



Cognitive fusion and affective isolation: Blurred self-concept and empathy deficits in schizotypy



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ABSTRACT

This is a cross-sectional nonclinical sample study to examine the different levels of the Ipsiety Disturbance Model (IDM) for schizophrenia spectrum disorders (introduced by Sass and Parnas, 2003). Three faces of schizotypy were studied: diminished self-presence, hyper-reflexivity, and distortion in experience of own self and another person's self-discrimination. A sample of college students ($N = 1312$) was provided a questionnaire packet that contained the Schizotypy Personality Questionnaire Brief-Revisited (SPQ-BR), the Self-Concept Clarity Scale, the Tellegen Absorption Scale, and Interpersonal Reactivity Index measures. Results: higher absorption capabilities predict higher scores on both the SPQ-BR cognitive and SPQ-BR disorganization factors. High scores in cognitive empathy predicted a low score on both SPQ-BR cognitive and SPQ-BR interpersonal scores. In contrast, higher affective empathy predicted high scores on the SPQ-BR interpersonal factor. The deficiency in self-concept clarity predicted an elevated score on the SPQ-BR cognitive, interpersonal, and disorganization schizotypy symptoms. We argue that a lack of self-concept clarity manifested in both the hyperreflexivity level (measured by absorption) and the metallization level (measured by empathy). We argue that the IDM is a reliable way to interpret functioning with different levels of schizotypy.

1. Introduction

A large amount of data on schizotypy and schizophrenia have shown that anomalous self-experiences own self-perception, and meta-cognitive disturbances play essential roles in the etiology of schizophrenia spectrum disorders (Bleuler, 1950; Raballo et al., 2011; Koren et al., 2016; Nordgaard and Parnas, 2014; Lenzenweger, 2015; Borda and Sass, 2015; Cicero, 2017; Varnes et al., 2018). Self-disorders also emerge in populations with high inherited risk for schizophrenia spectrum disorders (Raballo and Parnas, 2011; Nelson et al., 2012). The notion of disordered self can be articulated in various terms (i.e., diminished self-presence, diminished sense of self-coherence, blurred self-concepts, disturbed first-person perspective, porous ego boundaries, and disturbed self-other/self-world boundaries (Parnas, 2011; Mishara et al., 2014).

The detection of the social and physical environment involves two independent but collaborating cognitive systems including unconscious, implicit (“reflexive X-system”) and conscious, explicit (“reflective C-system”) processes that evaluate information from first-

person as well as third-person perspectives (Lieberman, 2007). The implicit processes consist of minimal self or proto-self functions; however, the explicit processes relate to narrative self-functions (Cicero, 2017). The first-person (egocentric) perspective is supported by interoceptive signals that are considered as the minimal self. However, the third-person (allocentric) perspective is based on environmental signals relatively independent of the body and are shared by abstract knowledge of the world and interpretation of relations between own self and reality (Jacobs and Nadel, 1985; Gallagher, 2000; Sass and Parnas, 2003). In schizophrenia spectrum disorders, this dual-perspective taking can occur in several forms, namely isolation or fusion, which reduce the mental stress induced by the oscillation between two sides of the same coin of reality (Parnas, 2011; Cicero, 2017). This oscillation also occurs in individuals with schizotypy and may be conceptualized in the frame of the ipseity (minimal self) disturbance model (IDM; Sass and Parnas, 2003; Nelson et al., 2014), which suggests three inter-related aspects to understand the phenomenology of major symptoms of schizophrenia. (1) In this context, if the self-coherence is low, the narrative self is conceptually unclear, the person is not present as an

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<https://doi.org/10.1016/j.psychres.2018.11.045>

Received 25 June 2018; Received in revised form 30 October 2018; Accepted 18 November 2018

Available online 19 November 2018

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active agent and withdraws from interpersonal actions (diminished self-presence, narrative self-deficiency). (2) An instability in the minimal self that can induce a state in which a person's attention is chronically engaged with subjective experiences (hyperreflexivity). (3) This fixed attention results in an enhanced awareness of body-related experiences. Parallel with that, the behavior becomes odd, and eccentric while drives, wishes, and needs lose the cues and requirements from the current environmental physical or social context (disturbed spatio-temporal structuring, grip or hold of the reality). (Nelson and Raballo, 2015).

1.1. Schizotypy

The operationalization of schizotypal traits for healthy, subclinical persons depends on a multidimensional approach (Meehl, 1990; Claridge and Beech 1995; Lenzenweger, 2011; Henriksen and Parnas, 2012). In the present study, following the suggestions of Kawapil et al. (2012) and Barrantes-Vidal et al. (2015), the rate of schizotypal traits are considered as an elevated risk factor for individuals for psychosis-spectrum disorders. The first questionnaire-based psychometric definition and the dimensional model of schizotypy (Claridge and Broks, 1984) pointed to a nonadaptive set of traits containing cognitive (positive), interpersonal (negative) and odd behavioral (disorganized) factors with a high risk for schizophrenia spectrum disorders. Moreover, schizotypal traits are associated with lower life satisfaction, social deficiency, and quality of life (Cohen et al., 2009). In contrast, cognitive and perceptual deficits facilitate an altered state of consciousness, creativity, and the immersion into unusual perceptual experiences (Day and Peters, 1999; Claridge and Blakey, 2009; Mohl and Claridge, 2015). Ross et al., (2002) and Farias et al., (2005) examined the associations between schizotypy, spirituality, and the five-factor model of personality and found that positive symptoms are an adequate way to compensate for the schizotypal maladaptation. General population-based studies showed that symptoms could be clinically relevant only if the symptom magnitude exceeds a certain threshold (Chapman et al., 1994; Raynal et al., 2016). Nevertheless, schizotypal traits play a role in the willingness to imagine and absorb oneself or outside perceptions, and in flow-type experiences (Nelson and Rawlings, 2010). Schizotypy contains various risks to social and cognitive adaptation and represents an alternative set of metallization processes of physical and social reality (Gooding and Pflum, 2011). Furthermore, aloofness, odd communication, and interpersonal isolation refer to several self-boundary problems and self-concept psychological adjustment difficulties (Stone, 1989).

The questionnaire measure of schizotypy fits the psychiatric diagnostic systems and follows the changing diagnostic requirements. Nowadays, a DSM-5 (2013)-supported brief revised version of schizotypy questionnaire (Cohen et al., 2010; SPQ-BR) is used to assess the different facets of schizotypy. The experimental study documented that bodily response to emotional stimuli is in most cases exaggerated in persons with schizotypy, and this type of metallization effort is associated with high social anxiety (Premkumar et al., 2012). This result refers to the fact that these persons emotionally detect the prosocial requirements of the interpersonal situation; it seems that affective empathy is present but is incapable of calming the individual to align with self-related wishes and motivation. Self-presence is diminished, the person is depersonalized, and the communication between the subcomponents of cognitive and affective empathy is inhibited. Alternatively, the source of the communication disorder between the fragments of the self may originate from a blurred self-concept as well (Kwapil et al., 2012).

Following the suggestions of Sass and Parnas (2003), Nelson et al. (2014), and Borda and Sass (2015) for the IDM, three main core features of schizophrenia spectrum disorders related schizotypy can be examined. (1) Diminished self-presence, *narrative self-deficiency*, (2) *hyperreflexivity*, and (3) *disturbed spatio-temporal structuring of self-*

related events, disturbed definition for the source of experience coming from the own self or another person's self.

This study focuses on the measurement of the different aspects of the IDM model. We propose that the exhibited inventories and the related theoretical constructs (self-concept clarity, absorption, and empathy) can contribute to the exploration of the IDM in a non-clinical sample. Considering the sex differences in self-related psychopathology (Damme et al., 2014) and schizotypal traits (Roth and Baribeau, 1997) the sex differences will be demonstrated as well.

We suppose that one of the most reliable ways to assess the coherence and the stability of the narrative self in schizotypy is the Self-Concept Clarity Scale (SCCS; Campbell et al., 1996). The theoretical frame of references contains a deficit in minimal self and narrative self-functions in schizophrenia spectrum disorders (Cicero et al., 2015; Cicero, 2017). In addition, the instability of the minimal self is associated with a diminished sense of existing as a bodily subject and with self-absorption wherein control of reality is provisionally suspended. Consequently, the self is absorbed with the recollected memories and sense. Absorption as a meta-cognitive capability influences healthy, creative, and the pathological thinking; regulates personal openness toward unusual experiences; and modulates immersion in the environmental stimuli, as well as takes part in psychosis-like cognitive disorders and enhanced cognition (Levine et al., 1996; Gooding et al., 2001). Consequently, the boundary between the first- and the third-person perspective becomes blurred (Tellegen and Atkinson, 1974; Kilstrom, 2012). One of the adequate methods to test absorption capability is Tellegen's Absorption Scale (TAS; Tellegen and Atkinson, 1974). Another possibility for exploring the interpersonal and cognitive facet of self-boundaries in schizotypy can be considered the basic mechanism of empathy. Empathy plays an essential role in development of the self and understanding another person's self-specific actions (Davis 1983). In various psychiatric disorders, the two main facets of empathy (cognitive and affective empathy) play different roles in adaptation to the social environment and have a key role in the regulation of self-boundary and the differentiation of own self and another person's self (Decety and Jackson, 2004). In schizotypy, both the minimal and narrative self-functions, as well as empathic capacities are impaired (Pickup, 2006; Henry et al., 2008). The most widely applied measurement method for empathy is the Interpersonal Reactivity Index (IRI; Davis, 1983; Pulos et al., 2004).

1.2. Proposed inventories to measure different aspects of IDM

1.2.1. Narrative self-deficiency

Self-disorder can be explored via a self-concept clarity questionnaire (SCCS), which reveals the degree of mental dialog on the self-relevant goal selections and coherence in self-concept descriptions. The blurred self-concept is associated with anxiety and depression (Ritchie et al., 2011) and is considered to be a maladaptation to solving and understanding a situation of self-related conflict in schizotypy (Cicero, 2017). We propose that all components of schizotypy (a) cognitive (positive) (b) interpersonal (negative), and (c) disorganization traits—can be associated negatively with deficits in self-concept clarity.

1.2.2. Hyperreflexivity and deficits in self-presence can be measured by different components of the TAS

Based on the suggestions of Sass and Parnas (2003), we propose that anomalous experiences, contamination between past and present feelings and perceptual affordances, and further disturbance of the preflexive (ipseity) awareness can be manifested in higher TAS absorption scores. The TAS measures the degree to which the participant's perceptual, motoric, imaginative, and ideational resources form a unified syncretic schema about the attended object. The developmental distortion of the syncretic schema often can be diagnosed in teenagers with schizophrenia (Werner, 1948; Miller and Ellen-Miller, 1989). Absorption-related openness for unhabituated sensations is associated with

diminished reality control and experience-driven cognitive processing to understand the meaning of the present situation (Nelson and Rawlings, 2010; Kihlstrom 2012). We propose that all elevated schizotypy factor scores will be associated with high scores on the TAS.

1.2.3. *The disturbed grip or hold*

Deficit in the spatiotemporal structuring are frequently associated with a deficit in mentalization and the misidentification of the spatiotemporal source of information. Mentalization is an ability for social understanding wherein the attentional allocation periodically shifts between one's own self and another person's self-representations. This spatial and temporal perceptual oscillation is an essential part of mentalization (Blanke 2012; Lieberman, 2007; Koster-Hale and Saxe, 2013). Mentalization abilities are closely related to empathy (Frith and Frith, 2006; Hooker et al., 2008; Walter et al., 2009). However, the collaboration between the cognitive and affective domains of empathy is controversial. Affective empathy is frequently associated with social anxiety in persons with limited ability to shift from a first- to second-person frame of reference (Decety and Jackson, 2004; Thakkar and Park, 2010). In the present study, the IRI was used for testing different features of empathy. Based on the current results of the association between schizotypy and empathy (Henry et al., 2008), we propose that all three components of schizotypy will be negatively associated with cognitive and affective empathy scores.

2. Methods

2.1. Participants

Participants included 1312 Caucasian descent graduate and post-graduate students (women = 875 [66.6%], men = 437; sex difference: chi-square = 145.6, $p < 0.001$; mean age of men = 25.1 years, SD = 6.0; mean age of women = 24.9, SD = 6.1; min-max = 18–40) enrolled in three different state universities (Pázmány Péter Catholic University, Kaposvár University, and University of Pécs). The selection criterion was age between 18 and 40 years. All persons participated voluntarily and at no cost for the examinations. The study was conducted in accordance with the Helsinki Declaration (ethical allowance No. 6732 PTE/2017).

2.2. Measures

2.2.1. *In the present study*

The Schizotypy Personality Questionnaire, SPQ-BR (Cohen et al., 2010) was used to test for schizotypy. The SPQ-BR is a short, revised form of Raine's (1991) SPQ that has a multidimensional structure and a cross-cultural stability (Davidson et al. 2016; Fonseca-Pedrero et al. (2017, 2018a, 2018b) and consists of nine first- and three second-order factors. During a factor analysis conducted on a graduate and post-graduate Hungarian student sample on SPQ-BR seven first- and three second-order factors were identified (Kállai et al., 2018). This result fit to Cohen et al. (2010) findings. Participants responded to items using a 5-point Likert-style scoring format that ranged from 0 (strongly disagree) to 4 (strongly agree). Higher scores reflect greater schizotypal trait severity. The SPQ-BR questionnaire consists of 32 items that are ordered in seven first-order factors subsumed under three second-order factors. The seven identified first-order factors were ideas of reference/suspiciousness (IRS), magical thinking (MT), unusual perceptions (UP; positive symptoms), no close friends/constricted affect (NCA), excessive social anxiety (ESA), (negative symptoms), eccentric behaviour (EB) and odd speech (disorganization symptoms). In the present study, all first-order factors had excellent internal reliability scores (Cronbach $\alpha = 0.71$ – 0.90). The second-order factors: (I) positive (cognitive-perceptual), (II) negative (interpersonal) and (III) disorganized (disorganization) symptoms structure, conform to those observed in schizophrenia spectrum disorders (Raine et al., 1994; Cohen et al., 2010;

Oezgen, Grant, 2018).

2.2.2. *The self-concept clarity scale (SCCS) (Campbell et al., 1996)*

The SCCS consists of 12 items that are rated on a 5-point scale ranging from strongly disagree (1) to strongly agree (5). Considering the construction of the SCCS, the self is a coherent, temporally relatively stable, individual, autonomous unit that is selective for proposed goals and continuously develops and integrates between personal and current social requirements. A higher score on the scale indicates a higher clarity of self-concept. Examinations using the SCCS have shown that a low score on the SCCS is associated with weakness in self-regulation, incoherence in self-description, blurred self-concept and absence of inert dialogues and contributes to the presence of unusual and odd bodily and self-experiences (Campbell et al., 1996; Cicero et al., 2015; Sousa et al., 2016). The SCCS is an excellent method for assessing the narrative definition of the self, which is requisite for a person to successfully discriminate their own set of goals from another person's concurrent goals (Lavalley and Campbell, 1995). In the present study, the internal consistency score was excellent (Cronbach $\alpha = 0.91$).

2.2.3. *The Tellegen absorption scale (TAS) (Tellegen and Atkinson, 1974; Hungarian adaptation by Simor et al., 2011)*

Absorption plays a role in experiential involvement, creative performance productions, such as esthetic experiences, flow, the intensity of intrinsic motivation and peak experiences (Wild, Kuiken and Schpflocher, 1995). The scale consists of 34 items that are ordered under six factors. In the present study, the participants responded to items using a 5-point Likert-style scoring format ranging from 0 (strongly disagree) to 4 (strongly agree). This scoring method was applied by Carleton et al. (2010) and Parsons et al. (2015). The first-order factors of the TAS are as follows: (I) responsiveness to engaging stimuli (RES), which refers to narrowed and conscious attention to a limited area of the environment or a personal experience. (II) Synesthesia (SYN), which refers to the integration of the multimodal stimuli that remove the boundaries between different perceptual modalities. (III) Enhanced Cognition (EC), which involves items for measuring the extensivity of the boundaries of concept and the looseness criterion for including or excluding one matter of common knowledge into an abstract category. The content of this factor involves the cognitive slippage that is a typical symptom of schizophrenia spectrum disorders (Kagan and Oltmanns, 1981). (IV) oblivious/dissociative involvement (DI), which measures the scale of the individual's focus on inner experiences and is parallel to the depersonalization of environmental stimuli. (V) vivid reminiscence (VR), which refers to recalling memories and experiences that are projected into the current perceptions. (VI) enhanced awareness (EA), which involves an elevated focus on body sensation and awareness of the interception stimuli (Tellegen, 1992). The original version of the TAS contained six first-order factors, but the factor numbers and structure showed differences in cultural diversity and sample variations (Tellegen, 1992; Glicksohn and Barrett, 2003; Jamieson, 2005). In the present study, both the total score and the first-order factors were used to define the rate of absorption. In the present sample, Cronbach's alpha for the TAS total score was $\alpha = 0.95$. The following first-order factors were considered good and satisfactory: RES, $\alpha = 0.80$; SYN, $\alpha = 0.83$; EC, $\alpha = 0.74$; DI, $\alpha = 0.87$; VR, $\alpha = 0.58$; EA, $\alpha = 0.80$.

2.2.4. *The interpersonal reactivity index (IRI) (Davis, 1983) contains 28 items ordered in four subordinate factors subsumed under two superordinate factors*

Participants responded to items using a 5-point Likert-style scoring format ranging from 0 (strongly disagree) to 4 (strongly agree). Higher scores reflect greater empathic abilities. Subsequently, the subordinate factors were as follows: (I) Perspective taking (PT) refers to a tendency to shift from a first-person perspective to a third-person perspective or back and forth. (II) Fantasy (FS) involves a predisposition to immersion

in a fictitious setting, empathically identifying with characters in movies or books. These factors can be considered as cognitive superordinate components of empathy. (III) Empathic concern (compassion) (EC) is a psychophysiological and affective response to another person's emotional state. (IV) Personal distress (PD) refers to anxiety and elevated aroused vigilance for the emotional presence and active agency in situations wherein another person's behavioral consequences are detectable. These two last factors are the affective components of empathy (Pulos et al., 2004). In the present study, two superordinate factors, the cognitive and affective empathy scores, were applied to identify different facets of empathy. In a fine-grained analysis, the subordinate factors were applied to reveal the intercorrelations between the SPQ-BR and the different facets of empathy. In the present sample, the Cronbach's alpha ratios are good and acceptable: PT, $\alpha = 0.75$; FS, $\alpha = 0.83$; EC, $\alpha = 0.71$; PD $\alpha = 0.69$.

2.3. Procedure and data analysis

Anonymized paper-and-pencil questionnaires were individually administered at participants' homes in a given successive order. For this study, the participants' physical and mental state histories have not been checked. Prior to performing the later outlined hypothesis tests, the dataset was screened for possible input errors and missing values. Mean response scores for individuals having less than 1% missing values on a respective scale were input, and individuals who had a higher percentage of missing responses were excluded. Univariate and multivariate outlier assessment was based on visual examination of boxplots for the former and on scatter-plots along with leverage and influence statistics for the latter; none of which suggested problematic cases. All statistical procedures were carried out using IBM SPSS 25.

Sex differences on the average rating scores of the first- and second-order factors of the SPQ-BR, SCCS, TAS, and IRI were analyzed by performing separate multivariate analysis of variances (MANOVA) on the corresponding questionnaires with their respective subscales. A linear regression analysis was performed to test the prediction efficiency of the second-order factors of the self-disorder questionnaires (SCCS, total TAS score, and IRI cognitive and affective factors) on the SPQ-BR cognitive, interpersonal and disorganization factors acting as dependent variables. In the next step, a fine-grained partial correlation analysis, controlling for sex effect, was conducted to reveal the associations between first-order factors of the SPQ-BR and the SCCS, TAS (RES, SYN, EC, DI, VR, EA) and IRI (PT, FS, EC, PD) factors.

3. Results

3.1. Sex differences

The data in Table 1 show that no significant age differences between women and men were detected. Furthermore, SPQ-BR cognitive symptoms scores were higher in women than in men, whereas men showed higher scores on the SPQ-BR disorganization factors (Table 1). Women scored higher on absorption capability and on cognitive and affective empathy. However, the first-order factors showed that unusual perceptions and constricted affects were sex-dependent. Also, while EB is dominant in men, the MT and the ESA are crucial for women. In this study, absorption, self-concept clarity and empathy were considered as prospective methods of measuring different facets of self-disorder in schizotypy. Sex differences showed that women scored higher on both the total score and the first-order factors of absorption and in cognitive and affective empathy and its first-order factors. However, self-concept clarity showed no significant differences (Table 1).

3.2. Prediction of the score for SPQ-BR second-order factors by absorption, empathy and self-concept clarity

In analyzing the predictive effect of second-order factors on the

Table 1
Sex differences by age and first- and second-order factors of self-disorder-related traits.

	Mean(SD)		F	Partial η^2
	Male	Female		
Age	25.1 (6.1)	24.9 (6.6)	0.141	0.000
I. SPQ-BR Cognitive ^a	0.8 (0.56)	1.0 (0.55)	10.175**	0.008
IR_S	1.4 (0.70)	1.5 (0.68)	1.746	0.001
MT	0.7 (0.86)	1.0 (0.98)	37.469***	0.028
UP	0.5 (0.68)	0.4 (0.61)	1.19*	0.001
II. SPQ-BR Interpersonal	1.4 (0.79)	1.3 (0.77)	5.014	0.004
NC_CA	1.3 (0.83)	1.1 (0.78)	21.828**	0.016
SA	1.4(0.98)	1.6 (0.10)	4.129*	0.003
III. SPQ-BR Disorganization	1.5 (0.79)	1.4 (0.77)	5.781**	0.004
EB	1.5 (1.1)	1.1 (0.94)	31,103***	0.023
OS	1.6 (0.84)	1.7 (0.90)	3,91	0.003
TAS_Total ^b	2.6 (0.73)	2.8 (0.75)	24.261***	0.018
RES	2.8 (0.94)	3.1 (0.96)	31.88***	0.024
SYN	2.3 (0.90)	2.5 (0.95)	11.434**	0.009
EC	2.3 (0.86)	2.6 (0.95)	26.293***	0.02
DI	2.9 (0.85)	3.1 (0.85)	18.187***	0.014
VR	2.8 (0.87)	3.1 (0.89)	25.901***	0.019
ESA	2.1 (0.84)	2.2 (0.85)	3.958*	0.003
I. IRI_Cognitive ^c	3.2 (0.57)	3.5 (0.61)	56.548**	0.041
PT	3.3 (0.66)	3.4 (0.70)	9.445**	0.007
FS	3.2 (0.82)	3.6 (0.84)	67.507***	0.049
II. IRI_Affective	2.9 (0.48)	3.2 (0.48)	149.919***	0.103
EC	3.9 (0.60)	3.7 (0.63)	118.4***	0.083
PD	2.5 (0.63)	2.8 (0.63)	63.87***	0.046
SCCS_Total	3.8 (0.87)	3.8 (0.83)	0.12	0.000

Note:

*** $p < 0.001$

** $p < 0.01$

* $p < 0.05$

Overall MANOVA:

^a Wilk's $\Lambda = 0.89$, $F(8) = 20.227$, $p < 0.001$, partial $\eta^2 = 0.11$

^b Wilk's $\Lambda = 0.957$, $F(8) = 9.71$, $p < 0.001$, partial $\eta^2 = 0.043$

^c Wilk's $\Lambda = 0.878$, $F(8) = 30.11$, $p < 0.001$, partial $\eta^2 = 0.122$

Abbreviations: SPQ-BR: I. Cognitive: Ideas of Reference/Suspiciousness (IRS), Magical Thinking (MT), Unusual Perceptions (UP); SPQ-BR: II. Interpersonal: No Close Friends/Constricted Affect (NCA), Excessive Social Anxiety (ESA); SPQ-BR: III. Disorganized: Eccentric Behavior (EB), Odd Speech (OS); TAS: Responsiveness to Engaged Stimuli (RES); Synesthesia (SYN); Enhanced Cognition (EC); Dissociative Involvement (DI); Vivid Reminiscence (VR); Enhanced Awareness (EA); IRI: I. Cognitive: Perspective Taking (PT); IRI Fantasy (FS); II. Affective: Empathic Concern (EC); IRI Personal Distress (PD). Self-concept clarity total (SCCS).

SPQ-BR scores, some results should be underlined. First, a high presence of TAS absorption capability predicts high scores on both the SPQ-BR Cognitive and SPQ-BR Disorganized factors (Table 2). Second, the IRI Cognitive and IRI Affective factors revealed a mixed picture. The high scores on the IRI Cognitive factor predicted a low score on both the SPQ-BR Cognitive and SPQ-BR Interpersonal scales. In contrast, high scores on the IRI Affective factor predicted high scores on the SPQ-BR Interpersonal factor. Third, deficiency in the coherence of self-description (SCCS) predicted an elevated score on the SPQ-BR cognitive, interpersonal and disorganization schizotypy factors. Fourth, a sex effect was detected only for the SPQ-BR disorganization factor, with men showing higher scores when compared to women (Table 2).

In a fine-grained association analysis between the first-order factors of the SPQ-BR and absorption, empathy and self-concept clarity (except NCA and ESA factors), all SPQ-BR factors showed a positive correlation with all absorption factors (Table 3). Significant correlations regarding the NCA and SA factors were present only with dissociative involvement and enhanced awareness. Furthermore, the SCCS showed a unitary pattern, with all high SPQ-BR factor scores correlating with a low score on the SCCS. In the case of empathy, the association patterns were more complex. The PT and EC are linked only to the SPQ-BR NCA factor, wherein a high score on PT and EC link to a low score on the NCA factor. On the contrary, FS, except for NCA, shows a positive

Table 2

Linear regression for the three main SPQ-BR factors treated as dependent and the self-disorder-related traits considered as independent variables, controlling for sex.

Predictors	Regression coefficients			95% Conf. Int.	
	Unstandardized (b)	Standardized (β)	T	Lower	Upper
SPQ-BR I. Cognitive^a					
TAS Total	0.362	0.493	16.88**	0.32	0.404
IRI Cognitive	-0.108	-0.119	-4.16***	-0.158	-0.057
IRI Affective	0.021	0.022	0.73	-0.037	0.079
SCCS Total	-0.139	-0.212	-8.29***	-0.172	-0.106
Sex	0.046	0.040	1.65	-0.009	0.102
SPQ-BR II. Interpersonal^b					
TAS Total	-0.052	-0.050	-1.59	-0.116	0.012
IRI Cognitive	-0.144	-0.112	-3.63***	-0.221	-0.066
IRI Affective	0.165	0.108	3.66***	0.077	0.254
SCCS Total	-0.421	-0.455	-16.48***	-0.472	-0.371
Sex	-0.057	-0.034	-1.31	-0.141	0.028
SPQ-BR III. Disorganization^c					
TAS Total	0.257	0.245	8.46***	0.197	0.316
IRI Cognitive	-0.04	-0.031	-1.07	-0.112	0.033
IRI Affective	-0.035	-0.023	-0.83	-0.118	0.048
SCCS Total	-0.413	-0.442	-17.33***	-0.46	-0.366
Sex	-0.142	-0.085	-0.352***	-0.221	-0.063

Note: Abbreviations: SPQ-BR: I. Cognitive (Positive); II. Interpersonal (Negative); III. Disorganized; TAS total score; IRI: I. Cognitive II. Affective factors of empathy and SCCS Total the aggregated score of self-concept clarity items. Sex was scored as 1 = males and 2 = females.

^a $F(5,1306) = 127.66, R^2 = 0.326, p < 0.001$;

^b $F(5,1306) = 71.73, R^2 = 0.215, p < 0.001$;

^c $F(5,1306) = 12,775, R^2 = 0.328, p < 0.001$

*** $p < 0.001$;

** $p < 0.01$;

* $p < 0.05$.

association with all factors of the SPQ-BR. Furthermore, PD, except for MT and UP, shows a strong positive association with all factors of the SPQ-BR (Table 3).

4. Discussion

Schizotypy is considered to be an elevated vulnerability for schizophrenia across a continuum of healthy, subclinical and clinical impairments (Lenzenweger, 2015; Kwapił and Barrantes-Vidal, 2015). The main characteristics of the SPQ-BR's cognitive (positive) and interpersonal (negatives) symptoms have a multidimensional nature and are associated with various patterns of cognitive and interpersonal

disturbances (Gooding and Pflum, 2011). Our present study focused on exploring the characteristics of self-disorders that are closely related to schizotypy.

4.1. Sex differences in the self-reported schizotypy

The present study showed that sex had a significant effect on the severity of schizotypy in a healthy population. Male participants scored lower on the SPQ-BR cognitive and higher on the disorganization factors than women did. We stated that men could be characterized by higher scores on constricted affect and eccentric behavior, whereas women showed higher scores on the magical thinking factors. We

Table 3

Partial correlation matrix for SPQ-BR and self-disorder variables, controlling for sex.

Variables	SPQ-BR Cog. IRS	MT	UP	SPQ-BR Interp. NCA	ESA	SPQ-BR Disorg. EB	OS
TAS							
RES	0.148**	0.259**	0.331**	0.013	0.061	0.244**	0.236**
SYN	0.210**	0.293**	0.387**	0.054	0.057	0.295**	0.222**
EC	0.265**	0.436**	0.416**	0.014	0.012	0.242**	0.249**
DI	0.289**	0.281**	0.453**	0.103	0.170**	0.343**	0.335**
VR	0.218**	0.182**	0.309**	0.018	0.086	0.247**	0.254**
EA	0.258**	0.414**	0.508**	0.142**	0.128**	0.352**	0.272**
IRI							
PT	0.069	0.066	0.043	-0.114*	-0.038	-0.016	-0.043
FS	0.152**	0.152**	0.247**	-0.050	0.135**	0.231**	0.234**
EC	0.036	0.097	0.064	-0.187**	-0.023	-0.050	0.021
PD	0.284**	0.036	0.165	0.251**	0.392**	0.205**	0.293**
SCC	-0.422**	-0.104	-0.425	-0.400**	-0.377**	-0.451**	-0.447**

Note: Reported significances are based on the Bonferroni correction.

Abbreviations: Cognitive: Ideas of Reference/Suspiciousness (IRS), Magical Thinking (MT), Unusual Perceptions (UP); II. Interpersonal: No Close Friends/Constricted Affect (NCA); Excessive Social Anxiety (ESA); III. Disorganized: Eccentric Behavior (EB), Odd Speech (OS); TAS Responsiveness to Engaged Stimuli (RES); TAS Synesthesia (S); TAS Enhanced Cognition (EC); TAS Dissociative Involvement (DI); Vivid Reminiscence (VR); TAS Enhanced Awareness (EA); IRI Perspective Taking (PT); IRI Fantasy (FS); IRI Empathic Concern (EC); IRI Personal Distress (PD); Self-Concept Clarity (SCC) controlling for sex.

** $p < 0.01$;

* $p < 0.05$.

argued that these findings are consistent with other previously reported results (Kirkpatrick et al., 2001; Fossati et al., 2003; Guo et al., 2011; Fonseca-Pedrero et al., 2018a). However, studies with larger age groups and in different cultures (Bora and Arabaci, 2009) and using a younger population and another method to assess the schizotypal traits (Miettunen and Jääskeläinen, 2010; Thakkar and Park, 2010) reported partly controversial data. Sex has a significant effect on the rating of schizotypal traits (Raine 1992). Schizotypy is a multidimensional construct and consists of a pattern of personality traits that depend on cultural habits and are also exposed to sex differences. Considering our hypothesis, three different candidate traits have been analyzed to reveal the sex-dependent latent personality structure of schizotypy: absorption (TAS), empathy (IRI) and self-concept clarity (SCC). Considering our presented data, it can be stated that all factor scores of absorption and empathy were higher in women than in men. Similar robust sex differences were reported previously in absorption (Kremen and Block 2002) and empathy (Eisenberg et al., 1991). Consequently, it can be established that the phenotypical expression of the latent content of absorption and empathy and partly schizotypy is modulated by sex. Regarding the data on self-concept clarity in this sample of young university students in Hungary, sex differences were not detected. The conceptual description of own self strongly depends on cultural habits and gender stereotypes (Campbell et al., 1996), and the findings in this domain are still inconclusive (Wu et al., 2006; Cice, 2012).

4.2. Self-concept clarity

The deficit in the self-concept clarity is a general risk factor for metallization disorders and social maladaptation (Campbell et al., 1996), which is considered as an allostatic load for schizotypy (Cicero et al., 2015). Our results confirm that coherence of self-beliefs is an important factor in the psychological adjustment of healthy persons with high schizotypy (Bigler et al., 2001; Weinberg et al., 2012; Hasson-Ohayon et al., 2014). Low conceptual clarity of the self is associated with several psychiatric disorders, primarily schizophrenia spectrum disorders (Cicero et al., 2015; Berna et al., 2016). Our results in healthy participants partly confirm that low self-concept clarity plays a role in enlargement of schizotypy. High scores in schizotypy in both the second- and the first-order factors are associated with low self-concept clarity in SPQ-BR cognitive, interpersonal and disorganization factors as well. However, in a study (Berna et al., 2016) with a mixed psychiatric and healthy control sample involving schizophrenia spectrum disorders, depression, post-traumatic stress disorder, obsessive-compulsive disorder and patients with different rates of attenuated psychotic symptoms, the authors found low self-concept clarity compared with the control group, but in other self-related description tests, such as meaning-making, there were no differences. These studies with two different samples (healthy and patients) yielded a different conclusion. Our results demonstrated a unitary self-concept clarity effect to negative and positive factors of schizotypy in healthy participants, but results with patients (Berna et al., 2016) revealed that in schizophrenia, the association of self-concept clarity was embodied in a dual way. In a critical review, Cicero et al. (2017) suggested that future investigations should explore the factors that play a mediating function between self-concept clarity and the different factors of schizophrenia spectrum disorders. Our results indicate that in schizotypy, self-reflection and the inner dialog about self-concepts in all SPQ-BR factors are limited or lost.

4.3. Self-absorption

Absorption as a part of the function of perceptual and cognitive openness generally enhances the intensity of personal experiences to somatic or mental symptoms in patients (Glisky et al., 1991; Witthöft et al., 2008). It also enhances the frequency and intensity of hallucinations, delusions and obsessions, and bipolar psychoses and schizophrenic spectrum disorders (Sofer-Dudek et al., 2015; Rosen et al.,

2017). Absorption contains two rivaling functions that regulate the integration of intero- and exteroceptive multimodal stimuli. One function creates an association among these stimuli to promote deep inner understanding of personal feelings; the other function promotes cognitive selection of extrapersonal stimuli to lead attentional allocation to salient stimuli, while other contextual cues are neglected. This openness to incorporating or fusing with the targeting events or stimuli and the cancellation or isolation of other objects and experiences comprise a vast but vulnerable functional repertoire for regulation of self-boundaries in both the healthy and patient populations (Carleton et al., 2010). Absorption consists of an experience-involvement bias (Roche and McCorky, 1990; Wild et al., 1995) and an inability to preserve conceptual boundaries (Kihlstrom, 2012). Our results indicate that the effect of this competitive attention allocation between one's own experiences and perception of environmental physical and social requirements can be detected in persons with cognitive and disorganization schizotypy traits. The process model of absorption and experiential involvement (Cummins, 1983; Wild et al., 1995) has documented that absorption prevails in both affective (motivational) and cognitive domains. The attention focused on the target with an extensive drive for imaginative activity maximizes the affective content of the experiences independently of their valences. However, in the cognitive domain, high absorption is linked to an enhanced cognition factor and a weakness in the form of conceptual categorical boundaries to explicate a wide range of meaning of the attended target. This cognitive strategy is similar to a thinking bias that may be detected in syncretic thinking, where the experiences and thoughts are assimilated, and the boundary between fantasy and reality becomes permeable.

In our study, two rivaling absorption mechanisms were demonstrated, the fusion and the isolation of those associated with opponent processes in cognitive and partly with interpersonal symptoms (dissociative involvement and enhanced awareness) in schizotypy. High absorption scores accounted as a bias toward gaining more intense experiences from targeted stimuli, while other competitive environmental stimuli are isolated. This cognitive strategy expands the boundaries of the conceptual category, causing an overinclusive automatic perceptual bias. At the same time, the motivating effect of high absorption to turn toward other targets remains on the checking of self-experiences. The source of motivation for the first-person and third-person attentional shift is inhibited. This interpretation is motivated by the IDM (Sass and Parnas 2003), which underlines the fact that in schizophrenic spectrum disorders, patients have a weakness in the competency to perceive themselves and consequently withdraw into loneliness. In schizotypy, the boundary of the conceptual categories is overloaded with irrelevant items. Consequently, the schizotypal individual's cognitive categories include extraneous associations that are only in part associated with the habitual content of the category meaning.

The most characteristic feature of cognitive (positive) symptoms in schizotypy is magical thinking (Eckblad and Chapman, 1983). The developmental origin of this thinking method is the preoperational, pre-causal stage of thinking that appears in certain conditions and may be active in adulthood (Miller and Ellen-Miller, 1989).

The investigation into absorption in the cognitive functioning in persons with schizophrenia spectrum disorder has no long history (Renard et al., 2017). Our results demonstrated that high absorption predicted high scores on the SPQ-BR cognitive and disorganization symptoms but found no prediction effect for the SPQ-BR interpersonal factor. The association analyses point to TAS enhanced awareness and TAS dissociative involvement as first-order factors associated with the interpersonal symptoms of schizotypy. These results support conclusions of previous clinical case studies that absorption between one's own experiences and others' experiences and the weak boundaries of the expanded self-evoke a disturbance in distinguishing self-created meaning from that created by others (Irrázaval, 2015). Consequently, disorganized symptoms indicate that the person withdraws into the

subjective world, and in parallel, the cognitive symptoms showed an expansion in the self-boundary while self-presence in experiences is diminished, and personal knowledge becomes universal. This duality, the openness toward risk factors of environmental stimuli and the quick, sensitive reaction to the embodied positive experiences, evolves into a conflict situation (Wickramasekera, 2007). Our results in healthy participants are considered confirmation of the dual nature of hyperreflexibility. Our findings highlight that the tendency of cognitive fusion and social isolation, as a competitive function, are present at the same time in cognitive and disorganization factors in schizotypy. The correlation analysis showed that the pattern of the first-order absorption factors, the elevated dissociative involvement, and the related enhanced awareness, play a role in the appearance of SPQ-BR interpersonal pathology.

4.4. Empathy

Empathy is referred to as a function of the theory of mind and includes the ability of an individual to understand and share attentional resources between one's own and others' perspectives. In schizotypy, the detection of irony is generally intact, but the general social sensitivity involving positive motions may be deficient (Jahshan and Sergy, 2007; Morrison et al., 2013; McCleery et al., 2012). A review of the role of the theory of mind in the social perception in schizotypy (Cohen et al., 2015) suggests that persons, depending on the applied compensatory mechanism, choose different ways to enhance adaptation success. Our results highlight some functions from these compensatory repertoires. We found that IRI cognitive empathy decreases the deficiency in metallization and improves psychological adjustment to social challenges. However, high IRI affective empathy is associated with decreasing metallization abilities. This duality is a key issue in the evolution of both anxiety disorders and schizophrenia spectrum disorders. Its normal condition presumes that a higher cognitive empathic capacity enhances metallization and consequently must detect a decrease in personal distress factor (PD). The opposite of the aforementioned supposition in schizotypy is not the case. The emergence of empathy is linked to interest in a partner and a sequence of affective and cognitive phases of emotional resonance relatively free of anxiety. In contrast, anxious individuals show elevated empathy and control over their behavioral effect on another person's state of mind and are sensitive and attentive to other persons' senses and opinions. However, sensitivity to social signals are not universal, and insecurity in attachment enhances the perceptual accuracy for negative cues (Tibi-Elhanany and Shamay-Tsoory, 2011; Ripoll et al., 2013). Anxious individuals may demonstrate a unique social-cognitive ability profile with elevated cognitive empathy tendencies and high accuracy in affective mental state attributions, which only partially mediates the association between the anxious negative schizotypy (Wang et al., 2013). The cognitive and affective developmental trajectory of cognitive and affective empathy are different (Hoffman 1987), but in adulthood, these two forms of empathy regulate each other (Davis, 1996). The method of this regulation or integration varies in those with autism, Asperger syndrome and schizoid personality disorder (Smith, 2006). With regard to developmental differentiation, Smith (2006) proposed that, in schizoid personality disorder, cognitive empathy is low. Our results in part support the hypothesis that low IRI cognitive empathy (particularly low ability in perspective taking) is associated with high activity symptoms on the SPQ-BR cognitive and interpersonal factors. However, a low IRI affective score (particularly low intensity in personal distress and high empathic concern) was associated with low scores on the SPQ-BR interpersonal factor. An association between the IRI affective factor and the SPQ-BR Disorganization factor has not been found. This trend of association was partially consistent with Bedwell's et al. (2014) results. However, in that study, the IRI PD factor was excluded from the data analysis, so the reported negative association between the SPQ Interpersonal and Empathy factors in our study has not been reproduced.

Similar, but only partly supported results were reported by Henry et al. (2008). They applied the 74-item version of the SPQ with a dichotomous yes/no response format, and the Empathy Quotient questionnaire was used to assess the cognitive and affective faces of empathy. These authors found a positive correlation between cognitive empathy and SPQ-BR Cognitive factors and a negative association between interpersonal schizotypy and affective empathy, but their sample was older and had mixed education, and it did not include PT, FS, EC and PD factors, which provide a detailed pattern of the different components of cognitive and affective empathy. Our correlation analyses showed an inconsistency inside the IRI cognitive functioning of empathy. The fantasy FS showed essential association with most of the schizotypy first-order factors, but alike association pattern cannot be detectable in the case of perspective taking PT. The next contradiction can be found in IRI affective factors. This contradictory pattern may have originated in the disharmony between the factor scores in emotional concern EC and personal distress PD. We propose that this inconsistency in the empathy first-order factors may be the key issue in understanding the empathic functioning of schizotypy. This question requires further investigation and critical analysis of the relationship between empathy and schizotypy testing with different methods.

In summary, the metacognitive disruption of self-representation occurred in heterogeneous form and was mainly specific to schizophrenia spectrum disorders and embodied in unarticulated self-concept and incoherent self-description or narration (Mishara et al., 2014). We argued that the SCCS could be considered one of the most adequate ways to measure general metacognitive disruption and psychological adjustment in schizotypy. The consequence of this self-description incoherence is manifested in integration difficulties between cognitive and interpersonal processing (fusion vs. isolation conflict), which is observable both in levels of hyperreflexivity (measured by absorption) and metallization deficits (measured by empathy). Considering our results regarding the use of interpersonal information to cope with social challenges, the second form of discrepancy can be detected. The intensity of interpersonal symptoms in schizotypy is associated with disharmonic empathy. While cognitive empathy is low, affective empathy is high. This contradiction originates in the elevated anticipation of social anxiety, the parallel-detected disregard for other persons' behaviors and emotional states and the fixed perspective on the first-person frame of reference, while the third-person perspective remains unattended. These results support previous suppositions that (Sass and Parnas, 2003; Gambini et al., 2004; Raballo et al., 2011; Harrison and Singer, 2013; Mishara et al., 2014; Nelson and Raballo, 2015) self and self-reference taking disturbances are the leading pathology in schizotypy and schizophrenia spectrum disorders. We argued that the minimal self-disturbance model (IDM; introduced by Sass and Parnas, 2003; Nelson et al., 2014) is a reliable way to interpret different levels of pathology in schizophrenia spectrum disorders.

Our data support the Ipeity Disturbance Model, IDM for schizophrenia spectrum disorders (Sass and Parnas, 2003; Nelson and Raballo, 2015; Parnas et al., 2005; Borda and Sass, 2015) and suggest questionnaire methods for assess the narrative self-deficiency, hyperreflexivity, and disturbed spatiotemporal structuring of self in cognitive and affective regulation of schizotypy. We suggest that in schizotypy, two faces of the self-boundary function are dynamically activated at the same time: personal fusion with others and personal isolation from others. The first is represented by positive symptoms and the second by negative symptoms. Consequently, persons with high schizotypy in self-involved conditions continuously search for ways to disengage from the pitfall of fusion versus isolation contrapositions.

4.5. Limitations

The presented results come from self-report questionnaire data. The phenotype of empathy depends on situational and demographic factors (Holm, 1996) and the method of the assessment (Thakkar, 2009). The

data in this study controlled only for sex and the sample consisted of college students. Comparative studies between self-report and behaviourally measured empathy have documented that the subcomponents of empathy, mainly emotional detection ability, and PT skills behaved differently when tested using a questionnaire or a behavioral method (Melchers et al., 2015). Therefore, the range of validity of the present results may be accounted for in a group of college students who were tested by a self-reported measure. The applied questionnaires have no contained validity control scales and the sample was dominated by women. However, considering the range of age and intellectual quality in our sample, and that the results were controlled for sex, the presented evidence provides an adequate chance to predict a schizotypy-related deficit in schizophrenic spectrum disorders. The lifetime prevalence of clinically significant schizotypal symptoms in the healthy population has been estimated to be more than 20% (Pulay et al., 2009; Hummelen et al., 2012). Consequently, one aspect of the schizophrenia spectrum in the healthy population is testable in this sample. A test for psychopathological samples is needed to investigate the clinical relevance of the presented results.

Acknowledgments

This work was supported by the National Research, Development and Innovation Office. Grant number: NKFI K 120334. Further, Robert Herold was supported by the National Brain Research Programme Grant number: NAP KTIA NAP-A-II/12 and National Brain Research Programme 2017-1.2.1.-NKP-2017-00002, and the "National Excellence Programme.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2018.11.045.

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