex-matched healthy control subjects. The brain activation strengths were measured by functional magnetic resonance imaging during evaluation of schizophrenia-related statements and of control statements.

Results—Association strengths between social inferiority and schizophrenia were inversely related to the strength of the activation of the rostro-ventral mPFC. This inverse correlation survived adjustment for global functioning, depression symptom scores, and insight. Activation of the rostro-ventral mPFC was negatively correlated with activation of the amygdala. The association strengths between social inferiority and schizophrenia correlated with the compromised performance in a Stroop task, which is a measure of cognitive regulation.

Discussion—Our findings suggest that individual stigma resistance is associated with emotion regulation. These findings may help to understand better stigma resistance and thereby aid the development of patient interventions that add to the public anti-stigma work in reducing devastating effects of stigma.

*Corresponding author. Brain Research Unit, O.V. Lounasmaa Laboratory, Aalto University School of Science, P.O. Box 15100, FI-00076 AALTO, Finland. tel: +358-40-7634251, fax: +358-9-47163744 , raijtu@neuro.hut.fi.

Keywords

brain; functional magnetic resonance imaging; self-stigma; stigma resistance; schizophrenia; resilience; medial prefrontal cortex; amygdala; Stroop

1. Introduction

Persons with mental disorders are doubly affected by their condition. First, the symptoms of the illness cause distress and impairment. Second, social misconceptions about mental disorders burdens the patient with the stigma of “insanity”. Cultural practices of naming persons with a mental disorder, say schizophrenics, exacerbate the process of stigmatization by separating “us” from “them”. Most of these patients silently accept the negative culturally held attitudes. Social discrimination and rejection are related to a subjective fear of being stigmatized and also to self-stigmatization. The latter is an acceptance of social negative appraisals as true evaluation of one’s value as a human being [1].

Self-stigmatization leads to the loss of self-esteem [2], a decrease of the quality of life, and to depression [3, 4]. Such internalized stigma may be one reason why the reduction of objective symptoms of psychosis is not sufficient in itself in improving the subjective quality of life in people with mental disorders. More fundamentally, the importance of self-stigmatization reflects a pervasive shift of priorities in health systems, health care ethics and even health economics towards outcomes subjectively valued by patients. These subjective outcomes include autonomy, quality of life and patient-reported outcomes in general [5, 6].

Not all people with mental illness are uniformly susceptible to self-stigmatization. Some seem to be able to resist negative attitudes. Such stigma resistance interferes with acquiescence in applying negative attitudes that, in turn, increase the subjective influence of stigma and impairs recovery. Therefore, enhancing stigma resistance could become an important target of treatment interventions. Enhancement of stigma resistance comprises one of the core aspects of recovery-orientation movement: “the development of new meaning and purpose in one’s life, irrespective of the presence or absence of symptoms of mental illness” [7].

Self-stigma has usually been measured by explicit interviews or questionnaires [8]. However, respondents may have varying self-representational strategies or may be unaware of their automatic appraisals [9], and for sensitive issues the explicit scales may be biased towards emotionally neutral answers [10]. Implicit measures may have better predictive validity than explicit measures in sensitive areas such as intergroup or interracial behavior [10, 11]. Therefore, researchers have started to use implicit association tests to measure implicit association strengths between mental disorders and stigma [9, 12]. Consequently, we measured implicit association strengths between schizophrenia and social inferiority in this study.

Although the neurobiological underpinnings of resilience towards mental disorders have attracted recent interest [13, 14], the neurobiology of stigma resistance remains unknown. It is known that in healthy subjects, the function of the medial prefrontal cortex (mPFC) is

related to reappraisals and optimism, and that the functioning of that same brain region is attenuated under conditions of anxiety and depression [13]. The rostro-ventral mPFC has been especially associated with emotion regulation [15] and control of the amygdala, which are factors that may play important roles in resilience [13, 14]. We therefore hypothesized that the activity of the rostro-ventral mPFC during the processing of one's illness is associated with a weaker amygdala activation and weaker implicit associations between schizophrenia and social inferiority in subjects with schizophrenia.

2. Material and methods

This study combines new implicit measurements of the strengths of the associations between social inferiority and schizophrenia with neuropsychological and functional magnetic imaging (fMRI) data that were collected during the evaluation of statements about one's illness in our published study [16].

2.1. Participants

We recruited patients with schizophrenia from the Helsinki City Health Center, Department of Psychiatry. We excluded those with drug- and alcohol dependency, neurological traumas, neurological disorders, and MRI contraindications. We also invited healthy age- and sex-matched control subjects from a pool of voluntary subjects attending Aalto University, Espoo, Finland. Twenty three of the 40 invited patients and 17 of the 25 control subjects volunteered. Twenty of the patients were able to participate in functional imaging and implicit association testing. One control subject had excessive (>1 voxel diameter) head movement during scanning, thus 20 patients and 16 healthy control subjects were included in the final analysis.

2.2. Clinical and neuropsychological assessment

One of us, T. T. R. used a structured interview for DSM-IV [17] to determine the diagnosis, a positive and negative symptom scale (PANSS) to assess the severity of the schizophrenia symptoms [18], the Calgary Depression Scale to estimate the severity of depression [19], and the Global Assessment Scale (GAS) to evaluate global functioning [20]. Insight was assessed on a composite scale (see: 2.7. Magnetic resonance imaging) that we have previously shown to correlate with other insight measures [16].

T. J. J. R. used Trail Making B [21] and the Stroop Color Word Interference Test [22] to assess executive functions, the Wechsler Adult Intelligence Scale [23] to estimate general intelligence, and the Logical Memory test from the Wechsler Memory Scale [24] to assess memory function.

2.3. Assessment of implicit association strengths (IAS) between schizophrenia and social inferiority: IAS-score

The implicit association test (IAT) [25] was conducted during the same day as the fMRI scanning. During the test, patients and healthy control subjects classified category-related words into four categories using a computer. The category-related words appeared one by one in the middle of the screen while the choices of the most appropriate categories were

displayed on the left and right sides of the screen. We instructed study participants to classify words by pressing a button at the side of the appropriate selected category as quickly as possible without frequent mistakes. A comparison condition is necessary for IATs, so we used common cold as a stigma-neutral condition during the IAT and during fMRI. The categories (and category-related words) during IAT were: good (loved, valuable, wonderful, clever, skilful and competent), bad (hated, miserable, poor, stupid, useless and vile), schizophrenia (paranoia, psychosis, hallucination, mental disease, memory problem and lethargy), and common cold (cold, fever, cough, sore throat, ache and sneezing).

First, the subject assigned category-related words to two pairs of categories once (either “good” and “bad” one pair or “schizophrenia” and “common cold” second pair). Second, the category words appeared together two on each side (e.g. “good” and “common cold” on the left and “bad” and “schizophrenia” on the right) and the subject assigned words from all four categories to the relevant sides. Third, the word pairing combinations were reversed so that the words that were first together now appeared on opposite sides (i.e. “bad” and “common cold”, and “good” and “schizophrenia”). The order of which pair came first was balanced between subjects so that each word pairing had even sequential presentation. Assuming schizophrenia to be negatively associated, it takes a longer time to associate “hallucination” to the category pair of “schizophrenia” and “good” than to category pair “schizophrenia” and “bad”, for example.

2.4. Analysis of the implicit association test

The IAT was scored using an improved algorithm [25]. Excessively slow runs were excluded and none of the subjects answered too quickly. The rest of the runs were used in the analyses and the means and standard deviations for the IAT were calculated. Error latencies were replaced by block mean + 600 ms. Finally, the mean difference between associations of common cold and schizophrenia to “good” and “bad” words was calculated. The resulting score reflected the standard-deviation-adjusted mean speed differences between assigning “good” and “bad” words to schizophrenia in contrast to common cold.

2.5. Assessment of explicit association strengths (EAS) between schizophrenia and social inferiority: EAS-score

We constructed a corresponding explicit measure to validate the implicit measure. We combined the subjective illness-related functional inability with subjective appraisal of the corresponding function to match the measure as well as possible. First, we assessed self-ratings of how strong inability schizophrenia and common cold were associated with in those areas of life that are typically affected by schizophrenia (work, education, intimate relationships, social equality and respect, intelligence, emotional functioning, sense of reality, and self respect). Subjective appraisals of the corresponding fields were then measured by separate self-ratings. Ratings were assessed by using visual analogue scales ranging from “not at all” (left end point, coded 0) to “very much” (right endpoint, coded 100). We first multiplied the “inability ratings” by the “appraisal ratings” within each area and then calculated individual means across all the fields: one for schizophrenia and one for common cold. The EAS-score was finally calculated as a difference between the individual

mean for schizophrenia and common cold to make the EAS-scores comparable with the IAS-scores that require the comparison condition,

2.6. Magnetic resonance imaging

All the participants practiced the task before entering the scanner (Signa VH/i 3.0T scanner, GE Healthcare, Chalmont St Giles, UK). They participated in two 9 min 28 s blood oxygenation level dependent (BOLD) fMRI sessions with an echo time (TE) of 32 ms, repetition time (TR) of 2.0 s, a flip angle of 75°, 34 slices, a matrix size 64×64 , and a voxel size of $3.4 \times 3.4 \times 4$ mm. We discarded the first four whole-head images to achieve equilibrium of the signal. After functional imaging, structural spoiled-gradient-echo T1-weighted images were collected with a TE of 3 ms, a TR of 10 ms, a flip angle of 15°, 146 slices, a matrix size of 256×256 , and voxel size of $1 \times 1 \times 1$ mm.

During two sessions of functional imaging, participants were asked to rate statements against a visual analogue scale that ranged from total disagreement to total agreement. Each session lasted for 9 min 28 s and included six blocks of five statements. Duration of each block depended on individual response time (mean block duration was 46 s in patients; see Results for the variance of response times). Thirty statements about schizophrenia (sch-evaluation), such as “I have schizophrenia” and “Schizophrenia is a challenge in my daily living” were modified from clinical insight scales [26-28]. In addition, we created 30 comparable statements about the common cold (cc-evaluation) to control for the visuomotor rating task, language processing, decision-making and attention. The control statements included “I may have symptoms of the common cold in the future” and “Common cold can be a challenge in my daily living”. We presented statements with Presentation® software (<http://www.neurobs.com/>). The blocks were interleaved with 30-s rest periods. Every second block consisted of a sch-evaluation and was alternated with cc-evaluation blocks. All participants evaluated every statement once by moving a cursor and by pressing one of two optical buttons, one for the right and one for the left thumb. An answer was registered two seconds after stopping the cursor movement.

2.7. fMRI analysis

Functional data were analyzed by using SPM8 software (<http://www.fil.ion.ucl.ac.uk/spm/software/spm8/>). In the pre-processing, we realigned each whole-head functional image of a participant to a common space by linear rotation and translation. Realigned images were normalized to MNI-space [29], and smoothed with a Gaussian kernel (full width at half maximum = 8 mm) to allow inter-subject comparison. During the image processing, voxel size was changed to the default value of $2 \times 2 \times 2$ mm.

We used a general linear model in the analysis [30]. Data were modeled by box-car functions for sch-evaluation, cc-evaluation, and rest blocks. These functions were convolved with the hemodynamic response function to model for the hemodynamic lag. Data were fitted to the model, and parameter estimates were calculated for BOLD signal difference in sch-evaluation > cc-evaluation contrast. Because BOLD signal increase is an indicator of neuronal activation, we refer to the positive parameter estimates as “activation”.

The resulting sch-evaluation > cc-evaluation contrast images were entered into the multiple regression analyses against the IAS-scores across the patients. The order of category presentation in the IAT was used as a confounding covariate. The analysis was corrected for multiple comparisons within a sphere with a radius of 15 mm, centered at $x = 0$, $y = 48$, $z = -8$. This region of interest was selected because it was suggested by Etkin et al. [15] that the ventral-rostral subregion of the mPFC is especially involved in the regulation of emotion.

Additional analyses were aimed at controlling any associations found. For these control analyses, we extracted patients' and healthy control subjects' individual activation strengths from a sphere with radius of 5 mm (41 voxels = 328 mm³), centered at the mPFC site of the strongest correlation with the IAS-scores to test these predictions.

We adjusted the association between the IAS-scores and the extracted mPFC activation strengths for potential confounders in a partial correlation analysis in SPSS. Global functioning was adjusted to rule out the possibility that the IAS-scores would be explained by adequate evaluation of poor functioning. Insight was included because patients with poor insight consider their illness as less self-relevant, and may be therefore be more resistant to stigma. Depression scores and psychiatric comorbidities were also included because these are closely related to emotion regulation. Finally, we included antipsychotic dose equivalents, calculated according to reference [31], to control the possible effect of medication.

We compared the extracted mPFC activation strengths across tasks and groups: Assuming that schizophrenia-related statements elicit more emotions than common cold-related statements for the patients, brain circuitry of emotion regulation should be more active during sch-evaluation than during the cc-evaluation within the patients. Moreover, we assumed that schizophrenia-related statements would evoke more emotions in the patients than in the healthy subjects, thus brain circuitry of emotion regulation should be more active in patients than in healthy control subjects in sch-evaluation > cc-evaluation contrasts.

Finally, the extracted medial PFC activation strengths were entered into a new correlation analysis in SPM8 with the sch-evaluation > cc-evaluation contrast images within the patients to test for the association of the mPFC with the amygdala. Results were corrected for multiple comparisons within a sphere of a 5 mm radius, centered in the middle of both amygdalae.

3. Results

3.1. Implicit and explicit scores

The EAS-scores of the patients were greater than zero ($M = 3524$, $SD = 2081$, $P < .001$; measured only in the patients; the greater the values the stronger the association between social inferiority and schizophrenia relative to the control condition). The IAS-scores ($M = -.13$, $SD = .32$) correlated with the EAS-scores ($R = .71$, $P = .007$) in the patient group. The IAS-scores were greater than zero in healthy control subjects ($M = .18$, $SD = .28$, $P = .01$; positive values which indicated a stronger association between social inferiority and schizophrenia relative to the control condition). The IAS-scores tended to be lower than zero

in patients, ($P = .09$; negative values indicate weaker association between social inferiority and schizophrenia relative to the control condition). Patients' IAS-scores were lower than the corresponding scores in healthy control subjects ($P = .003$). The IAS-scores correlated positively with illness duration but negatively with performance in the Stroop task in the patient group (Table 2).

3.2. Behavioural findings during fMRI

Response times from the presentation of a statement to the last movement of the cursor were similar between groups (for cc-evaluation: $M = 7.6$ s, $SD = 2.0$ s in patients and $M = 7.0$ s, $SD = 0.7$ s in healthy control subjects; $P = 0.17$) and between tasks within patients ($M = 7.5$ s, $SD = 1.8$ s for sch-evaluation and $M = 7.7$ s, $SD = 2.1$ s for cc-evaluation; $P = .076$). Patients and healthy subjects rated the statements about common cold similarly ($M = 73$, $SD = 18$ and $M = 82$, $SD = 13$, respectively, $P = .12$). As expected, patients evaluated the statements about schizophrenia to be true for themselves more often than healthy control subjects did ($M = 70$, $SD = 21$ vs. $M = 8$, $SD = 12$, $P < .001$).

3.3. Functional MRI activation

IAS-scores correlated negatively with the rostral-ventral mPFC activation strengths in sch-evaluation > cc-evaluation contrast ($P = .018$ at $x = 4$, $y = 62$, $z = -4$, corrected for multiple comparisons; Fig 1). In the control analyses, IAS-scores correlated with the activation strengths extracted from 41 voxels around $x = 4$, $y = 62$, $z = -4$ ($P = .004$, uncorrected). After adjustment for global functioning, insight, the Calgary depression scale score, and antipsychotic dose equivalents $P = .001$, and after including comorbid anxiety and personality disorders as additional confounding covariates, $P = .005$.

The mPFC activation strengths of the patients were greater than zero ($P = .002$) and greater than the corresponding activation strengths in the healthy control subjects ($P = .003$; Fig 3). These activation strengths correlated negatively with the right amygdala activation strengths within patients (Fig 2. $x = 30$, $y = -6$, $z = -16$; $P = .036$, corrected for multiple comparisons).

4. Discussion

We found the implicit association strengths between schizophrenia and social inferiority to be inversely correlated with activation strengths of the rostral-ventral mPFC during the processing of the schizophrenia category in the patients with schizophrenia. The mPFC activation strengths were negatively correlated with the right amygdala activation strengths. The stronger association between schizophrenia and social inferiority was also associated with weaker performances in a Stroop task, which is a measure of cognitive inhibition. Within the framework of the current understanding about resilience and emotion regulation, these findings provide preliminary evidence for association between brain circuitries of emotion regulation and resistance towards the stigma of schizophrenia.

We used implicit association strengths as the main measure in this study, because in sensitive issues they may have more validity than explicit measures [10, 11]. The validity of using the implicit measure was demonstrated when the IAS-scores correlated strongly with

the corresponding explicit scores that were planned to assess subjective appraisal of schizophrenia-related inability. Furthermore, the implicit measure was independent of potential confounders, including global functioning, insight, depression scores, antipsychotic dose equivalents, and psychiatric comorbidities.

The development of self-stigma has been suggested to progress from an awareness of stigma to the acceptance of stigma and finally to the internalization of stigma as a part of an individual's self-image [32]. Our data are not sensitive enough to determine, in which part of this process the study patients were, but we assume that the IAS-scores reflect progress in this development.

We used the brain imaging findings to elaborate on the possibility of increasing understanding about psychological underpinnings of stigma resistance. Reverse inference, *i.e.* an inference about the cognitive function based on neuroimaging findings has received appropriate criticism [33]. The medial PFC is related to multiple neuronal networks and cognitive functions, and therefore any inference made about emotion regulation based simply on the mPFC activation would be an oversimplification. However, within the framework of the function of the rostralventral mPFC in emotion regulation and emotion-related amygdala function [15], the inverse association between the mPFC and the amygdala function suggests at least some connection to the circuitry to emotion regulation. Moreover, cognitive and emotional regulation are linked to each other [15], thus the present association between the IAS-scores and poor performance in the Stroop task is consistent with this line of thinking. Furthermore, differences between groups and tasks in the mPFC activation also agree with the framework of emotion-regulation. The medial PFC activation as well as processing of sch-statements in the patients has been linked with self-referential processing [16]. We used insight scores as an estimate of self-relevance of schizophrenia, and adjusted the association between IAS-scores and mPFC activation with these estimates. Therefore, we find it unlikely that self-relevance of stimuli explains the observed association.

The patients with schizophrenia associated schizophrenia to social inferiority in the explicit measures more strongly than common cold. Nonetheless, they tended to associate common cold more strongly with social inferiority than schizophrenia in the implicit measures. The IAS-scores were independent of insight in the patient group, which suggests that factors other than insight into illness contributed to the variance. It has been suggested that people with mental disorders associate less stigma with oneself and others with mental disorder in comparison with general population, because they have more knowledge in addition to interactions with other people with the disorder.[12] However, if this was the case one would expect implicit self-stigma to decrease with the duration of the illness in the patients, which is in contrast to our findings. It is possible that the implicit association strengths between schizophrenia and social inferiority are weak in the early illness, but strengthen over years due to cultural stigma despite the treatment, knowledge and interaction with other people with mental disorders.

One factor that may contribute to the relatively positive appraisal of schizophrenia in the patient group is the general human tendency to appraise oneself more positively than others [34]. As a sensitive issue, such a tendency may be more accurately observed by implicit than

explicit measures. The general appraisal tendency has been suggested to explain more than half of the variance in subjective ratings of needs for care, treatment satisfaction and quality of life in patients with psychosis [35, 36]. Interestingly, the tendency for positive appraisal has been linked to functioning of the mPFC [37].

Limitations of the present study include heterogeneous patient group with various psychiatric comorbidities. Schizophrenia of a close friend or relative may contribute to the experience of stigma, but unfortunately, we did not ask about schizophrenia in close relatives or friends of the participants.

Improving our understanding about stigma resistance may help us to focus interventions to increase stigma resistance. Previous interventions have aimed at reducing self-stigmatization by altering the stigmatizing beliefs of the patient, and enhancing skills for coping with self-stigmatization through improvements in self-esteem, empowerment, and help-seeking behavior [38]. Such interventions likely enhance emotion-regulation. If further studies show that emotion-regulation is important for stigma resistance, these interventions could be further focused on emotion regulation.

Emotion-regulation skills include monitoring, evaluating and modulating the emotions [39]. Skills related to acceptance, tolerance, and active modification of emotions have been suggested to be especially important for resilience. These skills can be taught to patients by various psychotherapeutic techniques that can be integrated into programs such as Integrative Training of Emotional Competencies [40].

In addition to psychotherapeutic interventions, the regular experiencing of positive emotions may build some resilience [41]. In contrast, depressiveness is associated with one's inability to resist stigma [3]. Major depression has been estimated to occur at least temporarily in about half of the patients with schizophrenia [42]. Interventions that enhance emotion regulation and elicit positive emotions may simultaneously treat depression and prevent internalization of stigma. Consequently, these tools may be especially effective in increasing the quality of life of the patients with schizophrenia.

Enhanced emotion regulation may contribute to stigma resistance directly, along with one's ability to interact socially and also from benefiting from social support [13]. The importance of social support is indicated by findings that a network of friends, not being separated from one's spouse, in addition to receiving outpatient treatment, is associated with higher stigma resistance [3]. Furthermore, higher levels of social support have been shown to predict lower levels of perceived stigmatization at one-year follow-up among patients with a recent onset of severe mental illness [42]. Identification with a group seems to be beneficial as long as one appraises the group positively [44].

Recognizing the importance of stigma resistance also has implications that go beyond the individual patient. The low level of perceived legitimacy of stigma increases the individual's stigma resistance [32, 45]. As always, health professionals need to be engaged in anti-stigma efforts that range from the individual up to policy levels in order to reduce individual, structural and societal discrimination. Mental health care systems need to be integrated, and family and caregivers included in order to empower the patient to resist stigma.

Understanding the neurobiological and cognitive mechanisms of stigma resistance will hopefully help create individual interventions that increase stigma resistance. These interventions could be combined with societal and organizational anti-stigma efforts and have a synergistic effect.

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Fig. 1.

Implicit association strengths between social inferiority and schizophrenia correlated negatively with the brain activation of the rostral-ventral medial prefrontal cortex across patients. The brain activation was measured as the contrast between processing of one's schizophrenia and processing of a control condition. Cross points the voxel of the strongest correlation ($x = 4$, $y = 62$, $z = -4$).

Fig. 2. The right amygdala activation strengths were negatively correlated with the medial prefrontal cortex activation strengths. The brain activation was measured as a contrast between processing of one's schizophrenia and processing of a control condition. Cross points the voxel of the strongest correlation ($x = 30, y = -6, z = -16$).

Fig 3. Ventral-rostral medial prefrontal activation strengths in “schizophrenia evaluation > control evaluation” contrast. Error bars show 95 % confidence intervals. PE, parameter estimates.

Table 1

Characteristics of the participants included in the final analysis.

Characteristic	Patients		Healthy subjects		Difference	
	Mean (SD) or proportion	Range	Mean (SD) or proportion	Range	t-test P value	Chi-square P value
Age	26 (4)	21–33	28 (4)	21–33	.24	
Gender (males)	14/20		12/16			.84
Education (years)	13 (2)	9–17	17 (2)	12–20	<.001	
Duration of illness (months)	49 (23)	9–85				
Insight (0–100)	72 (21)	30–99				
GAS	52 (13)	32–78				
PANSS positive symptoms	16 (3)	14–26				
PANSS negative symptoms	16 (2)	14–19				
PANSS total score	70 (9)	61–90				
Calgary-depression scale	3 (4)	0–17				
Comorbidity, axis I*	9/20					
Comorbidity, axis II**	4/40					
AP equivalents (mg)***	575 (514)	0–2081				
IQ-estimates	101 (11)	76–118				
Stroop-interference	1.6 (.31)	1.1–2.4				

PANNS, positive and negative symptom scale. GAS, global assessment scale. AP equivalents, antipsychotic dose equivalents. Axis I comorbidity included major depression in five, obsessive compulsive disorder in four, and social anxiety disorder in two patients.

** Axis II comorbidity included mixed personality disorder in three and antisocial personality disorder in one patient.

*** Eighteen out of the 20 patients used antipsychotic medication.

Table 2

Correlates of implicit association strengths between schizophrenia and social inferiority (ISS-scores) in patients with schizophrenia

	ESS-scores	SUMD	GAS	Duration of illness	PANSS total score	Calgary Depression Scale	Stroop effect
ISS-scores	$R = .71$ $P = .007$	$P = .23$	$P = .34$	$R = .64$ $P = .002$	$P = .45$	$P = 1.00$	$R = .48$ $P = .03$

ESS-scores, explicit association strengths between schizophrenia and social inferiority; SUMD Scale to Assess Unawareness of Mental Disorder; GAS, Global Assessment Scale; PANSS, positive and negative symptom scale.