Psychiatry Research 276 (2019) 56–59

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Cognitive and emotional empathy in patients with schizophrenia spectrum disorders: A replication and extension study

Philipp Berger[a,*], Florian Bitsch[a], Babette Jakobi[a], Arne Nagels[b], Benjamin Straube[a], Irina Falkenberg[a]

[a] Department of Psychiatry and Psychotherapy, Philipps-University Marburg, Rudolf-Bultmann-Straße 8, 35039 Marburg, Germany
[b] Department of English and Linguistics, Johannes Gutenberg-University Mainz, Jakob-Welder-Weg 18, 55128 Mainz, Germany

ARTICLE INFO

Keywords:
Social cognition
Empathy
Schizophrenia

ABSTRACT

Impairments of social cognition are defined as core features in the pathology of schizophrenia. In a study by Lehmann and colleagues (2014), patients with schizophrenia have been shown to demonstrate a diminished capacity to understand others' emotions (i.e. cognitive empathy), but a preserved ability to share or feel the emotional states of others (i.e. emotional empathy). Here, we report on an independent replication study investigating cognitive and emotional empathy in 35 patients with schizophrenia spectrum disorders and a matched control group, which 1) confirms that patients demonstrate preserved emotional empathy in self-report and behavioural measurements, and 2) reveals associations between emotional empathy and social anhedonia in patients.

1. Introduction

The investigation of social cognition in individuals with schizophrenia has a long tradition, with clinical research findings pointing at marked impairments in abilities that underlie social interaction and communication, such as Theory of Mind (ToM) processing (Brüne, 2005) and emotion perception (Penn et al., 2008). Deficits in social cognition have further been considered as predictive for treatment response and functional outcome in schizophrenia (Fett et al., 2011). While research on affective ToM processing has extensively investigated whether patients with schizophrenia are capable of *understanding* others' emotions (i.e. cognitive empathy), the capacity to *share or feel* the emotional states of others (i.e. emotional empathy; see Reniers et al., 2011) has received less attention (Brüne, 2005; Lehmann et al., 2014). However, evidence demonstrating a pathology-related decrease in emotional contagion (Falkenberg et al., 2008) indicates that patients with schizophrenia show alterations in the subjective experience of emotions (Bonfils et al., 2016).

In a study by Lehmann et al. (2014), a sample of remitted patients with schizophrenia completed the Multifaceted Empathy Test (MET; Dziobek et al., 2008) in order to investigate both cognitive and emotional dimensions of empathy. The results of this study corroborate previous findings, showing that patients with schizophrenia exhibit impairments in measures of cognitive empathy (Bora et al., 2009). Interestingly, however, emotional empathy was unimpaired in patients, indicating that the capacity to share the emotional states of others might be relatively unaffected by schizophrenia disorder (Lehmann et al., 2014). While these results are in line with previous studies demonstrating preserved emotional responses to affective stimuli at the behavioural level (Atoui et al., 2018; Cohen and Minor, 2010), other studies have shown deficits of emotional empathy in patients with schizophrenia spectrum disorders (Bonfils et al., 2017, 2016). Notably, a meta-analysis by Bonfils et al. (2016) has revealed large discrepancies between studies using self-report and behavioural measurements to assess affective empathy.

Thus, independent replication is needed in order to validate the above findings. Moreover, although previous studies have investigated the association between empathy and measures of psychopathology (Lehmann et al., 2014), research addressing the question as to how empathy-related impairments are associated to social functioning deficits in schizophrenia is scarce (Abramowitz et al., 2014; Michaels et al., 2014). In this brief report, we sought to replicate the findings of Lehmann et al. (2014) in an independent sample of patients with schizophrenia spectrum disorders (SSD) to support the rationale of preserved emotional empathy in schizophrenia. To further explore the relationship of empathy deficits with social functioning impairments in schizophrenia, we examined associations between empathy and a reduced ability to experience pleasure in social situations (i.e. social

* Corresponding author.
E-mail addresses: philipp.berger@med.uni-marburg.de, bergerp@staff.uni-marburg.de (P. Berger).

https://doi.org/10.1016/j.psychres.2019.04.015
Received 19 June 2018; Received in revised form 11 April 2019; Accepted 15 April 2019
Available online 17 April 2019

Table 1
Demographic and clinical characteristics of patient and control group.

	Patients (n = 35) Mean [SD]	Controls (n = 18) Mean [SD]	p
Age (years)	34.84 [11.03]	29.47 [5.21]	0.057
Male/Female	23/12	8/10	0.137
Education Level	2.86 [1.14]	3.89 [0.32]	<0.001*
Neurocognition			
Corsi Block Task	5.69 [1.08]	5.72 [1.02]	0.906
MWTB	29.51 [3.60]	32.33 [2.60]	0.005*
Trail Making Test (TMT-B-TMT-A)	48.60 [43.00]	32.79 [20.23]	0.147
Cognition Composite Score	−0.04 [0.60]	0.10 [0.43]	0.386
Psychopathology			
Social Anhedonia	0.33 [0.20]	0.22 [0.15]	0.041*
SAPS	10.37 [10.53]		
SANS	8.91 [9.64]		
Years of Illness	10.82 [9.35]		

* $p < 0.05$.

anhedonia; Chapman et al., 1976).

2. Methods

2.1. Participants

35 patients with a DSM-IV diagnosis of schizophrenia (F20) or schizoaffective disorder (F25) (*SP;* M_{age} = 34.84, SD = 11.03, 12 female) and 18 healthy controls (*HC;* M_{age} = 29.47, SD = 5.21, 10 female) with no significant differences in age ($t(51) = 1.95$, $p = 0.057$) or gender ($\chi^2 = 2.22$, $p = 0.137$; see Supplementary Material) were recruited for the present study. All patients were remitted and the majority of patients ($N = 28$) was on stable doses of atypical antipsychotic medication, and 7 patients did not receive any antipsychotic medication within two weeks before investigation. We confirmed absence of mental disorders in the control group with a diagnostic interview revealing no history of psychiatric or neurological disorders. Education level was assessed with a scale from 1 to 4 coding the different levels of the German educational system (1 = lowest level, 4 = highest level; see Table 1). The study was approved by the local ethical review board.

2.2. Measures

2.2.1. Empathy

2.2.1.1. Behavioural assessment. The MET has been used to study cognitive and emotional empathy in psychiatric disorders, including schizophrenia (Lehmann et al., 2014) and depression (Thoma et al., 2011). Participants viewed photographs of either positive or negative emotional situations. For the scale of cognitive empathy (MET-CE), subjects were instructed to infer the emotional state of the protagonist by selecting one out of four mental state descriptions. Conversely, for the scale of emotional empathy (MET-EE), subjects were asked to rate their tendency to share the emotion on a scale from 0 to 9 (0 = not at all, 9 = very much). The revised version of the 'Reading the Mind in the Eyes'-Test (RME; Baron-Cohen et al., 2001) was administered to assess an additional behavioural measure for cognitive empathy. Participants viewed a series of 36 photographs, representing eyes of male and female actors. Mental state descriptions were presented around each picture and participants were instructed to select the word that best described what the person was feeling.

2.2.1.2. Self-report measurements. The Interpersonal Reactivity Index (IRI; Davis, 1983) with the subscales 'Empathic concern', 'Perspective Taking', and 'Personal Distress' was implemented to assess empathic responding. Furthermore, to address the tendency to synchronize with emotional expressions of others, we applied the Emotional Contagion Scale (ECS; Doherty, 1997). Values for self-report measures were missing in seven patients (M_{age} = 29.97, SD = 11.92).

2.2.1.3. Combined empathy scores. Combined scores of cognitive empathy (CE) were formed by summarizing z-scores of MET-CE scores, RME scores and the 'Perspective Taking' scale of the IRI. Combined scores of emotional empathy (EE) were calculated by summarizing z-scores of MET-EE scores, 'Empathic Concern' and 'Personal Distress' subscales of the IRI, as well as ECS scores.

2.2.2. Psychopathology and anhedonia

Psychopathology was assessed with the Scale for the Assessment of Positive and Negative Symptoms (SAPS/SANS; Andreasen, 1984a, 1984b). The 'Anhedonia' subscale was used to investigate associations with clinical anhedonia. Furthermore, self-report social anhedonia was examined by means of the Scale for Social Anhedonia (Chapman et al., 1976).

2.2.3. Cognitive functioning

To control for potential confounding effects of cognitive functioning, we implemented a neuropsychological battery. Short-term memory was assessed with the Corsi Block-Tapping task (Kessels et al., 2000), executive functions were assessed with the Trail Making Test (Reitan, 1958) and verbal intelligence was measured with the Multiple Choice Vocabulary test (Lehrl, 1977). To control the impact of neurocognition in subsequent analyses, a cognitive composite score was formed by summarizing z-scores of the above measures (Lehmann et al., 2014).

2.3. Statistical methods

In the current study, group differences were defined by t-tests (two-sided), and statistical significance was determined at a two-sided $p < 0.05$. To control for the impact of group differences in cognition scores, multivariate analyses of covariance (MANCOVA) were administered with cognitive composite scores as a control variable. Furthermore, in an additional analysis, we combined empathy scores of cognitive and emotional empathy measures to calculate semipartial correlations with social anhedonia in the patient sample.

3. Results

3.1. Cognitive empathy: behavioral and self-report

Between-group differences were found for MET-CE scores (positive emotions: $t(51) = 3.43$, $p = 0.001$; negative emotions: $t(51) = 3.82$, $p < 0.001$) and RME scores ($t(51) = 2.78$, $p = 0.008$). Further differences were revealed for the 'Perspective Taking' scale on the IRI ($t(45) = 2.10$ $p = 0.041$). Combined scores of CE also revealed between-group differences ($t(45) = 5.17$; $p < 0.001$). All results were confirmed by MANCOVA, controlling for neurocognition (Table 2).

3.2. Emotional empathy: behavioral and self-report

No significant between-group differences could be observed for MET-EE scores (positive: $t(51) = 0.02$, $p = 0.987$; negative: $t(51) = -0.132$, $p = 0.896$), 'Empathic Concern' ($t(45) = 0.48$, $p = 0.637$), 'Personal Distress' ($t(45) = -1.68$, $p = 0.099$), or combined scores of EE ($t(44) = 0.08$; $p = 0.936$). However, patients reported significantly more emotional contagion with fear ($t(44) = -2.10$, $p = 0.041$). All results remained stable after controlling for neurocognition (Table 2). Control analyses were performed by calculating a three way MANCOVA with diagnosis as independent group dimension, as well as condition (emotional vs. cognition) and valence (positive vs. negative) as repeated measures conditions, again

Table 2
(Multivariate) analyses of covariance ((M)ANCOVA) for the Multifaceted Empathy Test (MET), Interpersonal Reactivity Index (IRI), Emotional Contagion Scale (ECS), 'Reading the Mind in the Eyes'- Test (RME), and combined scores for cognitive and emotional empathy (CE/EE) in patients and controls.

	Patients (n = 35) Mean [SD]	**Controls** (n = 18) Mean [SD]	**Factor: Group**	**Covariate: Cognition**	**Effect size** (η_p^2)
MANCOVA 1 *F*[4;47]			**4.19****	1.64	0.26
Post-hoc ANOVA *F*[1;50]					
MET cognitive empathy					
Positive valence	14.77 [2.64]	17.11 [1.64]	**10.64****	**4.36***	0.18
Negative valence	14.43 [2.28]	16.76 [1.37]	**13.38****	**4.55***	0.21
MET emotional empathy					
Positive valence	5.35 [1.59]	5.34 [1.17]	0.00	0.05	< 0.01
Negative valence	5.33 [1.49]	5.28 [1.05]	0.02	0.01	< 0.01
MANCOVA 2 *F*[3;42]			**3.08***	0.28	0.18
Post-hoc ANOVA *F*[1;44]					
IRI empathic concern	13.72 [2.45]	14.06 [2.10]	0.25	0.16	0.01
IRI perspective taking	13.59 [2.90]	15.22 [1.99]	**4.45***	0.02	0.10
IRI personal distress	12.21 [3.30]	10.72 [2.22]	2.56	0.70	0.06
MANCOVA 3 *F*[2;43]			**2.49***	0.38	0.24
Post-hoc ANOVA *F*[1;43]					
ECS happiness	3.88 [0.84]	4.24 [0.42]	3.00	0.80	0.07
ECS love	3.61 [0.96]	4.00 [0.59]	2.39	0.05	0.05
ECS fear	3.33 [0.76]	2.89 [0.59]	**4.27***	0.01	0.09
ECS anger	3.24 [0.77]	2.89 [0.71]	2.40	0.16	0.05
ECS sadness	3.29 [0.94]	3.45 [0.69]	0.50	0.13	0.01
ANCOVA *F*[1;51]					
RME score	23.45 [3.94]	26.50 [3.42]	**7.94***	0.39	0.14
MANCOVA 4 *F*[2;42]			**15.50****	1.45	0.43
Post-hoc ANOVA *F*[1;43]					
Combined CE score	−0.28 [0.59]	0.53 [0.39]	**24.53****	1.76	0.37
Combined EE score	−0.00 [0.77]	0.02 [0.49]	0.10	0.09	< 0.01

* $p < 0.05$.
** $p < 0.01$.

controlling for neurocognition. The results revealed a main effect of condition (F = 957.290; $p < 0.001$; η_p^2 = 0.950) as well as an interaction of condition and group, indicating differential expression of the two factors in schizophrenia (F = 10.29; p = 0.002; η_p^2 = 0.171; see Table S1 in supplemental material).

3.3. Associations of empathy with psychopathology and anhedonia

Between-group differences could be revealed for social anhedonia (t(46) = 2.10; p = 0.041). Semipartial correlational analyses (covariate: neurocognition) revealed that combined EE scores were significantly related to self-report social anhedonia in the patient group (r(25) = −0.57, p = 0.002) .[1] SANS anhedonia was related to emotional empathy for positive emotions in the MET (r(32) = −0.40, p = 0.018). No significant relationship between combined CE scores and social anhedonia could be revealed in the patient group (r(25) = −0.08, p = 0.668). Furthermore, no significant correlation of combined CE with SANS anhedonia (r(32) = 0.16, p = 0.405) was detected. No significant associations of combined EE or CE scores was observed with symptom scores on SAPS (cognitive: r(25) = 0.19, p = 0.335; emotional: r(25) = 0.25, p = 0.217) or SANS (cognitive: r(25) = 0.10, p = 0.616; emotional: r(25) = 0.02, p = 0.907).

4. Discussion

In this independent replication study, we corroborate findings by Lehmann et al. (2014), demonstrating impaired cognitive, but preserved emotional empathy in patients with SSD within both behavioural and self-report measures. These results are in line with previous studies pointing at preserved affective responses to emotional stimuli in patients with schizophrenia (Cohen and Minor, 2010) and remain stable after controlling for cognitive functioning. Our results replicate the finding that patients with SSD might be more prone to synchronize with negative emotions of others, as indicated by higher emotional contagion for fear (Falkenberg et al., 2008; Lehmann et al., 2014). Notably, the results of the current study additionally revealed an association of social anhedonia with multidimensional measures of emotional empathy in both the patient and control group. These results extent previous findings pointing at associations between psychopathology and empathy (Falkenberg et al., 2008), and give rise to the assumption that impairments in emotional empathy might be specifically related to social functioning deficits in schizophrenia. Based on the ongoing debates surrounding reproducibility in psychological science (Simons, 2014), the current findings establish an important contribution to the scientific literature on empathy in schizophrenia disorder by implementing systematic and independent replication. Furthermore, our results underscore the importance of a more detailed investigation of empathy deficits in patients with schizophrenia by highlighting the relationship of these impairments with clinically relevant variables of social functioning, such as social anhedonia.

Nevertheless, some constraints limit the interpretation of the results discussed above. First, in the current study, we included patients across the schizophrenia spectrum, considering patients with both schizophrenia and schizoaffective disorder. While this approach has been used in a large number of previous studies (Bora, 2017), some investigations point towards systematic differences in cognitive impairments across these two diagnostic entities (Fiszdon et al., 2007). Furthermore, a possible limitation might be that our groups differ in levels of education. However, in the current study, we use composite cognitive scores to control for the influence of neurocognition. Last, recent studies have revealed discrepancies in studies using behavioural or self-report measurements to assess empathy (Bonfils et al., 2016). While we use a multidimensional assessment of empathy in the current study, future studies should consider testing for systematic differences between measurement methods.

[1] See Supplemental Material for intercorrelations among variables of emotional and cognitive empathy in patients and controls.

Conflict of interest

All authors declare no conflict of interest.

Funding

This work was supported by a grant of the Else Kröner-Fresenius-Stiftung to I.F. (grant number: 2014_A136). B.S. is supported by the "Deutsche Forschungsgemeinschaft" (grant numbers: STR-1146/4-1, STR-1146/8-1, STR-1146/9-1).

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.04.015.

References

Abramowitz, A.C., Ginger, E.J., Gollan, J.K., Smith, M.J., 2014. Empathy, depressive symptoms, and social functioning among individuals with schizophrenia. Psychiatry Res. 216, 325–332. https://doi.org/10.1016/j.psychres.2014.02.028.

Andreasen, N.C., 1984a. Scale For the Assessment of Positive Symptoms (SAPS). University of Iowa, Iowa City.

Andreasen, N.C., 1984b. Scale For the Assessment of Negative Symptoms (SANS). Iowa City.

Atoui, M., El Jamil, F., El Khoury, J., Doumit, M., Syriani, N., Khani, M., Nahas, Z., 2018. The relationship between clinical insight and cognitive and affective empathy in schizophrenia. Schizophr. Res. Cogn. 12, 56–65. https://doi.org/10.1016/j.scog.2018.02.004.

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., Plumb, I., 2001. The "Reading the Mind in the Eyes" Test revised version: a study with normal adults, and adults with Asperger syndrome or high-functioning autism. J. Child Psychol. Psychiatry Allied Discip. 42, 241–251. https://doi.org/10.1017/S0021963001006643.

Bonfils, K.A., Lysaker, P.H., Minor, K.S., Salyers, M.P., 2017. Empathy in schizophrenia: a meta-analysis of the Interpersonal Reactivity Index. Psychiatry Res. https://doi.org/10.1016/j.psychres.2016.12.033.

Bonfils, K.A., Lysaker, P.H., Minor, K.S., Salyers, M.P., 2016. Affective empathy in schizophrenia: a meta-analysis. Schizophr. Res. https://doi.org/10.1016/j.schres.2016.03.037.

Bora, E., 2017. Relationship between insight and theory of mind in schizophrenia: a meta-analysis. Schizophr. Res. https://doi.org/10.1016/j.schres.2017.03.029.

Bora, E., Yucel, M., Pantelis, C., 2009. Theory of mind impairment in schizophrenia: meta-analysis. Schizophr. Res. 109, 1–9. https://doi.org/10.1016/j.schres.2008.12.020.

Brüne, M., 2005. "Theory of mind" in schizophrenia: a review of the literature. Schizophr. Bull. https://doi.org/10.1093/schbul/sbi002.

Chapman, L.J., Chapman, J.P., Raulin, M.L., Bhatti, T.H., Goerke, R.F., Simon, S., Leitschuh, T.H., Xinos, T., Bronsky, T., Kampine, J., Margolis, R., Wes-Thuis, L., Edell, B., Lang, R., Brownlee, M., 1976. Scales for Physical and Social Anhedonia for assistance in obtaining schizo- phrenic subjects. Thanks are due to. J. Abnorm. Psychol. 85, 374–382. https://doi.org/10.1037/0021-843X.85.4.374.

Cohen, A.S., Minor, K.S., 2010. Emotional experience in patients with schizophrenia revisited: meta-analysis of laboratory studies. Schizophr. Bull. 36, 143–150. https://doi.org/10.1093/schbul/sbn061.

Davis, M.H., 1983. A Mulitdimensional Approach to Individual Differences in Empathy. J. Pers. Soc. Psychol. 44, 113–126. https://doi.org/10.1037/0022-3514.44.1.113.

Doherty, R., 1997. The emotional contagion scale: a measure of individual differences. J. Nonverbal Behav. 21, 131–154. https://doi.org/10.1023/A:1024956003661.

Dziobek, I., Rogers, K., Fleck, S., Bahnemann, M., Heekeren, H.R., Wolf, O.T., Convit, A., 2008. Dissociation of cognitive and emotional empathy in adults with Asperger syndrome using the Multifaceted Empathy Test (MET). J. Autism Dev. Disord. 38, 464–473. https://doi.org/10.1007/s10803-007-0486-x.

Falkenberg, I., Bartels, M., Wild, B., 2008. Keep smiling! Facial reactions to emotional stimuli and their relationship to emotional contagion in patients with schizophrenia. Eur. Arch. Psychiatry Clin. Neurosci. 258, 245–253. https://doi.org/10.1007/s00406-007-0792-5.

Fett, A.K.J., Viechtbauer, W., Dominguez, M., de, G., Penn, D.L., van Os, J., Krabbendam, L., 2011. The relationship between neurocognition and social cognition with functional outcomes in schizophrenia: a meta-analysis. Neurosci. Biobehav. Rev. https://doi.org/10.1016/j.neubiorev.2010.07.001.

Fiszdon, J.M., Richardson, R., Greig, T., Bell, M.D., 2007. A comparison of basic and social cognition between schizophrenia and schizoaffective disorder. Schizophr. Res. 91, 117–121. https://doi.org/10.1016/j.schres.2006.12.012.

Kessels, R.P.C., Van Zandvoort, M.J.E., Postma, A., Kappelle, L.J., De Haan, E.H.F., 2000. The Corsi Block-Tapping Task: standardization and normative data. Appl. Neuropsychol. 7, 252–258. https://doi.org/10.1207/S15324826AN0704_8.

Lehmann, A., Bahçesular, K., Brockmann, E.M., Biederbick, S.E., Dziobek, I., Gallinat, J., Montag, C., 2014. Subjective experience of emotions and emotional empathy in paranoid schizophrenia. Psychiatry Res. 220, 825–833. https://doi.org/10.1016/j.psychres.2014.09.009.

Lehrl, S., 1977. MWT-B: Mehrfach-Wahl-Wortschatz-Test B. Straube, Erlangen.

Michaels, T.M., Horan, W.P., Ginger, E.J., Martinovich, Z., Pinkham, A.E., Smith, M.J., 2014. Cognitive empathy contributes to poor social functioning in schizophrenia: evidence from a new self-report measure of cognitive and affective empathy. Psychiatry Res. 220, 803–810. https://doi.org/10.1016/j.psychres.2014.08.054.

Penn, D.L., Sanna, L.J., Roberts, D.L., 2008. Social cognition in schizophrenia: an overview. Schizophr. Bull. https://doi.org/10.1093/schbul/sbn014.

Reitan, R.M., 1958. Validity of the trail making test as an indicator of organic brain damage. Percept. Mot. Skills 8, 271–276. https://doi.org/10.2466/pms.1958.8.3.271.

Reniers, R.L.E.P., Corcoran, R., Drake, R., Shryane, N.M., Völlm, B.A., 2011. The QCAE: a questionnaire of cognitive and affective empathy. J. Pers. Assess. 93, 84–95. https://doi.org/10.1080/00223891.2010.528484.

Simons, D.J., 2014. The value of direct replication. Perspect. Psychol. Sci. 9, 76–80. https://doi.org/10.1177/1745691613514755.

Thoma, P., Zalewski, I., von Reventlow, H.G., Norra, C., Juckel, G., Daum, I., 2011. Cognitive and affective empathy in depression linked to executive control. Psychiatry Res. 189, 373–378. https://doi.org/10.1016/j.psychres.2011.07.030.