

Chapter 4

THE ASSESSMENT OF SCHIZOTYPAL EXPERIENCES IN ADOLESCENT POPULATION

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ABSTRACT

Schizotypal experiences represent the behavioural expression of liability for psychotic disorders in general population. Empirical evidence indicates that participants with high scores on schizotypal self-reports are at a heightened risk for the later development of psychotic disorders. In the literature, there are different measurement instruments for the assessment of schizotypal experiences in both adults and adolescents. There is no doubt that having a measuring instrument with adequate psychometric properties, reliability and sources of validity evidence, allow us to make well-founded decisions based on score profiles, for instance, screening participants at-risk for a more comprehensive psychological assessment. Within this research context, the main goal of this study was to analyze the rates of schizotypal experiences, the internal structure and reliability of the Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q) in nonclinical adolescents. The final sample consisted of 3,056 participants, 1,469 males, with a mean age of 15.9 years ($SD = 1.2$). The results indicated that schizotypal experiences are very common in this age group. The analysis of the underlying internal structure of the ESQUIZO-Q subscales revealed a three-factor solution specified in the following components: Reality Distortion, Anhedonia and Interpersonal Disorganization. The levels of internal consistency for the subscales of the ESQUIZO-Q were acceptable. The ESQUIZO-Q is a brief and easily administered self-report with adequate psychometric characteristics for the assessment of schizotypal experiences in nonclinical adolescents. Future studies should explore in more depth the psychometric properties of

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the ESQUIZO-Q (e.g., predictive validity) as well as the development of computerized-adaptive versions.

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1. INTRODUCTION

1.1. Schizophrenia and Schizotypy

Schizophrenia is a serious and devastating mental disorder characterized by symptoms such as hallucinatory experiences, delusional ideation, disorganized speech and behavior, which usually has its onset during late adolescence or early adulthood (American Psychiatric Association, 2000; van Os and Kapur, 2009). Epidemiological data indicates that the median lifetime prevalence estimated for schizophrenia is 4.0 per 1,000 persons (McGrath, Saha, Chant, and Welham, 2008). Also, schizophrenia and related disorders have a direct impact on the lives of individuals at the personal, educational, familiar and work levels. In fact, psychotic symptoms do not only have a clear repercussion on the health and quality of life of patients, but also on health care costs and society (Mangalore and Knapp, 2007; Wu et al., 2005). For example, patients with schizophrenia die, on average, 12-15 years earlier than the general population. The main reason for this mortality increase, in addition to suicide, is related to physical causes and the increase in the frequency of risk factors such as the lack of physical activity, obesity, diabetes, and tobacco addiction (Dixon et al., 2000; Lasser et al., 2000; Saha, Chant, and McGrath, 2007).

Since the beginning of the 20th century there has been an attempt to relate different personality typologies with schizophrenia (Kendler, 1985). There are two main hypotheses which were originally very different, but that currently can be seen as complementary. The first hypothesis holds that personality traits, or any of their components, could be considered as a specific predisposing factor for psychosis and not as a manifestation of it. The second hypothesis holds that personality traits could be conceived as precursors or behaviors that precede the onset of psychosis. This set of personality characteristics which attempts to predict the onset of psychosis, as well as define and identify the at-risk clinical state for its development, can be included in what is commonly known as schizotypy.

Schizotypy is a complex construct which is intimately related at historical, conceptual, genetic, neurodevelopmental, neurocognitive, and psychophysiological levels to schizophrenia-spectrum disorders, such as schizophrenia, psychotic affective disorders and schizoid, schizotypal and paranoid personality disorders (Kwapil and Barrantes-Vidal, in press; Lenzenweger, 2010; Raine, 2006). Arriving at an operative and concise definition of the current meaning of schizotypy is a difficult task given that this construct can be associated to a wide heterogeneity of meanings. In this regard, some authors employ the term schizotypy to make reference to an attenuated form of schizophrenia, thus, representing a premorbid or prodromal phase of the disorder (Raine, 2006). Other authors define it as a personality organization that represents genetic vulnerability toward psychosis (Meehl, 1962). On the other hand, from a dimensional point of view, schizotypy can be understood as a set of personality traits and experiences (cognitive, emotional and behavioral) which are expressed along a dynamic continuum of adjustment ranging from psychological well-being to

schizophrenia-spectrum personality disorders and full-blown schizophrenia (Claridge, 1997). These traits are present in the general population, are not necessarily associated to a mental disorder, and are configured as an indicator of vulnerability for psychosis in general, and schizophrenia in particular. However, despite the divergence in the conceptual delimitation of schizotypy, all these conceptions explicitly or implicitly assume the following: a) the necessity of the confluence or interaction of multiple neurodevelopmental (e.g., problems during labor and delivery), genetic (e.g., first degree relatives of patients with schizophrenia) and/or psychosocial factors (e.g., stressful situations, urbanicity or depression) for the development of a clinical condition of functional psychosis; and b) the possibility of finding individuals with “intermediate” phenotypic expressions at some point of the dynamic continuum of adjustment that, although they may never evolve into clinical psychosis, can exhibit emotional, cognitive, affective, neuropsychological and interpersonal deficits which are qualitatively similar, but less severe, than those found in patients with schizophrenia (Armando et al., 2010; Fonseca-Pedrero, Paino, Lemos-Giraldez et al., 2011; Kwapil, Barrantes Vidal, and Silvia, 2008; Raine, 2006; van Os, Linscott, Myin-Germeys, Delespaul, and Krabbendam, 2009; Wigman et al., 2011).

1.2. Psychometric High-Risk Paradigm: The Assessment of Schizotypal Experiences

A current line of research in the field is based on the idea of early detection, prevention and intervention in individuals at-risk for psychosis with the aim of mitigating or reducing the impact the disorder can cause on the personal, familial and social spheres (McGorry, Killackey, and Yung, 2008; Yung et al., 2007). This fact has propelled, among other aspects, the construction and validation of measurement instruments for the assessment of schizotypy, or more generically, psychosis proneness (Fonseca-Pedrero et al., 2008).

The aim of the “psychometric high-risk” paradigm is the detection, by means of self-reports and based on their score profiles, of those participants with a higher theoretical risk of transiting toward a psychotic disorder in the future (Lenzenweger, 1994). This method allows, in combination with other methods (e.g., genetic high-risk), the analysis of possible etiopathogenetic mechanisms that are at the basis of these types of disorders (Kwapil et al., 2008). The “psychometric high-risk” paradigm is considered a reliable, valid and useful method for the psychometric detection of individuals at-risk for schizophrenia-spectrum disorders. The use of these tools constitutes, in comparison to other techniques, a rapid, efficient and noninvasive method of assessment (Gooding, Tallent, and Matts, 2005; Kelleher, Harley, Murtagh, and Cannon, 2011; Kwapil et al., 2008). Moreover, it allows the study of symptoms that are similar to those found in patients with schizophrenia while avoiding the confounding effects frequently found in these individuals (e.g., medication or stigmatization).

The cornerstone of this research paradigm is founded on data from predictive validity analyses. Independent longitudinal studies indicate that individuals from the general population who report schizotypal experiences such as magical thinking, hallucinatory experiences, delusional ideation and/or anhedonia have a greater risk of transiting toward a schizophrenia-spectrum disorder (Chapman, Chapman, Raulin, and Eckblad, 1994; Dominguez, Saka, Lieb, Wittchen, and van Os, 2010; Dominguez, Wichers, Lieb, Wittchen,

and van Os, 2011; Gooding et al., 2005; Poulton et al., 2000; Welham et al., 2009). For example, Poulton et al., (2000) in a longitudinal study carried out in New Zealand in a sample of children, found that more than 25% of the participants who reported these experiences at the age of 11 years developed a schizophreniform disorder at the age of 26 years. In this regard, schizotypal experiences could be considered an exophenotypic risk marker for schizophrenia (Raine, 2006) or a behavioral expression of liability for psychosis (van Os et al., 2009).

The detection of these types of individuals at-risk for psychosis, whether in the clinical or educational settings, requires having adequate measurement instruments that allow us to make solid and well-founded decisions based on the data. Among the most used tools in the literature for the assessment of this construct in adult populations we find the Wisconsin Schizotypy Scales (Chapman, Chapman, and Kwapil, 1995), the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) and the Thinking and Perceptual Style Questionnaire (TPSQ) (Linscott and Knight, 2004). Likewise, and given that adolescence is a developmental period of special risk for schizophrenia-spectrum disorders (Walker and Bollini, 2002), efforts have also been directed at the assessment of schizotypal experiences in this age group. Good example of these self-reports are: the Junior Schizotypy Scales (JSS) (Rawlings and MacFarlane, 1994), the Schizotypy Traits Questionnaire (STA) for children (Cyhlarova and Claridge, 2005), and the Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q) (Fonseca-Pedrero, Muñiz, Lemos-Giráldez, Paino, and Villazón-García, 2010). Regarding the last mentioned, the ESQUIZO-Q, it is a brief and easy measurement instrument specifically designed for the assessment of schizotypal traits and experiences in adolescents. The construction and validation of the ESQUIZO-Q was carried out including the advances in psychological and educational measurement (e.g., differential item functioning) in a sample of 1,683 Spanish adolescents. The results showed that the ESQUIZO-Q presented adequate psychometric properties. The levels of internal consistency for the 10 subscales that comprised it ranged from .62 to .90. Likewise, none of the 51 items showed differential functioning as a function of gender of the adolescents (Fonseca-Pedrero, Lemos-Giráldez, Paino, and Muñiz, 2011; Fonseca-Pedrero, Lemos-Giráldez, Paino et al., 2011; Fonseca-Pedrero, Paino, Lemos-Giráldez et al., 2011).

It should be mentioned that the different measurement instruments originally developed for their use in adult populations have also been used in youth (e. g., SPQ or TPSQ) (Chen, Hsiao, and Lin, 1997; Fonseca-Pedrero, Linscott, Lemos-Giráldez, Paino, and Muñiz, 2010; Fossati, Raine, Carretta, Leonardi, and Maffei, 2003; Venables and Bailes, 1994). It is well known that this practice implies limitations, although it is equally true that the psychometric characteristics of these self-reports in children and adolescents are quite acceptable. Thus, the validation of self-reports which have not been specifically designed for the assessment of schizotypy in this age group may also be an interesting practice wherever it is supported by the data.

The number of available self-reports for the assessment of schizotypal experiences and traits in adolescents is quite limited and their psychometric qualities have been barely examined. Moreover, it is necessary to have measurement instruments specifically designed for their use in this age group available, as well as an exhaustive and well-founded study of their metric quality in reference to their reliability and different sources of validity evidence. By way of example, it would not be of much use to employ an instrument for the assessment of schizotypal experiences in adolescents with the aim of identifying participants at-risk for

schizophrenia if, for instance, the psychometric characteristics of the instrument were unknown, as the inferences (e.g., whether an adolescent is at-risk or not) and the decisions (e.g., whether a more exhaustive psychological evaluation or a preventive intervention must be performed) extracted from the data would be completely ambiguous and unfounded, and would lead to a significant impact on the participants.

1.3. Epidemiology of Schizotypal Experiences in Non Clinical Adolescents

Schizotypal experiences -also known as psychotic-like experiences- represent the behavioral expression of vulnerability for psychotic disorders in general population (van Os et al., 2009). In this sense, a continuous dose-response risk function exists between these kind of experiences and later clinical disorder (Dominguez et al., 2011; Kelleher and Cannon, 2011). Psychotic symptoms are reported not only by patients with schizophrenia but also by healthy members of the general population. In this sense, clinical cases of psychosis represent only a small proportion of the phenotypic continuum of psychosis. The mean prevalence rate of these experiences in general population are of around 5% (Nuevo et al., in press; Scott et al., 2008; van Os et al., 2009). For instance, Nuevo and colleagues (in press) conducted a Worldwide Health Survey in a sample of 256,445 participants, from nationally representative samples of 52 countries. The results showed that the overall prevalence for specific psychotic symptoms ranged from 4.8% for delusions of control to 8.4% for delusions of reference and persecution. Also, the nonclinical expression of the psychosis phenotype has been associated with the same risk factors related to schizophrenia (e.g., cannabis, neurodevelopmental, genetic, urbanicity, etc.) conferring aetiological validity on this construct and suggesting a possible continuity between the clinical and the nonclinical psychosis phenotypes (Kelleher and Cannon, 2011).

In particular, the percentage of self-reported positive schizotypal experiences in adolescents is higher than that found in studies with adults in both clinical and general population samples. The prevalence of positive schizotypal experiences varies considerably across epidemiological studies. It must be mentioned that strict comparison among studies is limited by the type of measurement instrument and the characteristics of the sample used as well as by the statistical criteria employed to determine the prevalence of these experiences (Fonseca-Pedrero, Lemos-Giráldez, Paino, and Sierra-Baigrie, 2011). This consideration must be kept in mind when interpreting and comparing the results obtained in different investigations. In this regard, Yung et al. (2009), using a sample of 875 Australian adolescents, found that around 28% of the assessed participants reported having heard voices sometimes, and 1.9% reported always or nearly always having experienced this. In another study, Scott et al. (2009), analyzing a sample of 1,261 Australian adolescents, found that 8.4% of these reported having had some visual or auditory hallucinatory experience. In another investigation by De Loore and cols. (2008) conducted in a sample of 1,903 Dutch adolescents, the results showed that 5.3% of the participants reported some hallucinatory experience. Higher percentages were found in the study by Horwood et al. (2008), who, using a sample of 6,455 English adolescents, found that 38.9% scored positively on more than one item regarding psychotic experiences, although when these experiences were assessed through an observer-rated method, the percentage decreased to 13.7%. Wigman et al. (2011),

in two representative samples of Dutch adolescents ($N = 5422$; $N = 2230$) using the Community Assessment of Psychic Experiences-42 (CAPE-42), found that approximately 95% of both samples endorsed at least one positive psychotic experience at level “sometimes” and between 39-43% endorsed at least one experience at level “often” or “nearly always”.

Recently, our research team has conducted an empirical study with the aim of examining the distribution of psychotic-like experiences in a representative sample of the adolescent general population (Fonseca-Pedrero, Lemos-Giráldez, Paino et al., 2011). In this research, a total of 1,438 students participated (691 males). The mean age was 15.9 years ($SD = 1.2$), ranging from 14 to 18 years. Ten items included in the ESQUIZO-Q that assess aspects related to magical thinking, unusual perceptual experiences and paranoid ideation were used. The results indicated that psychotic-like experiences are a very common phenomenon in this age group. Between 3.2 and 7.2% of the adolescents reported symptoms related to magical thinking; between 1.2 and 8.8% reported having experienced some unusual perceptual experience; finally, between 1.3 and 13.2% of the nonclinical adolescents were found to report paranoid ideation symptoms.

1.4. Multidimensionality of Schizotypy in Adolescent Population

The understanding of the structure and content of schizotypy in adolescent populations has considerably advanced in the last decade. When the dimensional structure underlying the measurement instruments which assess schizotypal experiences in this age group is analyzed, it can be observed that the construct is of a multidimensional nature (Cyhlarova and Claridge, 2005; Chen et al., 1997; Fonseca-Pedrero, Linscott et al., 2010; Fossati et al., 2003; Venables and Bailes, 1994), phenotypically similar to that found in the general adult population (Bora and Arabaci, 2009; Mason and Claridge, 2006; Wuthrich and Bates, 2006) and in patients with schizophrenia (Liddle, 1987). The number, structure and content of the dimensions found depend greatly on the measurement instrument used, the sample analyzed and the statistical analyses conducted. Nevertheless, although there is no unanimous agreement on the number of dimensions, the results of the different studies taken as a whole allow us to assert that schizotypy in adolescent populations is composed of three or four factors or dimensions, namely Positive (Cognitive-Perceptual, Reality Distortion or Unusual Perceptual Experiences), Negative (Anhedonia or Interpersonal), Disorganized (Cognitive Disorganization) and Impulsive Non-conformity. The Positive factor makes reference to an excessive or distorted functioning of a normal process and includes facets of the type of hallucinatory experiences, paranoid ideation, ideas of reference, and magical thinking. The Negative dimension refers to the reduction or deficit in the normal behavior, and includes facets regarding difficulties to experience pleasure at a physical (physical anhedonia) and social level (social anhedonia), blunted affect, lack of close friends and difficulties in personal relationships. The Disorganized dimension describes thought problems, and odd speech and behavior. The Impulsive Non-conformity dimension includes aspects related to rebelliousness, impulsiveness, and extravagance.

The three-factor model, also known as the Disorganized model (Raine, 1991), composed by the Positive, Interpersonal and Disorganized dimensions, is possibly one of the most replicable and consistent models. It has been found in nonclinical and outpatient adolescents from different cultures, across different statistical techniques (Axelrod, Grilo, Sanislow, and

McGlashan, 2001; Chen et al., 1997; Fonseca-Pedrero, Lemos-Giráldez, Paino, Villazón-García, and Muñiz, 2009; Fossati et al., 2003) and these dimensions have been shown to be invariant across gender and age (Fonseca-Pedrero, Paino, Lemos-Giráldez, Sierra-Baigrie, and Muñiz, 2011; Fossati et al., 2003). Other dimensional models of schizotypy are equally plausible. For example, in some studies, the third dimension of Disorganization could be substituted by a dimension of Impulsive Non-conformity (Fonseca-Pedrero, Linscott et al., 2010; Rawlings and MacFarlane, 1994) or by a more general dimension of Social Disorganization (Fonseca-Pedrero, Linscott et al., 2010). However, other studies posit a different three-factor model composed by the Positive, Paranoid Ideation/Social Anxiety, and Magical Thinking dimensions (Cyhlarova and Claridge, 2005) or by the factors of Magical Ideation/Perceptual Experiences, Ideas of Reference/Social Anxiety, and Suspiciousness (Wolfradt and Straube, 1998). Specifically, with respect to ESQUIZO-Q, the internal structure analysis yielded three second-order factors: Distortion of Reality (Unusual Perceptual Experiences, Paranoid Ideation, Magical Thinking and Ideas of Reference), Negative (Physical and Social Anhedonia) and Interpersonal Disorganization (Excessive Social Anxiety, Odd Behavior, Lack of Close Friends, Odd Thinking and Language) (Fonseca-Pedrero, Muñiz et al., 2010). This internal structure has been replicated in an independent study in a sample of nonclinical Spanish adolescents (Fonseca-Pedrero, Lemos-Giráldez, Paino et al., 2011).

1.5. Aims of Current Study

The ESQUIZO-Q is a self-report of recent construction and therefore it is necessary to carry out new studies that continue to examine its metric quality in a representative sample of adolescents. It is also important to improve our understanding of the psychopathological experiences among youth and develop early detection and intervention strategies in this sector of population in order to mitigate the potential impact of the disease at multiple levels (e.g., family, work, school). Within this research context, the main goal of this study was to analyze the rates of positive schizotypal experiences, as well as the internal structure and reliability of the ESQUIZO-Q in a large sample of Spanish adolescents from the general population. These goals would allow us to: a) deepen current knowledge regarding the psychometric characteristics of a self-report that can be used as a screening tool for the detection of individuals at-risk for psychosis; b) improve comprehension of schizotypal experiences in a developmental stage of special risk for psychosis such as adolescence; and c) advance the field by further understanding the expression of the extended psychosis phenotype in the general population.

2. METHOD

2.1. Participants

Two stratified random cluster sampling were carried out at the classroom level, in a population of approximately 37,000 students selected from the Principality of Asturias (a

region in northern Spain) during two academic years (2008/2009 and 2009/2010). Previous data from this research has been published elsewhere (Fonseca-Pedrero, Lemos-Giráldez, Paino et al., 2011; Fonseca-Pedrero, Muñiz et al., 2010). The students were from various public and state-subsidized secondary schools and vocational training centres, as well as from a wide range of socio-economic levels.

The strata were created on the basis of geographical zone (East, West, Centre and Mining area) and educational stage (compulsory – to age 16 – and post-compulsory). The likelihood of the inclusion of a school was directly proportional to the number of students in it. The final sample was made up of $N = 3,056$ participants, 1,496 boys (48.1%).

The mean age was 15.9 years ($SD = 1.2$), with an age range of 14 to 18 years. The sample distribution according to age was the following: 14 year olds ($N = 400$; 13.1%), 15 year olds ($N = 780$; 25.5%), 16 year olds ($N = 885$; 29%), 17 year olds ($N = 703$; 23%) and 18 year olds ($N = 288$; 9.4%).

2.2. Instruments

The Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q) (Fonseca-Pedrero, Muñiz et al., 2010) is a self-report composed of 51 items in a 5-point Likert-type response format (1= “*completely disagree*”; 5= “*completely agree*”) designed to assess schizotypal traits in Spanish adolescents. The ESQUIZO-Q is based on the diagnostic criteria proposed in the DSM-IV-TR (American Psychiatric Association, 2000) and on Meehl’s schizotaxia model (1962) regarding genetic predisposition to schizophrenia.

The items of ESQUIZO-Q were selected on the basis of an exhaustive review of the literature on schizotypy (Fonseca-Pedrero et al., 2008). Its construction was conducted following the proposed steps for the construction of measurement instruments (Schmeiser and Welch, 2006) and the guidelines for multiple-choice item construction (Moreno, Martínez, and Muñiz, 2006). The ESQUIZO-Q comprises a total of 10 subscales derived empirically by means of factor analysis: Ideas of Reference, Magical Thinking, Unusual Perceptual Experiences, Odd Thinking and Language, Paranoid Ideation, Physical Anhedonia, Social Anhedonia, Odd Behavior, Lack of Close Friends and Excessive Social Anxiety. These subscales are grouped into three general dimensions: Reality Distortion, Anhedonia, and Interpersonal Disorganization.

Internal consistency levels for the ESQUIZO-Q subscales ranged from .62 to .90 and different sources of validity evidence were obtained (Fonseca-Pedrero, Lemos-Giráldez et al., 2011; Fonseca-Pedrero, Lemos-Giráldez, Paino et al., 2011; Fonseca-Pedrero, Paino, Lemos-Giráldez et al., 2011).

The Oviedo Infrequency Scale (INF-OV) (Fonseca-Pedrero et al., 2009) is a 12-item self-report with a 5-point Likert-type rating scale format (1= “*totally disagree*”; 5= “*totally agree*”). Its goal is to detect participants who respond randomly, pseudorandomly or dishonestly on self-reports (e.g., “*The distance between Madrid and Barcelona is greater than between Madrid and New York*”). This type of self-report is frequently used in studies on psychosis proneness. Students with more than 2 incorrect responses on this test were removed from the study.

2.3. Procedure

The administration of the questionnaires was conducted in a collective manner in groups of 10 - 35 students during the school schedule and in a room prepared for this purpose.

The study was presented to participants as an investigation regarding diverse personality characteristics, assuring participants of the confidentiality of their answers as well as the voluntary nature of their participation.

The completion of the questionnaires was conducted under the supervision of a researcher at all times. In cases where necessary, parental informed consent was obtained. The study is part of a wider investigation on the detection and early intervention in psychological disorders in adolescence (www.p3-info.es).

The study was approved by the Research and Ethics Committees at the University of Oviedo, and the Department of Education of the Principality of Asturias.

2.4. Data Analysis

First, the descriptive statistics for the ESQUIZO-Q subscales and second-order dimensions were calculated. Second, the Pearson correlations among the subscales of the ESQUIZO-Q were examined.

In addition, rates of positive schizotypal experiences were analyzed using ten items of the self-report. Next, the dimensional structure underlying the ESQUIZO-Q subscales was analyzed by means of a Principal Components Analysis with posterior Oblimin rotation. Fourth, the reliability for both subscales and general dimensions of the ESQUIZO-Q were estimated using Cronbach's Alpha coefficient.

For the statistical analyses we used the SPSS 15.0 program (Statistical Package for the Social Sciences, 2006).

3. RESULTS

3.1. Descriptive Statistics

Table 1 shows the descriptive statistics for the total sample referring to the number of items, mean, standard deviation, asymmetry and kurtosis values, score range and levels of internal consistency for the ESQUIZO-Q subscales as well as for the second-order dimensions. As can be observed, the asymmetry and kurtosis values for the subscales fell within the normality range. The Pearson correlations among the ESQUIZO-Q subscales are displayed in Table 2. It can be observed that: a) there was a positive correlation among the Ideas of Reference, Magical Thinking and Unusual Perceptual Experiences subscales; b) there were also strong correlations among the subscales Odd Thinking and Language, Excessive Social Anxiety, Lack of Close Friends and Odd Behavior; c) the Physical Anhedonia subscale correlated negatively with the remaining subscales and positively with the Social Anhedonia subscale; and d) the Social Anhedonia subscale correlated significantly, although weakly, with the remaining subscales.

Table 1. Descriptive statistics for the subscales and the dimensions of the Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q)

Subscales	Nº items	M	SD	Asymmetry	Kurtosis	Range	Alpha Cronbach
REF	4	6.16	2.61	1.42	2.00	4-20	.70
MAG	5	7.69	3.04	1.36	1.88	5-25	.67
EXP	7	10.38	4.36	1.84	4.06	7-35	.79
PA	5	8.10	3.31	1.30	1.77	5-25	.74
PhysAnh	4	7.82	2.64	0.70	0.61	4-20	.60
SocAnh	5	7.62	2.42	1.09	1.27	5-19	.61
OTL	6	13.96	4.71	0.39	-0.27	6-30	.77
OB	4	6.93	2.88	1.27	1.70	4-20	.68
LCF	4	9.57	3.71	0.39	-0.45	4-20	.63
ANX	7	15.09	5.19	0.71	0.41	7-35	.78
<i>Dimensions</i>							
Reality Distortion	21	32.34	10.39	1.39	2.76	21-97	.84
Anhedonia	9	15.43	4.10	0.78	0.95	9-35	.66
Interpersonal Disorganization	21	45.56	11.83	0.45	0.10	21-93	.87

Note: REF: Ideas of Reference; MAG: Magical Thinking; EXP: Unusual Perceptual Experiences; PA: Paranoid Ideation; PhysAnh: Physical Anhedonia; SocAnh: Social Anhedonia; OTL: Odd Thinking and Language OB: Odd behavior; LCF: Lack of Close Friends; ANX: Excessive Social Anxiety.

3.2. Rates of Positive Schizotypal Experiences

The number and percentage of participants who answered “*I agree quite a bit*” (4) or “*Completely agree*” (5) in the response categories of the 10 selected items in the ESQUIZO-Q are presented in Table 3. As can be seen, between 4.7 and 8.8% of the adolescents reported symptoms related to magical thinking (items 1 to 3); between 2.7 and 10% of the participants reported having experienced some unusual perceptual experience (items 4 to 7); finally, between 2 and 14.5% of the adolescents were found to report paranoid ideation symptoms (items 8 to 10). Moreover, 36.7% of adolescents reported at least one or more positive schizotypal experiences.

3.3. Validity Evidence Based on Internal Structure

A Principal Components Analysis was conducted with posterior Oblimin rotation using the ESQUIZO-Q subscales.

Table 2. Pearson correlations among the subscales of the Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q)

	REF	MAG	EXP	PA	PhysAnh	SocAnh	OTL	OB	LCF	ANX
REF										
MAG	.49*									
EXP	.54*	.54*								
PA	.40*	.38*	.45*							
PhysAnh	-.11*	-.10*	-.14*	-.05*						
SocAnh	.09*	.02	.09*	.16*	.31*					
OTL	.32*	.33*	.41*	.40*	-.12*	.09*				
OB	.37*	.28*	.42*	.48*	.10*	.17*	.33*			
LCF	.21*	.17*	.27*	.37*	-.06*	.15*	.32*	.36*		
ANX	.25*	.25*	.28*	.32*	-.11*	.10*	.41*	.32*	.30*	

* $p < .01$.

Note: REF: Ideas of Reference; MAG: Magical Thinking; EXP: Unusual Perceptual Experiences; PA: Paranoid Ideation; PhysAnh: Physical Anhedonia; SocAnh: Social Anhedonia; OTL: Odd Thinking and Language OB: Odd behavior; LCF: Lack of Close Friends; ANX: Excessive Social Anxiety.

Table 3. Number (and percentage) of participants who obtained high scores (values of 4 or 5 on the Likert scale) on ten selected items of the Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q) relative to positive schizotypal experiences

Selected items of the ESQUIZO-Q (positive schizotypal experiences)	Total sample (N = 3,056) N (%)
1. "I believe that the things that are on the radio or television have a special meaning to me, that my friends don't understand"	143 (4.7)
2. "I think that there are some people who can read other people's minds"	270 (8.8)
3. "I believe there are people who can control the thoughts of others"	197 (6.4)
4. "Being alone at home, I have had the feeling that someone was talking to me"	260 (8.5)
5. "I hear voices that others can't hear"	81 (2.7)
6. "When I am alone, I have the feeling that someone is whispering my name"	103 (3.4)
7. "I have thoughts which are so real that it seems as if someone was talking to me"	306 (10.0)
8. "I think that someone is planning something against me"	236 (7.7)
9. "Somebody has it in for me"	444 (14.5)
10. "My classmates are against me"	62 (2.0)

Table 4. Principal Components Analysis of the Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q) subscales

<i>Subscales</i>	Components		
	I	II	III
Lack of Close Friends	.80		
Excessive Social Anxiety	.72		
Odd Thinking and Language	.59		
Odd Behavior	.54		
Paranoid Ideation	.47		
Physical Anhedonia		.81	
Social Anhedonia		.79	
Magical Thinking			.85
Ideas of Reference			.81
Unusual Perceptual Experiences			.76
Eigenvalue	3.58	1.35	1.04
% Explained variance	35.75	13.48	10.43
% Accumulated explained variance	35.75	49.23	59.66

Note: factorial loadings inferior to .30 have been eliminated.

Table 4 shows the factorial loadings and the percentage of explained and accumulated variance by the three obtained components. The sampling adequacy measure was 7245.86 ($p < .001$), being the KMO index .84. The first component corresponded to the subscales Lack of Close Friends, Excessive Social Anxiety, Odd Thinking and Language, Odd Behavior and Paranoid Ideation, and was denominated Interpersonal Disorganization. The second component corresponded to the Physical and Social Anhedonia subscales and was denominated Anhedonia. Finally, the third component grouped the subscales Magical Thinking, Ideas of Reference, Unusual Perceptual Experiences and Paranoid Ideation and was named Reality Distortion. The Paranoid Ideation facet saturated both in the Interpersonal Disorganization and Reality Distortion components. The correlation between the three dimensions was the following. FI-FII: .05; FI-FIII: .43; FII-FIII: -.01.

3.4. Analysis of Internal Consistency

As can be observed in Table 1, the levels of internal consistency for the ESQUIZO-Q subscales ranged from .60 (Physical Anhedonia) to .79 (Unusual Perceptual Experiences). The levels of internal consistency for the general dimensions of the ESQUIZO-Q ranged from .66 (Anhedonia) to .87 (Interpersonal Disorganization).

DISCUSSION

Adolescence is an interesting period for the early detection of serious mental disorders, such as is the case of psychosis, as well as for the study of risk and protection markers. Both from a clinical and a research perspective, it is of great importance to have at our disposal

measurement instruments that are brief, easy and of rapid application to use as screening methods for the detection and posterior preventive intervention of participants who are at-risk for psychosis. Thus, the main goal of the present study was to analyze the rates of positive schizotypal experiences, the internal structure and reliability of the Oviedo Questionnaire for Schizotypy Assessment (ESQUIZO-Q) (Fonseca-Pedrero, Muñiz et al., 2010) in a community sample of Spanish adolescents. The results showed that the ESQUIZO-Q is a self-report with an adequate psychometric characteristic that can be used for schizotypy assessment in adolescents.

The levels of internal consistency for the subscales and the general dimensions of the ESQUIZO-Q ranged from .60 to .87. Some of the reliabilities estimated were inferior to .70; however, it must be taken into account that certain subscales that constitute the ESQUIZO-Q are composed of a reduced number of items. The obtained results are completely convergent with those found in previous studies. For example, Fonseca-Pedrero et al. (2010) had found that the levels of internal consistency for the ESQUIZO-Q subscales ranged from .62 to .90, whereas for the second-order dimensions, they ranged from .67 to .88. Undoubtedly, in future studies, it would be interesting to incorporate a greater number of items in the Anhedonia dimension of the ESQUIZO-Q to improve its internal consistency.

The analysis of the internal structure of the ESQUIZO-Q subscales reflected that schizotypy is a three-factor structure specified in the following factors: Reality Distortion, Anhedonia and Interpersonal Disorganization. This three-factor model is completely convergent with the previous studies conducted with the ESQUIZO-Q and these data also support the underlying structure of this self-report (Fonseca-Pedrero, Lemos-Giráldez, Paino et al., 2011; Fonseca-Pedrero, Muñiz et al., 2010). In previous studies that have used other self-reports (e.g., SPQ, Wisconsin Schizotypy Scales), a factorial structure similar to the one in this study is found (Bora and Arabaci, 2009; Fonseca-Pedrero et al., 2009; Fossati et al., 2003; Kwapil et al., 2008; Wuthrich and Bates, 2006), although we must keep in mind the difficulties inherent to the comparison between studies (e.g., cultural origin or sampling). For example, Fonseca-Pedrero et al. (2010), using the TPSQ in a sample of Spanish adolescents, obtained a three-factor structure composed of the dimensions: Aberrant Information Processing, Anhedonia, and Social Disorganization. Other studies using the SPQ by Raine (1991) consistently replicate the disorganized model of schizotypal personality composed of the Positive, Interpersonal and Disorganized dimensions (Bora and Arabaci, 2009; Fonseca-Pedrero et al., 2009; Fossati et al., 2003; Wuthrich and Bates, 2006). These data indicate that schizotypy seems to be a multifactorial structure specified in three correlated factors similar to that found in the young adults and in patients with schizophrenia.

The ESQUIZO-Q can also be used as a measurement instrument for the assessment of the rate of positive schizotypal experiences in adolescent populations. The results of this study show that between 2 and 14.5% of the adolescents, reported some positive schizotypal experience. These data are also convergent with those found in other previous studies conducted with the ESQUIZO-Q (Fonseca-Pedrero, Lemos-Giráldez, Paino et al., 2011) and with nonclinical adolescents from different cultures (Armando et al., 2010; Wigman et al., 2011; Yung et al., 2009). Likewise, previous studies indicate that this group of experiences are frequent in this developmental stage and that their frequency and intensity are greater than that reported by adults from the general population (Nuevo et al., in press; Scott et al., 2008; van Os et al., 2009). Moreover, previous investigations indicate that a continuous dose-response risk function exists between subclinical psychotic experiences and later clinical

disorder (Dominguez et al., 2011; van Os et al., 2009). However, it is equally true that most of the participants who report positive schizotypal experiences may be experiencing a transitory state or may never progress to clinical psychotic disorder. Specifically, between 10 and 35% of these subclinical psychotic experiences can interact synergetically or additively with other environmental (i.e., genetic, trauma, cannabis, urbanicity, victimization, etc.) or genetic factors, increasing the persistence of psychotic experiences and consequently becoming abnormally persistent, clinically relevant and need of care (Cougnard et al., 2007; De Loore et al., 2011; van Os et al., 2009). In addition, these individuals who report schizotypal experiences present a greater degree of affective, social, interpersonal and behavioral deficits (Armando et al., 2010; Fonseca-Pedrero, Paino, Lemos-Giráldez et al., 2011; Kwapil et al., 2008; Lenzenweger, McLachlan, and Rubin, 2007; Raine, 2006; Wigman et al., 2011; Yung et al., 2009). These data seem to reflect that the alterations characteristic of patients with schizophrenia can also be found in samples of the general population below the clinical threshold supporting the continuity between clinical and nonclinical psychosis phenotype. According to this theory, schizotypal experiences are situated at some point of this continuum and could be seen as an “intermediate” phenotype, qualitatively similar and quantitatively less severe than the symptomatology found in patients with schizophrenia presenting itself with a lesser intensity, persistence, frequency and associated disability (Dominguez et al., 2011; van Os et al., 2009; Wigman et al., 2011).

The results obtained from studies on the psychometric high-risk paradigm have important practical implications. Measuring instruments such as ESQUIZO-Q can be used as screening tools in educational settings. The assessment of uncommon beliefs and thoughts, such as schizotypal experiences, could be carried out within a multi-step process. In the first phase we would detect those participants with a hypothetical liability to schizophrenia spectrum disorders, based on the self-report scores. Then, in a second step, there would be a more comprehensive psychological assessment. In this phase, the certainty and the distress of the psychotic-like experiences and the symptoms of depression would be assessed; other risk factors of psychosis such as genetic background (e.g. first-degree relatives of patients), cannabis use, or coping strategies would be evaluated as well. At this stage, information from other sources close to the individual, such as parents, close friends or teachers can also be gathered, in a multi-informant assessment. In third place, participants could be sent to a specialized mental health care center to receive a prophylactic treatment. This multi-step process is just one of the possible ways, as it may be the case of a participant who is sent directly to the mental health care center due to the severity of his/her psychopathological symptoms and signs.

Issues like those raised above open the debate on the possibility of early interventions before the development of psychotic symptoms, which is related to the Attenuated Psychotic Symptoms Risk Syndrome, recently proposed in the DSM-V. From our point of view, assessing the risk of psychosis requires reliable and rigorous data, allowing a precise and accurate detection of individuals at high risk, in order to make sound decisions, for instance, whether to use psychopharmacological treatments or not when psychotic symptoms are below the critical threshold. This requires: a) rigorous assessments which collect information from different sources, not only self-report; and b) standardized testing protocols, both nationally and internationally, must be developed. To this end it is necessary to create multidisciplinary teams composed of psychologists, physicians, neuropsychologists, social workers, and other health professionals. Current research going in this direction, and although we are still in a

development phase, everything suggests that we have a promising future in this area of study. The psychometric high-risk paradigm is only a small part of the different action lines that currently exist (e.g. first episode psychosis, clinical high-risk studies), however we believe that they are generating very interesting clues. We should not forget that the main goal of this research is to mitigate the potential impact of psychotic disorder in the individual.

The results found in the present study should be interpreted in light of the following limitations. First, the extracted conclusions are founded exclusively on a self-report and there is no doubt that the use of external informants such as parents or teachers via hetero-reports would have been interesting. Second, it is frequent that the questions on these self-reports can cause some kind of stigma on participants. Third, the schizotypal experiences must always be analyzed within a biopsicosocial model. The additive or synergic interactions between schizotypal experiences and genetic, chemical, cognitive and social factors are relevant and interesting with a view to understanding and explaining the transition to the clinical state. Fourth, no information was gathered regarding the participants' psychiatric morbidity or the use or abuse of substances, aspects which may be partially modulating the obtained results.

Future lines of research should continue to examine the psychometric properties of ESQUIZO-Q in other samples of interest, such as adolescents or young adults with prodromes ("clinical high-risk" studies). It is specifically relevant to determine the predictive validity of this self-report (e.g., sensitivity and specificity) in longitudinal studies. Finally, integration of schizotypy within dimensional models of personality and the study of measurement invariance across cultures are interesting lines of study for the near future.

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