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Associations between schizotypal personality features, mentalizing difficulties and thought problems in a sample of community adolescents

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Abstract

Aim: Schizotypal trait expression and mentalizing impairments represent key factors associated with increased vulnerability for schizophrenia. In the current study, we analysed the nature of associations linking specific schizotypal personality features to mentalizing difficulties during adolescence. Furthermore, we examined the extent to which mentalizing difficulties mediate the relationship between schizotypal trait features and self-reported thought problems.

Methods: One hundred and five community adolescents (M_{age} = 15.72; SD = 1.91) completed a recently developed self-report measure of mentalizing (Reflective Functioning Questionnaire [RFQ]), evaluating the degree of certainty (RFQc-scale) and uncertainty (RFQu-scale) with which individuals utilize mental state information to understand their own and others' behaviour. High scores on the RFQu-scale reflect poor usage of mental state information, while high scores on the RFQc-scale capture adaptive levels of certainty about mental states. Self-report questionnaires were also used to assess schizotypal trait expression, thought problems and symptoms of anxiety/depression.

Results: Linear regression models indicated that schizotypal features of social anxiety and odd speech accounted for increased RFQu scores, while odd speech also accounted for reduced RFQc scores. RFQu partially mediated the effects of social anxiety and odd speech on the level of thought problems in the sample.

Conclusions: Present findings suggest that schizotypal features that impede interpersonal communication during adolescence are linked to difficulties in mental state understanding. Our study also provides original data suggesting that the effects of social anxiety and odd speech on psychosis-risk may partially depend upon the level of mentalizing uncertainty. Mentalizing difficulties may constitute important clinical assessment and early prevention treatment targets in adolescents who demonstrate schizotypal features.

KEYWORDS

mentalization, reflective functioning, schizophrenia, schizotypy

1 | INTRODUCTION

Contemporary research suggests that clinical psychosis is distally linked with schizotypal trait expression (Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Kwapil, Gross, Silvia, & Barrantes-Vidal, 2013), and more proximally with the breakdown of higher-order cognitive processes pertaining to mentalizing (Kim et al., 2011) – the capacity to understand the intentional mental states driving one's own and others' behaviours (Fonagy & Target, 1996). Mentalizing represents a multidimensional construct that encompasses a number of processes involved in mental state understanding, such as theory of mind (ToM: inferring beliefs from others' behaviours), empathy (understanding the emotional states of others), mindfulness (emotional self-awareness) and self-monitoring (cognitive self-awareness) (Choi-Kain & Gunderson, 2008; Debbané et al., 2016; Fonagy & Luyten, 2009). Good mentalizing entails the integration of these processes to construe a sensitive understanding of the internal states (ie, thoughts, feelings) underpinning one's own and others' intentions (Fonagy, Gergely, Jurist, & Target, 2002; Fonagy & Luyten, 2009). As such, mentalizing enables individuals to form representational models of human behaviour in order to sustain a coherent sense of self and attenuate experiences of confusion within interpersonal relationships (Fonagy et al., 2002).

Difficulties in utilizing mental state information to understand oneself and others are increasingly regarded as key factors for the development and maintenance of psychotic manifestations (Brent & Fonagy, 2014; van Os, Kenis, & Rutten, 2010). Meta-analytic investigations indicate that patients with established schizophrenia, first episode sufferers, as well as help-seeking individuals at clinical high-risk for psychosis (CHR), perform poorly in multiple domains of mentalizing, such as ToM, self-monitoring and emotion recognition (Bora & Pantelis, 2013; Brüne, 2005; Sprong, Schothorst, Vos, Hox, & Van Engeland, 2007). Overall, current evidence suggest the presence of a generalized impairment in mentalizing processes across schizophrenia-spectrum disorders.

Another line of research indicates that subtle mentalizing difficulties are present among non-clinical samples in the context of schizotypal personality features, prior to the development of clinical manifestations, suggesting a pathway towards illness expression (Langdon & Coltheart, 1999; Pickup, 2006). Schizotypal traits signal an increased liability to develop schizophrenia (Barrantes-Vidal, Grant, & Kwapil, 2015; Chapman et al., 1994; Kwapil et al., 2013) and psychometric analyses examining their factorial structure consistently identify three main dimensions: the cognitive-perceptual (positive schizotypy: hallucination, delusion-like phenomena), interpersonal (social anxiety, constricted affect) and disorganization dimensions (odd behaviours, odd speech) (Fonseca-Pedrero et al., 2018; Raine, 2006). Only a limited number of studies have analysed the associations between schizotypal trait dimensions and mentalizing difficulties in community samples. These have reported that high scores on the cognitive-perceptual dimension are associated with reduced ToM scores (Langdon & Coltheart, 1999; Pickup, 2006). Although these findings are suggestive of a relationship between trait-vulnerability for psychotic disorders and mentalizing difficulties, they involve adult participants either within or beyond the critical period of illness onset. From an early intervention standpoint, important insights can be gained by examining mentalizing in the context of schizotypal trait dimensions during earlier developmental stages, in childhood and adolescence.

Schizotypal manifestations emerge early in life (Debbané & Barrantes-Vidal, 2014) and adolescence represents a key period during which they can become clinically relevant (Gooding, Tallent, & Matts, 2005). Developmentally, the maturation and elaboration of mentalizing processes continues throughout adolescence into early adulthood (Choudhury, Blakemore, & Charman, 2006; Dumontheil, Apperly, & Blakemore, 2010; Vetter, Altgassen, Phillips, Mahy, & Kliegel, 2013). As such, cognitive and interpersonal aberrations in the context of schizotypal traits, may disrupt the normative development of mentalizing processes during adolescence and impair the capacity for mental state understanding (Debbané & Barrantes-Vidal, 2014). Indeed, recent evidence indicate that young people who display attenuated psychotic manifestations demonstrate reduced trajectories for common age-related improvements in ToM compared to healthy controls (Davidson et al., 2018). Because the development of mentalizing commonly unfolds against the background of close interpersonal relationships (Fonagy et al., 2002), one possibility is that the expression of schizotypal traits that impede interpersonal communication during adolescence may negatively impact on the capacity to understand mental states. However, little is known at present about the nature of associations linking specific schizotypal personality features to mentalizing difficulties during adolescence.

Furthermore, studies suggest that the effects of schizotypal traits on the development of clinically relevant symptoms may depend upon the level of mentalizing dysfunction. For instance, Bartels-Velthuis, Blijd-Hoogewys, and Van Os (2011), reported that in sample of young adolescents who experienced non-clinical hallucinations within the previous 5 years, the risk for the development of secondary delusional ideation was higher for those with lower ToM scores. Despite these findings, no study to date has examined the potential mediating role of mentalizing on the relation between schizotypal personality features and the experience of thought problems that lie in a continuum with clinically relevant symptoms during adolescence. Research on adolescent schizotypy can elucidate our understanding regarding the early course and significance of mentalizing dysfunction in the premorbid stages of schizophrenia-spectrum illnesses, with important implications for early prevention treatment.

Mentalizing in psychosis-research has been traditionally measured using experimental-tasks that assess specific domains of mental state understanding (eg, ToM). Recently, Fonagy et al. (2016) developed the Reflective Functioning Questionnaire (RFQ), an easy-to-administer, screening measure of general mentalizing abilities. The RFQ assesses participant's self-reported *certainty* and *uncertainty* about mental states, reflecting how confident vs how doubtful one is in utilizing mental state information, such as thoughts and feelings, to form representations of their own and others' behaviours. Because of its brief nature, the RFQ is a suitable assessment tool for the purposes of outcome evaluation in clinical settings and clinical trials. The RFQ

correlates with measures of mindfulness, perspective-taking and empathy (Fonagy et al., 2016), and its use has been validated for adolescents from the general population (Badoud et al., 2015).

In the present study, we seek to: (a) identify specific features across all three schizotypal dimensions that account for RFQ-measured mentalizing difficulties in adolescence; (b) assess the effects of schizotypal personality features and RFQ-measured mentalizing on thought problems relevant for psychosis; and (c) examine whether RFQ-measured mentalizing mediates the relation between schizotypal personality features and thought problems.

Given that the normative elaboration of mentalizing relies upon interpersonal interactions within close relationships (Fonagy et al., 2002; Gergely & Watson, 1999; Uddin, Iacoboni, Lange, & Keenan, 2007), we hypothesise that schizotypal features that impede interpersonal communication during adolescence will be linked to mentalizing difficulties. Specifically, we expect that social anxiety, constricted affect and lack of close friends (interpersonal), as well as suspiciousness (cognitive-perceptual) and odd speech (disorganization) will be associated with high uncertainty and low certainty in understanding mental states. Furthermore, on the basis of previous research (Debbané et al., 2015; Hart, Venta, & Sharp, 2017) we hypothesise that both schizotypal personality features and mentalizing difficulties will be associated with self-rated thought problems. Finally, given that mentalizing dysfunction has been proposed as a potential pathway through which schizotypal features relate to psychosis vulnerability (Bartels-Velthuis et al., 2011; Debbané, Salaminios, et al., 2016), we expect that mentalizing difficulties (high uncertainty and low certainty in mental states) will, at least in part, mediate the effects of schizotypal personality features on thought problems in our community adolescent sample.

2 | METHODS

2.1 | Participants and procedure

One hundred and twenty community adolescents were recruited through written advertisements in public schools in the city of Geneva, Switzerland. Inclusion criteria were age (12-19 years) and fluency in French. Participants were screened for cognitive impairment, and those with a standard score below 7 in the Block Design subtest of the Wechsler Intelligence Scale (Wechsler, 1955) were excluded from the analyses (n = 15). The final sample consisted of 105 community adolescents (53 females, 52 males, M_{age} = 15.72). None of the participants suffered from past/present neurological or neurogenetic disorders. Written informed consent was obtained from all participants and legal guardians of those under 18 years of age.

2.2 | Measures

The Schizotypal Personality Questionnaire (SPQ, French version, Dumas et al., 2000) is designed to measure schizotypal traits subjectively experienced as common aspects of one's personality functioning. The measure yields three dimension scores and nine subscale scores: cognitive-perceptual (unusual perceptual experiences, ideas of reference, suspiciousness, odd beliefs or magical thinking), interpersonal (social anxiety, constricted affect, lack of close friends) and disorganization (odd speech, odd behaviour). The SPQ has been validated for French-speaking adolescents (Badoud, Chanal, der Linden Van, Eliez, & Debbané, 2011).

The *Reflective Functioning Questionnaire* (RFQ, French version, Badoud et al., 2015) evaluates mentalizing abilities by measuring the degree of certainty and uncertainty with which individuals utilize mental state information to understand their own and others' behaviour. The *uncertainty about mental states* subscale (RFQu) focuses on the extent to which individuals agree with statements such as 'Other people's thoughts are a mystery to me' and 'Strong feelings often cloud my thinking'. High scores on the RFQu reflect poor usage of mental state information and a stance characterized by a lack of knowledge about mental states. The *certainty about mental states* subscale (RFQc) focuses on the extent to which individuals disagree with statements such as 'I don't always know why I do what I do'. RFQc items are recoded so that high scores reflect better usage of mental state information and adaptive levels of certainty about mental states. The measure has been validated for French-speaking adolescents (Badoud et al., 2015).

The *Youth Self-Report* (YSR; Achenbach, 1991) measures self-reported psychopathology in the past 6 months, among adolescents aged 11–18 years. Unlike the Child Behaviour Checklist (CBCL) which is completed by parents or surrogates, the YSR is completed by young people themselves. The *Adult Self-report* (ASR; Achenbach, 1991) assesses psychopathology in adults. It has comparable items to the YSR and the same range of scores across its scales. In line with recent studies (Hart et al., 2017), the *thought problems* subscale of the YSR/ASR was used to assess cross-cutting, rather than disorder-specific, symptoms that lie in a continuum with clinical manifestations relevant for psychosis, including cognitive-perceptual aberrations, as well as strange thoughts and behaviours. Assessing psychosis-relevant symptoms continuously, rather than focusing solely on specific symptom-subgroups, addresses the need to identify cross-cutting factors that contribute to early risk for psychosis in adolescence. Indeed, longitudinal findings suggest that the *thought problems* subscale captures symptomatic behaviours relevant to proximal/prodromal risk for psychosis (Simeonova, Nguyen, & Walker, 2014).

Because symptoms of anxiety and depression influence mentalizing inferences (Bateman & Fonagy, 2004) the *anxious/depressed* subscale of the YSR/ASR was used as a control variable in the analyses.

2.3 | Statistics

Statistical analyses were performed in SPSS version 24. Spearman's correlation coefficients were calculated to examine associations between SPQ and RFQ subscale scores (Bonferroni corrected alpha = 0.001). We then ran two multiple linear regression models to

assess the effects of SPQ subscales on RFQ scale scores (RFQu and RFQc). In the first model, all SPQ subscales were entered together as independent variables and RFQu was entered as the dependent variable. In the second model, all SPQ subscales were entered together as independent variables and RFQc was entered as the dependent variable. Age and the YSR/ASR anxious/depressed subscale were also entered in each model to account for their effects. Multicollinearity was tested using variance inflation factors (VIF) and tolerance statistics (VIF > 5 and/or tolerance <0.2 suggest multicollinearity).

Two multiple linear regression models, controlling for age, were also ran to explore the effects of (a) SPQ subscale scores and (b) RFQ scale scores, on the level of thought problems (YSR/ASR thought problems subscale T-score).

Finally, Hayes's PROCESS macro (Hayes, 2018) for SPSS version 24 was used to test the prediction that mentalizing mediates the relationship between schizotypal traits and subthreshold psychotic symptoms. The YSR/ASR thought problems scale was entered as the outcome variable, SPQ subscales were entered as the independent variables and RFQ scales as the mediators in each model, with age as a control variable in the analyses. The PROCESS macro uses non-parametric bootstrapping, which involves random resampling of observations with replacement to obtain confidence intervals (CIs) for indirect effects (bootstrap CIs were based on 10 000 samples). Effects are considered significant if the CI does not contain zero. Mediation is present if the indirect effect (A and B) of the independent variable (SPQ subscale) on the outcome variable (YSR/ASR thought problems) through the mediator (RFQ scale) is significant and the direct effect of the dependent variable on the outcome variable, while accounting for the mediator (C'), is smaller than the total effect (C) (Figure 1).

3 | RESULTS

3.1 | Descriptive statistics

Table 1 presents the descriptive results for the major variables included in our analyses.

3.2 | Assessing the relationships between schizotypal trait dimensions and mentalizing difficulties in adolescence

Table 2 presents the Spearman's correlations between SPQ and RFQ subscale scores.

There were no concerns for multicollinearity between the independent variables. Multiple linear regression analyses indicated that when all SPQ subscales were entered together as predictors in the model, only the social anxiety (β = 0.26, t = 2.37, P < .05) and odd speech SPQ subscales (β = 0.25, t = 2.02, P < .05) significantly accounted for increased RFQu scores, controlling for the effects of age and YSR/ASR anxious/depressed scale scores (Table 3). Furthermore, regression analyses showed that increases in SPQ odd speech significantly accounted for decreased RFQc scores (β = −0.30, t = −2.31, P < .05), controlling for the effects of age and YSR/ASR anxious/depressed scale scores (Table 4).

3.3 | Effects of schizotypal traits and mentalizing on thought problems

Two multiple linear regressions were computed to examine the effects of (a) SPQ subscale scores and (b) RFQ scale scores, on the YSR/ASR thought problems subscale, controlling for the effects of age. Results showed that only SPQ social anxiety (β = 0.17, t = 2.02, P < .05) and SPQ odd speech (β = 0.28, t = 2.86, P = .005) were significantly associated to YSR/ASR thought problems. In terms of mentalizing, only RFQu was significantly associated with YSR/ASR thought problems (β = 0.38, t = 3.92, P < .001) (Table 5).

3.4 | Mediation analysis

According to the results of the regression analysis presented in Table 5, the social anxiety and odd speech SPQ subscales, as well as RFQu significantly accounted for YSR/ASR thought problems scale
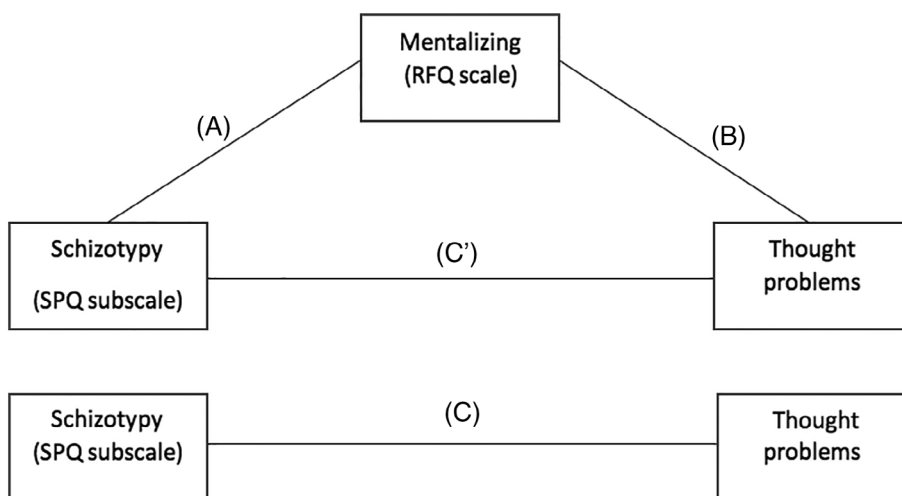
FIGURE 1   Mediational model with schizotypy as independent variable, mentalizing as mediator and thought problems as dependent variable

TABLE 1 Means, ranges and standard deviations for each major variable in the sample

	Mean	Range	SD
Mentalizing			
RFQu	3.02	0–11	2.55
RFQc	6.36	0–18	4.04
SPQ cognitive-perceptual dimension			
SPQ unusual perceptual experiences	2.24	0–8	2.20
SPQ ideas of reference	2.32	0–8	2.23
SPQ suspiciousness	1.99	0–7	1.83
SPQ odd beliefs	1.89	0–7	1.78
SPQ interpersonal dimension			
SPQ social anxiety	2.86	0–8	2.27
SPQ constricted affect	2.00	0–6	1.50
SPQ lack of close friends	1.72	0–9	1.67
SPQ disorganized dimension			
SPQ odd speech	3.96	0–9	2.65
SPQ odd behaviour	1.65	0–6	1.83
Psychological symptoms			
YSR/ASR thought problems	58.68	50–95	8.22
YSR/ASR anxious/depressed	56.31	50–94	7.78

Abbreviations: RFQc, RFQ certainty about mental states; RFQu, RFQ uncertainty about mental states; SPQ, Schizotypal Personality Questionnaire; YSR/ASR, Youth and Adult Self-Report.

TABLE 2 Correlations between RFQ dimensions and SPQ subscales

	1	2	3	4	5	6	7	8	9	10	11
1. RFQu	–	−.42**	.21	.36**	.34**	.38**	.34**	.20	.40**	.18	.30
2. RFQc		–	−.16	−.18	−.23	−.24	−.30	−.24	−.34**	−.05	−.14
3. SPQ unusual perceptual experiences			–	.53**	.48**	.23	.32	.38**	.49**	.50**	.52**
4. SPQ ideas of reference				–	.61**	.41**	.35**	.36**	.61**	.41**	.50**
5. SPQ suspiciousness					–	.43**	.48**	.58**	.44**	.31	.40**
6. SPQ social anxiety						–	.36**	.46**	.32	.14	.19
7. SPQ constricted affect							–	.57 **	.46**	.19	.35**
8. SPQ no close friends								–	.39**	.19	.26
9. SPQ odd speech									–	.33	.55**
10. SPQ odd beliefs										–	.52**
11. SPQ odd behaviour											–

Note: ** indicates significance at $P < .001$.

Abbreviations: RFQc, RFQ certainty about mental states; RFQu, RFQ uncertainty about mental states; SPQ, Schizotypal Personality Questionnaire.

scores. Thus, two mediation models were tested with YSR/ASR thought problems as the outcome variable. In the first model, SPQ social anxiety was entered as the independent variable and RFQu was entered as the mediator. In the second model, SPQ odd speech was entered as the independent variable and RFQu was entered as the mediator. Age was entered as a control variable in both models.

When controlling for age, SPQ social anxiety was significantly associated to RFQu ($b = 0.47$, 95% CI [0.23,0.70], $P < .001$) (path A in Figure 2) and RFQu was significantly associated to thought problems ($b = 0.90$, CI [0.25, 1.54], $P < .01$) (path B in Figure 2). There was a significant indirect effect of SPQ social anxiety on YSR/ASR thought problems through RFQu ($b = 0.42$, 95% CI [0.1370, 0.9145], $P < .05$), indicative of a mediation effect. The total effect of SPQ social anxiety on YSR/ASR thought problems ($b = 1.68$, 95% CI [1.03, 2.33], $P < .0001$) (path C in Figure 2) was reduced by 25% when RFQu was accounted for ($b = 1.26$, 95% CI [0.72, 1.80], $P < .0001$) (path C' in Figure 2), indicating partial mediation.

Results further indicate that when controlling for age, SPQ odd speech was significantly associated to RFQu ($b = 0.40$, 95% CI [0.23,0.58], $P < .0001$) (path A in Figure 3), and RFQu was significantly associated to YSR/ASR thought problems ($b = 0.68$, CI [0.12, 1.23], $P < .05$) (path B in Figure 3). There was a significant indirect effect of

TABLE 3 Linear multiple regression of SPQ on RFQu

Dependent variables	Model coefficients					Collinearity statistics	
Control and independent variables	R^2	F	B	t	P	Tolerance	VIF
RFQu	0.29	3.37			<.01		
Age			0.007	0.06	.95	0.67	1.50
YSR/ASR anxious/depressed			0.17	1.53	.13	0.61	1.64
SPQ social anxiety			0.26	2.37	<.05	0.66	1.52
SPQ odd speech			0.25	2.02	<.05	0.50	2.02
SPQ constricted affect			0.06	0.55	.58	0.61	1.65
SPQ ideas of reference			0.03	0.19	.85	0.36	2.81
SPQ lack of close friends			−0.02	−0.14	.89	0.46	2.20
SPQ suspiciousness			0.08	0.58	.56	0.38	2.63
SPQ odd beliefs			−0.04	−0.29	.77	0.56	1.80
SPQ odd behaviour			0.03	0.25	.80	0.48	2.09
SPQ unusual perceptual experiences			−0.10	−0.79	.43	0.44	2.29

Abbreviations: RFQu, RFQ uncertainty about mental states; SPQ, Schizotypal Personality Questionnaire; VIF, variance inflation factor; YSR/ASR, Youth and Adult Self-Report.

TABLE 4 Linear multiple regression of SPQ on RFQc

Dependent variables	Model coefficients					Collinearity statistics	
Control and independent variables	R^2	F	B	t	P	Tolerance	VIF
RFQc	0.20	2.08			<.05		
Age			0.19	1.66	.10	0.67	1.50
YSR/ASR anxious/depressed			0.18	1.55	.13	0.61	1.64
SPQ social anxiety			−0.07	−0.64	.53	0.66	1.52
SPQ odd speech			−0.30	−2.31	<.05	0.50	2.02
SPQ constricted affect			−0.24	−1.97	.05	0.61	1.65
SPQ ideas of reference			0.07	0.44	.66	0.36	2.81
SPQ lack of close friends			−0.02	−0.14	.89	0.46	2.20
SPQ suspiciousness			0.06	−0.40	.69	0.38	2.63
SPQ odd beliefs			−0.02	−0.19	.85	0.56	1.80
SPQ odd behaviour			0.93	0.69	.49	0.48	2.09
SPQ unusual perceptual experiences			−0.01	−0.06	.95	0.44	2.29

Abbreviations: RFQc, RFQ Certainty about Mental States; SPQ, Schizotypal Personality Questionnaire; VIF, variance inflation factor; YSR/ASR, Youth and Adult Self-Report.

SPQ odd speech on YSR/ASR thought problems through RFQu (b = 0.27, 95% CI [0.05, 0.60], P < .05), indicative of a mediation effect. The total effect of SPQ odd speech on YSR/ASR thought problems (b = 1.88, 95% CI [1.22, 2.54], P < .0001) (path C in Figure 3,) was reduced by 14% when RFQu was accounted for (b = 1.61, 95% CI [0.99, 2.23], P < .0001) (path C' in Figure 3), indicating partial mediation.

4 | DISCUSSION

The first aim of the current study was to identify schizotypal features that contribute to mentalizing difficulties in a sample of community youths. Furthermore, we examined the effects of schizotypal features and mentalizing on self-reported thought problems. Finally, we tested the mediating role of mentalizing on the relationship between schizotypal features and thought problems.

4.1 | Associations between schizotypal personality features and mentalizing

In accordance with our hypothesis, the present findings show that interpersonal schizotypal manifestations pertaining to social anxiety are associated to high mentalizing uncertainty. This resonates with

TABLE 5 Effects of SPQ subscales and RFQ scales on YSR/ASR thought problems

Dependent variables	Model coefficients					Collinearity statistics	
Control and independent variables	R^2	F	B	t	P	Tolerance	VIF
YSR/ASR thought problems	0.56	11.72			<.001		
Age			0.07	0.91	.37	0.92	1.09
SPQ social anxiety			0.17	2.02	<.05	0.66	1.52
SPQ odd speech			0.28	2.86	<.01	0.50	2.02
SPQ constricted affect			−0.05	−0.60	.55	0.62	1.60
SPQ ideas of reference			0.04	0.33	.75	0.36	2.80
SPQ lack of close friends			0.12	1.15	.26	0.46	2.17
SPQ suspiciousness			0.09	0.85	.40	0.38	2.61
SPQ odd beliefs			0.06	0.71	.48	0.59	1.71
SPQ odd behaviour			0.12	1.19	.24	0.48	2.09
SPQ unusual perceptual experiences			0.17	1.61	.11	0.44	2.28
YSR/ASR thought problems	0.19	8.06			<.001		
Age			0.12	1.31	.19	0.99	1.00
RFQu			0.38	3.92	<.001	0.84	1.20
RFQc			−0.20	−0.98	.33	0.83	1.20

Abbreviations: RFQc, RFQ certainty about mental states; RFQu, RFQ uncertainty about mental states; SPQ, Schizotypal Personality Questionnaire; VIF, variance inflation factor; YSR/ASR, Youth and Adult Self-Report.
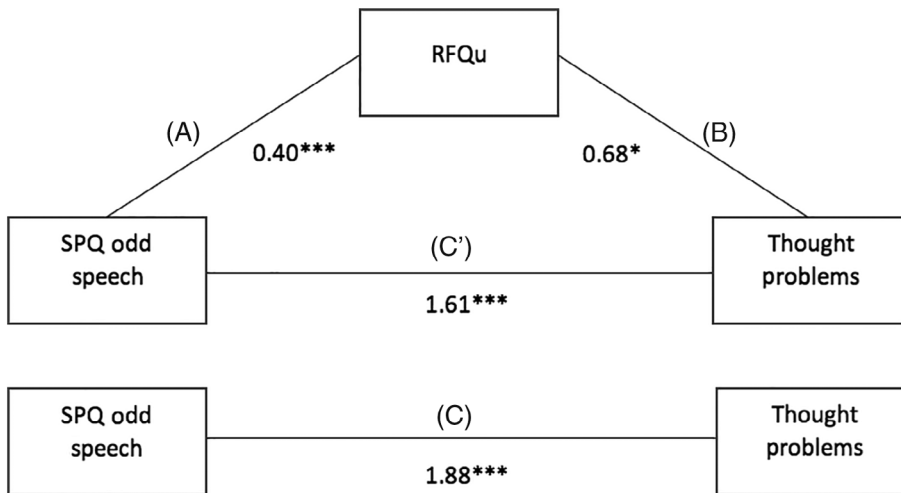

FIGURE 2 Mediational model with SPQ social anxiety as independent variable, RFQu as mediator and thought problems as dependent variable. Abbreviations: RFQu, Reflective Functioning Questionnaire uncertainty about mental states scale; SPQ, Schizotypal Personality Questionnaire
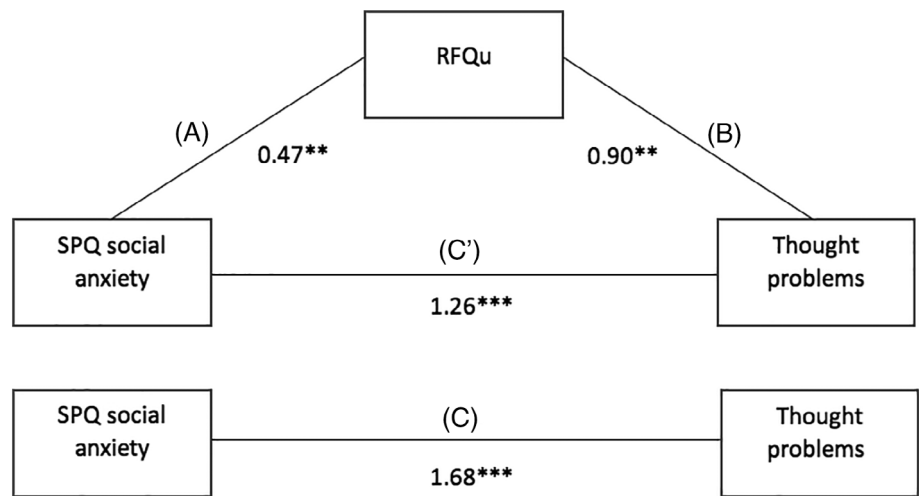
data suggesting that mentalizing deficits are linked with the level of interpersonal withdrawal in patient samples (Frith, 2014; Sergi et al., 2007; Weijers et al., 2018). Our results are also consistent with recent findings demonstrating links between diminished mentalizing capacities in adolescence and retrospective reports of social anxiety in childhood (Ballespí, Pérez-Domingo, Vives, Sharp, & Barrantes-Vidal, 2018). Young people who withdraw from interpersonal contact in the context of social anxiety, may encounter less social interaction opportunities, essential for developing a capacity to understand mental states (Banerjee & Henderson, 2001). Alternatively, or in conjunction, difficulties in understanding the mental states of oneself and others may interfere with young people's ability to function within social situations, leading to experiences of increasing anxiety in the context of interpersonal contact. Indeed, according to Banerjee and Henderson

(2001), the relationship between social anxiety and mentalizing dysfunction appears to be bidirectional (one influences the other across development). For those developing clinical psychosis, poor mentalizing appears to further impede interpersonal communication, increase the tendency to withdraw from social situations and reduce treatment engagement (Debbané, Salaminios, et al., 2016).

A novel finding of our study is that schizotypal personality features of odd speech are associated with high mentalizing uncertainty and reduced mentalizing certainty in adolescence. As in the case of social anxiety, speech that is vague, concrete or tangential, impedes the effective communication of thoughts and feelings within interpersonal interactions, potentially disrupting the developmental elaboration of complex meta-representations of self-experience. Given that deficits in the communicative use of speech are prominent in

FIGURE 3 Mediational model with SPQ odd speech as independent variable, RFQu as mediator and thought problems as dependent variable. Abbreviations: RFQu, Reflective Functioning Questionnaire uncertainty about mental states scale; SPQ, Schizotypal Personality Questionnaire

schizophrenia and reflect a genetic vulnerability for the illness (Docherty & Gottesman, 2000), the association between schizotypal manifestations of odd speech and mentalizing difficulties in adolescence may represent a distal marker of psychosis vulnerability.

Contrary to the present findings, previous studies examining the relationship between mentalizing abilities and schizotypal traits using ToM-tasks report associations with the cognitive-perceptual manifestations (Pickup, 2006). This could be attributed to the different methods employed to assess mentalizing (ToM vs RFQ). Task-based measures of ToM, mainly capture the ability to form inferences about other peoples' cognitions, and it has been suggested that contrary to clinical psychosis, poor ToM in schizotypy may be primarily related to hallucination and delusion-like phenomena (Pickup, 2006). Conversely, the RFQ is a self-report measure designed to also assess self-oriented and affect-based facets of mentalizing, as well as the ability to make mentalizing inferences of the self in relation to close others, thus may be more sensitive in capturing associations with interpersonal features of schizotypy. Importantly, the only study to date that has examined the relationship between ToM and schizotypy in community adolescents also found an association with the cognitive-perceptual dimension of schizotypy (Barragan, Laurens, Navarro, & Obiols, 2011). Thus, differences between the current findings and those reported in adult ToM studies cannot be readily attributed to the inclusion of an adolescent sample. Future studies should examine the associations between RFQ-measured mentalizing and schizotypy in adult samples.

4.2 | Effects of schizotypal personality features and mentalizing difficulties on thought problems in adolescence

Our findings suggest that schizotypal trait features pertaining to social anxiety and odd speech are associated to the level of thought problems in our community adolescent sample. The association between social anxiety and thought problems in the current sample

is in line with previous research indicating that social anxiety relates to the severity of psychotic symptoms in CHR adolescents and young adults (Pontillo et al., 2017). Our data are also in line with previous studies reporting that disorganized speech relates to thought problems in both chronic psychosis and non-clinical samples (Sommer et al., 2010).

Interestingly, our results indicate that mentalizing uncertainty mediated the effects of schizotypal features on the level of thought problems in our sample. These were only partial mediations, suggesting that other interpersonal, cognitive and psychological factors may also shape the relationship between schizotypal traits and thought problems in adolescence. Nevertheless, current findings lend support to a model in which mentalizing difficulties contribute to the relation between schizotypal traits and thought problems that lie in a continuum with clinically relevant psychotic symptoms (Debbané & Barrantes-Vidal, 2014; Debbané, Salaminios et al., 2016).

First, our findings suggest that mentalizing uncertainty may represent a potential pathway through which trait features of social anxiety relate to thought problems in adolescence. Social anxiety has been consistently linked to the development and maintenance of psychotic symptoms (Rietdijk et al., 2013), including paranoid/persecutory ideation (Michail & Birchwood, 2009), however the underlying mechanisms remain incompletely understood. One possibility is that difficulties in understanding the mental states of others in the context of social anxiety may lead individuals to overattribute other people's intentions (Ballespí, Vives, Sharp, Tobar, & Barrantes-Vidal, 2019). Indeed, the tendency to overattribute mental states in others, also known as 'hypermentalizing' (Sharp et al., 2013), has been associated with both paranoid beliefs and hallucination-like phenomena in community samples (Clemmensen et al., 2014) and in adults suffering with schizophrenia (Ciaramidaro et al., 2015). Although the use of the RFQ in the current non-clinical sample did not permit for the direct assessment of hypermentalizing misattributions, previous studies suggest that difficulties in understanding mental states may trigger the overattribution of intentions in others, leading to clinically relevant manifestations (Langdon & Brock, 2008).

Our findings also suggest that uncertainty in mental states partially mediated the relationship between schizotypal features of odd speech and thought problems in our sample. It must be noted however that the indirect effects of the mediational model were small. Indeed, it has been reported that the relationship between disorganized speech and clinically relevant thought problems, such as hallucinatory phenomena, may primarily reflect the outcome of a shared neurobiological basis between the two (Sommer et al., 2010). Importantly though, disorganization features of schizotypy (including odd speech) in adolescence have been longitudinally associated with the developmental trajectory of clinically relevant cognitive-perceptual manifestations (Dominguez, Saka, Lieb, Wittchen, & van Os, 2010). Our findings add to this literature, suggesting that the effect of disorganized speech on psychosis-risk may partly depend upon the level of mentalizing impairment.

Mentalizing difficulties are transdiagnostic and have been implicated in the development and phenomenology of various psychiatric illnesses, such as BPD (Bateman & Fonagy, 2010); depression (Taubner, Kessler, Buchheim, Kächele, & Staun, 2011) and functional somatic disorders (Luyten, van Houdenhove, Lemma, Target, & Fonagy, 2012). Regarding psychotic disorders, our results tentatively suggest that mentalizing dysfunction may represent a potential pathway through which schizotypal personality traits affect the level of thought problems in adolescence. From an early prevention standpoint, mentalizing difficulties may constitute important psychotherapeutic targets to sustain resilience against psychosis-risk during adolescent development.

4.3 | Limitations and conclusions

The results of the current study should be interpreted in light of certain limitations. First, the data were derived from a relatively small sample and further associations could emerge with a larger sample. Second, the analyses performed were cross-sectional and longitudinal investigations are needed to establish the causal relevance of schizotypy on the developmental cascade of mentalizing. Third, mentalizing represents a multidimensional construct reflecting the capacity to make implicit and explicit inferences about one's own and other people's cognitions and affects (Fonagy & Luyten, 2009). However, the RFQ is a screening measure, not designed to capture different dimensions of mentalizing. Therefore, the assessment of specific mentalizing dimensions and their relation to schizotypy or thought problems in the current sample was not possible. Finally, given that the study was based on self-report measures, difficulties in reflecting on one's own mental states may have led to biased responses in the RFQ (Fonagy et al., 2016).

Despite these limitations, this study is the first to examine the associations between mentalizing difficulties and schizotypal features during adolescence, as well as their effect on thought problems, using an easy-to-administer measure of mentalizing. The findings underlie the importance of encompassing evaluations of mentalizing when clinically assessing psychosis-risk in youths who present schizotypal features. Mentalization-based treatment (Brent & Fonagy, 2014; Debbané et al., 2016) may be applied preventatively to sustain mentalizing functioning and attenuate psychosis-risk in adolescents who present schizotypal manifestations, prior to the development of clinical symptoms.

DATA AVAILABILITY STATEMENT

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