



Schizotypy assessment: State of the art and future prospects¹

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ABSTRACT. Schizotypy is considered to be a multidimensional construct distributed along a dynamic neurodevelopmental vulnerability continuum for schizophrenia. The interest in the assessment of schizotypy focuses on the detection of individuals at a heightened risk for schizophrenia-spectrum disorders. The purpose of this theoretical study was to review the current state of the most important tests for the measurement of schizotypy according to their psychometric properties. There is a wide range of questionnaires for the assessment of schizotypal traits with different psychometric properties. The review of the different schizotypy scales seems to indicate that both versions of the Schizotypal Personality Questionnaire, as well as the Perceptual Aberration Scale, Magical Ideation Scale, Physical Anhedonia Scale and Revised Social Anhedonia Scale all developed by the research team of the University of Wisconsin, show better psychometric properties than the rest of the self-report questionnaires. However, the measures of schizotypy should improve in certain aspects related to the response format, test-retest reliability, and predictive validity. Future lines of research should consider different statistical models, the use of computerized procedures, and its study in different cultures.

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RESUMEN. La esquizotipia es considerada como un constructo multidimensional que se distribuye a lo largo de un continuo dinámico de vulnerabilidad al neurodesarrollo para la esquizofrenia. El interés por la evaluación de la esquizotipia se centra en la detección de sujetos con propensión a los trastornos del espectro esquizofrénico. El objetivo de este estudio teórico fue realizar una revisión del estado actual de los principales instrumentos de medida empleados en la medición de la esquizotipia a través de sus propiedades psicométricas. Existe una abundante gama de cuestionarios que evalúan los rasgos esquizotípicos con distintas propiedades psicométricas. La revisión de las diferentes escalas de esquizotipia parece indicar que el *Schizotypal Personality Questionnaire* en sus dos versiones, y las escalas del grupo de la Universidad de Wisconsin, Perceptual Aberration Scale, Magical Ideation Scale, Physical Anhedonia Scale y Revised Social Anhedonia Scale presentan mejores propiedades psicométricas que el resto de las escalas. Las medidas de esquizotipia tendrían que mejorar ciertos aspectos referidos al formato de respuesta, a la fiabilidad test-retest y a la validez predictiva. Posibles líneas de investigación futuras deberán tener en cuenta la aplicación de diferentes modelos estadísticos, la utilización de los medios informáticos y su estudio a través de diferentes culturas.

PALABRAS CLAVE. Esquizotipia. Autoinformes. Propensión a la psicosis. Psicometría. Estudio teórico.

Research regarding the predisposition to psychosis and, specifically, the early detection of neurocognitive and vulnerability markers for psychosis, is at a crucial moment on the international scene (Lemos-Giráldez, Vallina, and Fernández, 2003; Lemos-Giráldez *et al.*, 2006). Among the procedures employed for detecting the risk for psychosis we find the studies on “high risk” whose aim is none other than to investigate those subjects who present traits and characteristics which make them vulnerable to developing schizophrenic psychosis (McGorry, Yung, and Phillips, 2003). Research on the assessment of schizotypy falls within studies on psychometric high risk method being one of the most frequently studied predisposition indicators (Vázquez, Nieto-Moreno, Cerviño, and Fuentenebro, 2006). According to the literature, high scores on schizotypy self-reports are at heightened risk for the later development of schizophrenia-spectrum disorders (Chapman, Chapman, Raulin, and Eckblad, 1994; Kwapil, 1998; Kwapil, Miller, Zinser, Chapman, and Chapman, 1997). Recently, Gooding and colleagues (Gooding, Kathleen, and Matts, 2005), have replicated this finding in a 5-year-follow-up study on high risk. Subjects with high scores on psychometric schizotypy present a greater proportion of schizophrenia spectrum disorders, which is also the best predictor for a wide range of psychopathological variables for the later development of this type of disorders.

Schizotypy has been related to schizophrenia on a historical, clinical and conceptual level (Claridge, 1997). Historically Meehl (1962) coined the term schizotypy to

refer to an organization of the personality which represents the vulnerability or diathesis for the development of psychosis. Meehl's model incorporates the assumption that although the majority of schizotypal subjects will never develop the clinical form of psychosis, they will exhibit a series of cognitive, behavioural, social, psychophysiological and neurobiochemical alterations that reflect their risk status (Raine, 2006; Siever and Davis, 2004) as well as a factorial structure similar to that found in patients with psychosis. These and other empirical findings seem to support the hypothesis that the neurodevelopmental vulnerability for schizophrenia is expressed across the continuum of schizotypy (Kwapil, Barrantes Vidal, and Silvia, *in press*). It is possible that both schizotypal subjects and schizophrenic subjects share a common path to vulnerability in neurodevelopment.

At present the term schizotypy is a heterogeneous construct which includes a wide variety of meanings. Firstly, schizotypy can be understood basically as a personality trait of a multidimensional nature (Fonseca-Pedrero, Muñoz, Lemos-Giráldez, García-Cueto, Campillo-Álvarez, and Villazón García, 2007) which seems to show predisposition to psychosis (Claridge *et al.*, 1996) within a psychopathological health-illness continuum (Claridge, 1997). Secondly, it can also refer to the schizotypal personality disorder from Axis II of the DSM-IV (American Psychiatric Association, 1994). Likewise, the term schizotypy can indicate an idea in the schizophrenia spectrum or a phenotypical expression of the genetic load in schizophrenia (Álvarez-López, Gutierrez Maldonado, and Pueyo, 2001). It is interesting to highlight that the importance of research in the field of schizotypal personality traits resides basically in three aspects. First, it focuses on the possibility of studying subjects free of psychosis without the secondary effects of medication, stigmatization and the cognitive-social deterioration which are in many cases added to the course of the disorder. Second, it allows the study of the structure and understanding of the underlying mechanisms to the schizotypal personality (Fossati, Raine, Carretta, Leonardi, and Maffei, 2003), as well as the mechanisms underlying the aggravation of psychotic symptoms (Badcock and Dragovic, 2006) toward greater knowledge regarding the links to schizophrenic psychosis. Lastly, as has been mentioned, these kinds of studies allow the identification of subjects at risk for schizophrenia-spectrum disorders using psychometric tests.

The study of the schizotypy using self-report measures only makes sense if we are able to measure the construct with certain psychometric guarantees. The importance of having reliable and valid instruments becomes a necessity (Carretero-Dios and Pérez, 2007). Therefore, the objective of this theoretical study (Montero and Leon, 2007) is to provide a comprehensive vision of the current state, without it being a historical revision, focusing on the scales which are widely used in the assessment of schizotypy or, more generally, psychosis proneness. The interest of this study resides basically in the relevance and the necessity of having instruments with rigorous psychometric properties, of rapid application and with reduced costs regarding their implementation in research and clinical practice.

Instruments for schizotypy measurement

A wide range of questionnaires have been developed with the aim of psychometrically detecting people prone to psychosis, thus schizotypy assessment has been an important research objective in the last decades. However, we have to point out that there are also specific structured-clinical interviews for the assessment of schizotypy with adequate psychometric properties. The Structured Interview for Schizotypy-Revised (SIS-R) (Vollema and Ormel, 2000) is an example.

TABLE 1. Schizotypy assessment instruments.

<i>Name of scale</i>	<i>Reference</i>	<i>Acronym</i>	<i>N° Items</i>	<i>Format</i>
Perceptual Aberration Scale	(Chapman, Chapman, and Raulin, 1978)	PAS	35	T/F*
Physical Anhedonia Scale	(Chapman, Chapman, and Raulin, 1976)	PhA	61	T/F
Social Anhedonia Scale	(Chapman <i>et al.</i> , 1976)	SA	48	T/F
Revised Social Anhedonia Scale	(Eckblad, Chapman, Chapman, and Mishlove, 1982)	RSAS	40	T/F
Magical Ideation Scale	(Eckblad and Chapman, 1983)	MIS	30	T/F
The Intense Ambivalence Scale	(Raulin, 1984)	IAS	45	T/F
Schizotypal Traits Questionnaire	(Claridge and Broks, 1984)	STA	37	T/F
Schizotypy Scale	(Venables, Wilkins, Mitchell, Raine, and Bailes, 1990)	VSS	30	T/F
Schizotypal Personality Questionnaire	(Raine, 1991)	SPQ	74	T/F
Kings Schizotypy Questionnaire	(Williams, 1993)	KSQ	63	Yes/No
Junior Schizotypy Scales	(Rawlings and MacFarlane, 1994)	JSS	74	Yes/No
Schizotypal Personality Questionnaire Brief	(Raine and Benishay, 1995)	SPQ-B	22	Yes/No
Oxford-Liverpool Inventory of Feeling and Experiences	(Mason, Claridge, and Jackson, 1995)	OLIFE	159	Yes/No
The Schizophrenia Proneness Scale of the MMPI-2	(Bolinsky, Gottesman, Nicholls, and Shapiro, 2003; Bolinsky <i>et al.</i> , 2001)	SzP	32	T/F
Eppendorf Inventory Schizophrenia	(Mass, 2000; Mass <i>et al.</i> , 2007)	ESI	39	Likert 4
Schizotypal Ambivalence Scale	(Kwapil, Mann, and Raulin, 2002)	SAS	19	T/F
Peters Delusions Inventory (PDI) 40/21**	(Peters, Joseph, Day, and Garety, 2004; Peters, Joseph, and Garety, 1999)	PDI	21	Yes/No Likert 5
Thinking and Perceptual Style Questionnaire	(Linscott and Knight, 2004)	TPSQ	99	Likert 5
Schizotypy Traits Questionnaires for Children	(Cyhlarova and Claridge, 2005)	STA	37	Yes/No
Schizotypic Syndrome Questionnaire	(Ven Kampen, 2006)	SSQ	108	Likert 4

* T/F (True/False)

** The PDI-21 gathers information in three subscales: degree of preoccupation, distress and conviction.

The first attempts, now classical, for achieving schizotypy measurement through the use of specific questionnaires go back to studies on the MMPI by Golden and Meehl (1979) and to the Loren and Jean Chapman research team in the seventies. This second research team belonging to the University of Wisconsin has developed a wide variety of questionnaires, extensively used at present, which are the base of the current schizotypy assessment measures (Chapman, Chapman, and Kwapil, 1995) also generically called “psychosis-proneness” scales (Chapman, Chapman, and Miller, 1982). Table 1

shows the questionnaires used in the field of psychosis proneness assessment as well as the number of items and response format. Recently developed instruments which are being used in this field are also included.

On the other hand, Table 2 shows the psychometric properties of the questionnaires with respect to their reliability (Cronbach, KR 20 and Test-retest) and validity (construct, convergent, discriminant, criterion-related and predictive). Likewise, it must be pointed out that there are a large number of scales which are not included in this revision such as: Schizoida Scale (GM) (Golden and Meehl, 1979), Hypomanic Personality (HP) (Eckblad and Chapman, 1986), Impulsive NonConformity Scale (IN) (Chapman *et al.*, 1984), The Rust Inventory of Schizotypal Cognitions (RISC) (Rust, 1988), Launay Slade Hallucination Scale (LSHS) (Launay and Slade, 1981), Combined Schizotypal Traits Questionnaire (CSTQ) (Bentall, Claridge, and Slade, 1989), Psychoticism Scale (Eysenck and Eysenck, 1975), Schizophrenism Scale (NP) (Nielsen and Petersen, 1976) and The Referential Thinking Scale (REF) (Lenzenweger, Bennett, and Lilienfeld, 1997).

Specific measures for schizotypy assessment have also been developed for adolescents, because, as we know, adolescence represents an especially risky period for the development of schizophrenia-spectrum disorders (American Psychiatric Association, 1994). The Junior Schizotypy Scales (JSS) (Rawlings and MacFarlane, 1994) subsequently revised by DiDuca and Joseph (1999) and the Schizotypy Traits Questionnaires for Children (STA) (Cyhlarova and Claridge, 2005) were designed for assessment in this age group. However, other scales have been employed for detecting psychosis proneness in this age group (Barrantes-Vidal *et al.*, 2002; Chen, Hsiao, and Lin, 1997).

TABLE 2. Psychometric properties of schizotypy assessment measures.

<i>Abbreviation</i>	<i>Reliability</i>	<i>Test-retest</i>	<i>Validity</i>	<i>References**</i>
PAS	.84/.90	.43/.84	Construct, convergent, discriminant and predictive	1,2,4,5,6,7,8,9,10
MIS	.78/.92	.41/.84	Construct, convergent, discriminant and predictive	1,2,4,5,6,7,9,10
PhA	.77/.86	.65/.84	Construct, convergent, discriminant and predictive	1,2,4,5,7,9,10
RSAS	.77/.89	.75/.84	Construct, convergent, discriminant and predictive	2,3,4,5,6,7,8,9,10
IAS	.87	.81/.78	Predictive	11
STA	.71/.86 (.63/.74)*	--	Construct and convergent	12-14
VSS	.76/.82	--	Construct	15
SPQ	.87/.92	.53	Construct, convergent, discriminant and criterion-related	16-20
SPQ-B	(.59/.82)*	.82	Construct, criterion-related, convergent and discriminant	21-24
KSQ	.75/.83 (.58/.87)*	.90/.82	Construct, criterion-related, convergent and discriminant	21-24
KSQ	.81	.73	Construct and convergent	25-26
JSS	.68/.83	--	Construct	27-28
O-LIFE	.89/.77	.70	Construct and concurrent	29-31
	.62/.80			

TABLE 2. Psychometric properties of schizotypy assessment measures (*cont.*).

<i>Abbreviation</i>	<i>Reliability</i>	<i>Test-retest</i>	<i>Validity</i>	<i>References**</i>
ESI	.85 (.73/.87)*	.42/.17	Construct and convergent	32-33
SAS	.84	--	Convergent	34
PDI-40/21	.88/.75	.78/.81	Construct, convergent, discriminant and criterion	35-37
TPSQ	.86 (.66/.87)*	.48/.79	Construct, convergent and discriminant	38-39
STA Children	.82 (.63/.71)*	--	Construct	40
SSQ	.85(.73/.92)*	--	Construct and convergent	41
SzP	.52/.70	--	Sensibility (.50/.49), Specificity (.95/.91), Positive Predictive Value (.80/.34) and Negative Predictive Value (.97/.70)	42-43

* Cronbach's alpha for questionnaire subscales are shown in parenthesis.

** References: 1 (Meyer and Hautzinger, 1999); 2 (Pope and Kwapil, 2000); 3 (Chapman *et al.*, 1995); 4 (Ross, Lutz, and Bailley, 2002); 5 (Kwapil, Crump, and Pickup., 2002); 6 (Graves and Weinstein, 2004); 7 (Lewandowski *et al.*, 2006); 8 (Horan, Brown, and Blanchard, 2007); 9 (Rawlings, Williams, Haslam, and Claridge, 2007); 10 (Kwapil *et al.*, in press); 11 (Kwapil, Raulin, and Midthun, 2000); 12 (Vázquez *et al.*, 2006); 13 (Merckelbach, Rassin, and Muris, 2000); 14 (Rawlings, Claridge, and Freeman, 2001); 15 (Venables *et al.*, 1990); 16 (Fossati *et al.*, 2003); 17 (Calkins, Curtis, Grove, and Iacono, 2004); 18 (Badeck and Dragovic, 2006); 19 (Stefanis *et al.*, 2006); 20 (Raine, 1991); 21 (Raine and Benishay, 1995); 22 (Axelrod, Grilo, Sanislow, and McGlashan, 2001); 23 (Aycicegi, Dinn, and Harris, 2005); 24 (Compton, Chien, and Bollini, 2007); 25 (Williams, 1993); 26 (Jones *et al.*, 2000); 27 (Rawlings and MacFarlane, 1994); 28 (DiDuca and Josehp, 1999); 29 (Mason *et al.*, 1995); 30 (Burch, Steel and Hemsley, 1998); 31 (Mason, Linney, and Claridge, 2005); 32 (Mass, 2000); 33 (Mass *et al.*, 2007); 34 (Kwapil, Mann *et al.*, 2002); 35 (Peters *et al.*, 1999); 36 (Peters *et al.*, 2004); 37 (López-Ilundain, Pérez-Nievas, Otero, and Mata, 2006); 38 (Linscott and Knight, 2004); 39 (Linscott, 2007); 40 (Cyhlarova and Claridge, 2005); 41 (Van Kampen, 2006); 42 (Bolinsky *et al.*, 2001); 43 (Bolinsky *et al.*, 2003).

There is a series of measures extensively validated and employed by the scientific community for schizotypy research (see Table 2). Following is a detailed review of the two measures with the greatest number of studies on their psychometric properties.

Psychosis-proneness scales of the University of Wisconsin-Madison

The scales employed by the University of Wisconsin-Madison are widely used at present, besides being the base for other more comprehensive measures of the schizotypy construct (*e.g.*, MSTQ; O-LIFE). These are the MIS, PAS, RSAS, IAS and PhA scales (see Table 1). They present a dichotomous true/false response format. Their psychometric properties have been researched since the eighties. In general terms, the reliability indexes fluctuate between .79 and .89 and the test-retest reliability between .75 and .84 (Chapman *et al.*, 1982, 1995). Current studies indicate that the indexes of internal consistency for the PAS, MIS, RSAS and PhA scales fluctuate between .77/.90 for males and between .78/.90 for females (Graves and Weinstein, 2004; Horan *et al.*, 2007; Kwapil *et al.*, in press; Kwapil, Crump *et al.*, 2002; Lewandowski *et al.*, 2006; Pope and Kwapil, 2000; Ross *et al.*, 2002). Recently, Kwapil and Colleagues (Kwapil *et al.*, in press) in a study with 6137 participants at the University of North Carolina

in Greensboro applying the PAS, MIS, PhA and RSAS scales, found alpha coefficients which fluctuate between .79 and .90. On their part, Wuthrich and Bates (2006) at the University of Macquarie, have been using the MIS, PAS, RSAS and SPQ scales in a computerized Likert-type format. The construct, convergent, discriminant and predictive validity have also been widely studied (see Table 2). This research team's scales, which are being considered in this study, present different levels of correlation between them as well as with the SPQ (Lewandowski *et al.*, 2006; Meyer and Hautzinger, 1999; Pope and Kwapil, 2000; Wuthrich and Bates, 2006). The correlations between this group of scales seem to be, to a certain degree, invariable across samples and cultures. The data are presented in Table 3.

Schizotypal Personality Questionnaire (SPQ) (Raine, 1991)

The SPQ is a self-report questionnaire for the assessment of schizotypal personality disorder according to the DSM-III-R criteria (American Psychiatric Association, 1987). There is an abbreviated version of the SPQ-B (Raine and Benishay, 1995). Both questionnaires have been translated and adapted to numerous cultures. The internal consistency of the SPQ is .91 (the subscales mean is .74), its correlation with other personality measures is around .59 and .81, and the test-retest reliability is .82/.53 (Raine, 1991; Stefanis *et al.*, 2006). The SPQ has shown a high internal consistency across different samples. The internal consistency found for secondary students is .87 (.57/.80 subscales), for university students .90 (.57/.90 subscales) (Fossati, Raine, Borroni, and Maffei, 2007; Fossati *et al.*, 2003), for military recruits .91 (.58/.80 subscales) (Stefanis *et al.*, 2006), for adults .59/.82 (Badcock and Dragovic, 2006) and for relatives of patients with schizophrenia .92 (Calkins *et al.*, 2004). Numerous data exist regarding its construct, criterion-related, convergent and discriminant validity (Raine, 1991; Stefanis *et al.*, 2006). Recently, it has been applied in Likert-type and computer format clearly improving its psychometric properties with respect to the dichotomous format (Wuthrich and Bates, 2005, 2006).

With respect to the psychometric properties of the abbreviated version of the SPQ, it presents a mean internal consistency index of .76 (.73/.83), the test-retest reliability is .90 (2 months), its correlation with the SPQ is .91 (.89/.94) and its criterion-related validity is .62 (.34/.73) (Raine and Benishay, 1995). Axelrod and colleagues find Cronbach indexes oscillating between .87 and .74 in adolescent hospitalized patients (Axelrod *et al.*, 2001). The internal consistency indexes in Turkish students fluctuate between .58 and .60, being the total alpha .75, and the test-retest reliability .82 (Aycicegi *et al.*, 2005). Finally, Compton and colleagues (Compton *et al.*, 2007), applying the SPQ-B in family members of schizophrenia-spectrum disorder patients, have found a total reliability coefficient (KR 20) of .83/.82 (.64/.83 for the subscales). It has also been widely validated at the construct, convergent, discriminant and criterion-related levels (Axelrod *et al.*, 2001; Aycicegi *et al.*, 2005; Compton *et al.*, 2007).

TABLE 3. Correlations between schizotypy assessment measures.

<i>Scales</i>	<i>PAS</i>	<i>MIS</i>	<i>PhA</i>	<i>RSAS</i>
MIS	.53/.75			
PhA	-.07/.04	-.19/-.10		
RSAS	.32/.36	.21/.25	.38/.43	
SPQ	.70	.72	--	.48

Schizotypy assessment in Spain

At present there are a wide variety of instruments with adequate psychometric properties throughout the country for both clinical and research purposes. Schizotypy assessment commenced in Spain around the nineties with the study by Muntaner, García-Sevilla, Fernández, and Torrubia (1988), which adapted the Perceptual Aberration Scale (PAS) (Chapman *et al.*, 1978), Physical Anhedonia Scales (PhA) (Chapman *et al.*, 1976) and the Revised Social Anhedonia Scale (RSAS) (Eckblad *et al.*, 1982; Mishlove and Chapman, 1985) to Spanish. These scales have been extensively used in Spanish populations (Barrantes-Vidal *et al.*, 2002; Caparros, Barrantes-Vidal, and Obiols, 2000; Obiols *et al.*, 1997; Rosa *et al.*, 2000). The O-LIFE has also been used in its original and reduced version in research studies regarding smoking habits, relatives of patients with schizophrenia and attentional deficit, and verbal memory (Álvarez López, Gutiérrez Maldonado, and Pueyo, 2001; Caparros, Barrantes-Vidal, Viñas, and Obiols, 2008; Gutiérrez Maldonado, Caqueo, and Ferrer, 2006; Jiménez Melero, Muela Martínez, García León, and Garrancho Segura, 2004; Martinena Palacio *et al.*, 2006). Recently, Álvarez-Moya and colleagues (Álvarez-Moya, Barrantes-Vidal, Navarro, Subira, and Obiols, 2007), have also used the O-LIFE with adolescents with sustained attention deficits (CPT) in a 10-year follow-up study.

The Junior Schizotypy Scales (JSS) (Rawlings and MacFarlane, 1994) was adapted to Spanish by Martínez-Suárez *et al.* (1999) under the name of Multidimensional Schizotypal Traits Questionnaire (MSTQ). In the same way as the O-LIFE, it has also been widely used in combination with neurocognition measures creating a combined measure for the detection of schizotaxia or early detection of psychosis proneness (Lemos Giráldez, Paino-Piñeiro, Inda-Caro, and Besterio González, 2004; Paino-Piñeiro and Lemos-Giráldez, 2003), in relation to an extensive range of emotional and behavioural variables (Fonseca-Pedrero, Muñiz, Lemos-Giráldez, García-Cueto, and Campillo-Álvarez, 2007) and in the relation to schizotypal traits with sex and age (Fonseca-Pedrero, Lemos Giráldez, Muñiz, García-Cueto, and Campillo-Álvarez, in press). Moreover, the Schizotypal Traits Questionnaire (STA) by Claridge and Broks (1984), the Schizotypal Personality Questionnaire (SPQ) by Raine (1991) and the Thinking and Perceptual Style Questionnaire (TPSQ) (Linscott and Knight, 2004) or the Peters Delusion Inventory-21 (PDI) (Peters *et al.*, 2004) are also being applied to Spanish samples with adequate levels of internal consistency (Fonseca-Pedrero, Muñiz, Lemos-Giráldez, García-Cueto, and Campillo-Álvarez, 2007; López-Ilundain *et al.*, 2006; Mata, Mataix-Cols, and Peralta, 2005; Sánchez-Bernardos and Avia, 2006; Vázquez *et al.*, 2006).

Research limitations in schizotypy assessment

According to Lemos (Lemos Giráldez, 1999) and more recently, Stefanis and colleagues (Stefanis *et al.*, 2004), the difficulties encountered when comparing the results of diverse research studies on schizotypy could possibly be due to three factors: a) the heterogeneity of the sample (*e.g.*, nationality, sex, clinical population, or age) and sampling limitations (*e.g.*, few studies with samples randomly drawn from the population); b) the wide variety of instruments used in schizotypy measurement; and c) the statistical procedure for data analysis. The crux of the matter could possibly be found in the statistical model used, that is, the Classic Test Theory (CTT). As it is known, in the CTT, the measure of a variable or construct is inseparable from the instrument used for its measurement and the properties of the measurement instrument are a function of the subjects it is applied to (Muñiz, 1997). The Item Response Theory (IRT) could solve, as a complement to the CTT, some of the limitations present in the schizotypy field. This way, there are few studies from the point of view of the IRT. The first study in the literature was conducted by Vollema and Hoijtink (2000) who applied the SPQ to a clinical population using the Model by Rasch. Graves and Weisntein (2004) also using the Rasch Model in the Wisconsin Psychosis proneness scales (MIS, PAS and RSAS), indicate that the application of these statistical models can be useful for the interpretation of the test scores and for directly comparing scores obtained by different scales which measure the same construct.

Another possible limitation can be found in the response format utilized. The great majority of measures used for schizotypy have a dichotomous response format (T/F, Yes/No). However, a Likert-type response format usually improves the psychometric properties of the tests (Muñiz, García-Cueto, and Lozano, 2005; Wuthrich and Bates, 2005). Logically, these and other aspects should be taken into account when proposing future lines of research.

Recapitulation

At present schizotypy or, more generically psychosis proneness, is a broad heterogeneous concept which can be measured with a wide variety of instruments, clearly showing the richness of this field. It is considered a relevant research field as well as a feasible and valid strategy for detecting individuals prone to schizophrenia-spectrum disorders using self-reports (Gooding *et al.*, 2005; Gooding, Tallent, and Matts, 2007) for the posterior application of prophylactic treatments.

The use of self-reports allows for a series of advantages compared with other assessment methods as it is a non-invasive method of rapid application, and easier administration, scoring and interpretation. As Gooding *et al.* (2007) point out, it is possible that the psychometric high-risk strategy may identify some individuals at risk who might not be detected by the genetic high-risk paradigm. As the clinical (ultra high risk), psychometric and genetic high-risk studies show (Álvarez-Moya *et al.*, 2007; Mason *et al.*, 2004; Miller *et al.*, 2002; Morrison *et al.*, 2006) sufficient accumulated empirical evidence exists which highlights the relevant role of schizotypy. In this sense,

schizotypy self-reports could make the leap from research to clinical practice with respect to detection and intervention in this type of participants.

The study of schizotypy permits research regarding its links with schizophrenia, within a neurodevelopmental vulnerability continuum. In this sense, Raine (2006), in an excellent revision of the subject matter, hypothesized that subjects with high schizotypy scores or schizotypal patients could be provisionally defined as pseudoschizotypal whereas those participants with a family history of schizophrenia or neurodevelopmental markers could be defined as neuroschizotypal. In the second case, the genetic-neurobiological basis, disorganized-interpersonal features and greater temporal stability would have a more predominant role, and they would respond better to psychopharmacological treatment. On the other hand, in the pseudoschizotypal, psychological environmental and postnatal events and cognitive-perceptual features are predominant, and they would perhaps respond better to psychological interventions. The study of schizotypal traits also allows us to see the possible underlying mechanisms of schizophrenia without the collateral effects of medication and stigmatization. The psychosis-proneness self-reports have been created with the aim of detecting those subjects with probabilities of developing schizophrenia spectrum disorders. This way, in the past few years a wide variety of assessment instruments have emerged which attempt to measure schizotypy from different approaches (*e.g.* symptom, syndrome or trait) which tend to become homogeneous. Logically, every measurement should be accompanied by adequate psychometric properties (Muñiz, 2004). A view of the current state of affairs indicates that the questionnaires employed present adequate psychometric properties (reliability and validity). All this permits the selection of those questionnaires with certain psychometric guarantees with respect to the inferences which can be made with the data and its application in the clinical setting.

The self-report measures revised in this research study show that the Schizotypal Personality Questionnaire in its two versions (extended and brief) and the scales from the research team of the University of Wisconsin, Perceptual Aberration Scale, Magical Ideation Scale, Physical Anhedonia Scale and Revised Social Anhedonia Scale, present, in comparison to the rest of the scales, adequate psychometric properties. These properties have certain stability across the different cultures in which they have been used. In addition, the role of the MMPI in the assessment of schizotypal personality and schizophrenia liability must be highlighted (Bolinsky *et al.*, 2003), which to a certain extent returns to the origins of the study of schizotypy. However, current schizotypy measures must improve regarding their response format, test-retest reliability, and the creation of rigorous scales. The growing globalization of psychological assessment and specifically of schizotypy, enhances the necessity of carrying out translations and adaptations of the tests from one culture to another, using international standards created for this purpose (Muñiz and Bartram, 2007).

Schizotypy seems to be a field with an interesting future where interesting lines of research are taking shape. The study of schizotypy assessment through the new psychometric technologies would allow the use of Computerized Adaptive Tests (CAT) under the application of the IRT models; the study of the dimensional or categorical nature of schizotypy using taxometric analyses (Fossati *et al.*, 2007; Rawlings *et al.*,

2007) especially in adolescent populations. The application of longitudinal studies with independent research groups, the study of schizotypal traits through cross-cultural research, the study of its nature and relation to endophenotypes (Lenzenweger, McLachlan, and Rubin, 2007; Lenzenweger and O'Driscoll, 2006), genetic polymorphisms (Ma *et al.*, 2007), or other constructs (Burch, Hemsley, and Corr, 2008) are possible future research lines. The measure of schizotypy or psychosis proneness in itself is not necessarily an indicator for defining proneness or vulnerability to psychosis, but rather it needs to be accompanied by other measures, such as social and clinical functioning or neuropsychological batteries, scores in so social, clinical and neuropsychological functioning (Lemos Giráldez *et al.*, 2004) in studies with normal subjects as well as clinical or genetic high-risk subjects.

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