PHENOTYPIC EXPRESSION OF SCHIZOTYPAL TRAITS IN AN ADOLESCENT POPULATION

Eduardo Fonseca-Pedrero, PhD, Serafín Lemos-Giráldez, PhD, Mercedes Paino, PhD, Susana Sierra-Baigrie, PhD, and José Muñiz, PhD

The main goal of the present study was to examine the influence of gender and age in the phenotypic expression of schizotypal traits in a community sample of adolescents. The sample was composed of a total of 1,618 participants, 776 (48%) males, with a mean age of 15.9 years (*SD* = 1.2). The ESQUIZO-Q: *Oviedo Schizotypy Assessment Questionnaire* was used for the assessment of schizotypal traits, a measure specifically developed for its use in adolescents. The results showed that gender and age were two sociodemographical variables that influenced the expression of schizotypal features. The males in the study obtained higher mean scores than the females in the Negative dimension (Physical and Social Anhedonia); however, the females obtained higher mean scores in Magical Thinking, Lack of Close Friends, and Social Disorganization. With regard to age, the younger adolescents had lower scores in Odd Thinking and Language, Lack of Close Friends, Excessive Social Anxiety, and Social Disorganization compared to the older adolescents. This differential pattern is similar to the one found in patients with schizophrenia and in nonclinical young adults, and these findings improve our understanding about the phenotypic expression of schizotypy during adolescence.

Schizotypy, also called psychosis proneness, may indeed be the most widely studied exophenotypic risk marker for schizophrenia-spectrum disorders. This personality organization has been associated with schizophrenia at different levels (e.g., historical, conceptual, genetic, neurochemical, and neurocognitive; Lenzenweger, 2010; Raine, 2006) and it can be basically understood from two viewpoints. Thus, for some researchers, mainly North American, it is considered as a latent organization related to genetic vul-

nerability to schizophrenia (Lenzenweger, 2006; Meehl, 1962). In contrast, European authors consider schizotypal traits as an aggregate of cognitive, behavioral, and emotional traits which are expressed across a dynamic continuum of adjustment, ranging from psychological well-being to schizophrenia-spectrum personality disorders and to full-blown schizophrenia (Claridge, 1997). Furthermore, exploratory and confirmatory factor analyses suggest that schizotypy is a multidimensional construct, basically involving three dimensions: Cognitive-Perceptual (Unusual Perceptual Experiences, Magical Ideation, Ideas of Reference), Interpersonal (Blunted Affect, No Close Friends, Social Anxiety, Paranoid Ideation), and Disorganized (Odd Behavior, Odd speech; Cohen, Matthews, Najolia, & Brown, 2010; Fonseca-Pedrero, Lemos-Giráldez, Paino, Villazón-García, & Muñiz, 2009; Fonseca-Pedrero, Paino et al., 2009; Fossati, Raine, Carretta, Leonardi, & Maffei, 2003; Wuthrich & Bates, 2006).

Empirical evidence indicates that participants with high scores on schizotypy self-reports are at a heightened risk for the later development of schizophrenia-spectrum disorders (Chapman, Chapman, Raulin, & Eckblad, 1994; Gooding, Tallent, & Matts, 2005). Similar results are found when schizotypal traits or any of its components are analyzed (i.e., psychotic-like experiences) in nonclinical adolescent populations (Dominguez, Wichers, Lieb, Wittchen, & van Os, 2011; Poulton et al., 2000; Welham et al., 2009). Although the great majority of these individuals will never make the transition to clinical psychosis, a continuous dose-response risk function exists between these kinds of experiences and later disorder (Dominguez et al., 2011; van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). For instance, Poulton et al. (2000), in a birth study cohort of children from Dunedin, showed that children who had reported hallucinations and delusions at 11 years of age had a more than 16-fold higher risk for developing a schizophreniform disorder by the age of 26. In this sense, schizotypal experiences in non-ill people may represent the behavioral expression of increased vulnerability for psychotic disorders in general, and schizophrenia in particular (van Os et al., 2009).

Gender and age are two sociodemographic variables that seem to play an important role in the expression of psychosis phenotype at both clinical and subclinical levels (Goldstein & Link, 1988; Spauwen, Krabbendam, Lieb, Wittchen, & van Os, 2003; van Os & Kapur, 2009). In this regard, if schizotypy is considered an attenuated form of psychosis or a dimensional variable distributed across a dynamic continuum, then it can be supposed that both entities are related to the same variables. Previous studies indicate that, as occurs in the case of patients with schizophrenia, comparisons of mean scores in schizotypal traits according to gender and age yield statistically significant differences. In adult populations, women score higher than men in Cognitive-Perceptual or Reality Distortion and men tend to score higher than women in the Negative (Physical and Social Anhedonia) and Disorganization dimensions (Bora & Arabaci, 2009; Fossati et al., 2003; Kwapil, Barrantes Vidal, & Silvia, 2008; Mason & Claridge, 2006; Paino, Fonseca-Pedrero, Lemos-Giráldez, & Muñiz, 2008; Wuthrich & Bates, 2006). These results found in adult populations are convergent to those found in nonclinical adolescents.

When the relationship between schizotypal features and gender is analyzed, it is found that adolescent females obtain higher scores than males in the Positive, Paranoid Ideation, Magical Ideation, Ideas of Reference, and Social Anxiety; however, males score higher than females in the Negative and Disorganized dimensions (Cyhlarova & Claridge, 2005; Fonseca-Pedrero, Lemos-Giráldez, Muñiz, García-Cueto, & Campillo-Álvarez, 2008; Fossati et al., 2003; Venables & Bailes, 1994). Nevertheless, we should mention that there are other studies in the literature that have not found such an association (Fonseca-Pedrero, Lemos-Giráldez et al., 2009) or partially contradictory results have even been reported where females obtained higher scores than males in schizotypal traits (Chen, Hsiao, & Lin, 1997).

Similar to what occurs with gender, age is a variable that also seems to play some role in the phenotypic expression of schizotypal traits. Research in adult populations has shown that the Negative dimension correlates positively with age, while the Cognitive-Perceptual dimension correlates negatively (Claridge et al., 1996; Mason & Claridge, 2006). The study of schizotypal features in adolescents is more problematic than adults. First, on comparing groups of individuals on the basis of age (adults vs. adolescents), the younger ones tend to score higher in schizotypal traits than the older ones (Bora & Arabaci, 2009; Chen et al., 1997; Fossati et al., 2003; Venables & Bailes, 1994). Second, when we compare groups of adolescents exclusively, the role of age is not so clearly outlined. Several studies have not found an association between age and schizotypal traits (Venables & Bailes, 1994), while others have found negative association (Cyhlarova & Claridge, 2005), or even a positive correlation between both variables (Fonseca-Pedrero, Lemos-Giráldez et al., 2008; Wigman et al., 2011). Third, most studies do not use representative adolescent population samples nor self-reports specifically designed for their use in this age group; therefore, the inferences and decisions that have been made based on these data may be invalid.

Adolescence is a stage at which there is particular risk for the development of psychotic disorders (Walker & Bollini, 2002), as well as being an especially important developmental phase for the early detection of individuals at risk of psychosis, prior to the onset of clinical pychosis (Fonseca-Pedrero, Lemos-Giráldez et al., 2009). Moreover, it is important to understand schizotypal traits in this age group without the effects commonly associated with patients with schizophrenia (e.g., medication, iatrogenic effects) from a developmental psychopathological perspective, as well as to identify its phenotypic parallels with the schizotypal traits present in nonclinical adult samples and symptoms found in patients with schizophrenia. But, as has been observed and according to Fonseca-Pedrero, Lemos-Giráldez, et al. (2008), there are still few studies showing the relation between schizotypal traits and gender and age in representative samples of nonclinical adolescents. Given that inconsistent and contradictory results have been found, we consider it to be relevant to continue advancing in the comprehension of the role these variables may be playing in the expression of schizotypal features during adolescence. Within this research frame, the main objective of the present study was to examine the influence of gender and age in the phenotypic expression of schizotypal traits in a representative sample of nonclinical adolescents

using a mesaurement instrument that has been specifically designed for the assessment of this construct in this age group.

METHOD

PARTICIPANTS

Stratified random cluster sampling was 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. The students were from various public and state-subsidized secondary schools and vocational training centers, as well as from a range of socio-economic levels. The strata were created on the basis of geographical zone (East, West, and Center) and educational stage (compulsory—to age 16—and post-compulsory), where likelihood of inclusion depended on the number of students in the school. Thus, the final sample was made up of 1,618 students, 776 males (48%) and 842 females (52%), from 41 public and state-subsidized secondary schools and vocational training centers and 95 classrooms. The mean age was 15.9 (SD = 1.2), with an age range of 14 to 18. Distribution by age was: 14-year-olds (n = 207), 15-year-olds (n = 432), 16-year-olds (n = 477), 17-year-olds (n = 348), and 18-year-olds (n = 154).

INSTRUMENTS

The ESQUIZO-Q: *Oviedo Questionnaire for Schizotypy Assessment* (Fonseca-Pedrero, Muñiz, Lemos-Giráldez, Paino, & Villazón-García, 2010) is a self-report composed of 51 items in a Likert response format (1 - completely disagree; 5 - completely agree) designed to assess schizotypal traits in adolescent populations. It is based on the diagnostic criteria proposed in the DSM-IV-TR (American Psychiatric Association, 2000) and Meehl's (1962) schizotaxia model. The ESQUIZO-Q items were selected on the basis of an exhaustive review of the literature on schizotypal personality (Fonseca-Pedrero, Paino et al., 2008). The ESQUIZO-Q was developed in line with the steps proposed for the construction of tests (Schmeiser & Welch, 2006) and the guidelines for the construction of items (Moreno, Martínez, & Muñiz, 2006). The questionnaire was constructed taking into account a total of 10 subscales and three second-order dimensions derived from factor analysis; namely: Ideas of Reference, Magical Thinking, Unusual Perceptual Experiences (Reality Distortion Dimension), Odd Thinking and Language, Paranoid Ideation, Odd Behavior, Lack of Close Friends and Excessive Social Anxiety (Social Disorganization Dimension), Physical Anhedonia and Social Anhedonia (Negative dimension). The internal consistency of the subscales and dimensions ranged from 0.62 to 0.90. Likewise, several sources of validity evidence have been obtained (Fonseca-Pedrero, Muñiz et al., 2010; Fonseca-Pedrero et al., 2011).

The Oviedo Infrequency Scale (*INF-OV*; Fonseca-Pedrero, Lemos-Giráldez et al., 2009) is a 12-item self-report with a five-point Likert-type rating scale

format (1 - completely disagree; 5 - completely agree) similar to others used in the schizotypy literature (Kwapil et al., 2008) and which was developed in accordance with international guidelines for test construction (Schmeiser & Welch, 2006). Its goal is to detect participants who respond randomly, pseudorandomly or dishonestly. Students with more than 3 incorrect responses on this test were removed from the sample. Thus, based on their scores on this scale, a total of 69 participants were excluded.

PROCEDURE

The questionnaires were applied in groups of 15–25 participants, who were informed of the confidentiality of their responses and the voluntary nature of their participation. Written informed consent was obtained from all participants. For those under 18, parents were requested to provide written informed consent for their child's participation in the study. Participants received no kind of incentive, monetary or otherwise. Application of the questionnaires took place under the supervision of the researchers. The study was approved by the Research and Ethics Committees at the University of Oviedo, and Department of Education of the Principality of Asturias.

DATA ANALYSES

First, the descriptive statistics for the subscales and second-order dimensions of the ESQUIZO-Q were calculated. Second, the influence of gender and age on the schizotypal personality traits as measured by the ESQUIZO-Q were analyzed. In order to do this, a Multivariate Analysis of Variance (MANOVA) was conducted, taking the ESQUIZO-Q subscales and dimensions as the dependent variables, and gender and the five age groups as the fixed factors. The MANOVA is an interesting multivariate technique for controlling type I error when multiple comparisons are performed and there is more than one dependent variable. Wilk's Lambda (λ) was used to determine if there were statistically significant differences in the dependent variables taken as a whole. Post hoc comparisons were performed using Bonferroni. As an estimate of effect size, partial eta squared (partial η^2) was employed. SPSS 15.0 was used for data analyses.

RESULTS
DESCRIPTIVE STATISTICS

Table 1 shows the descriptive statistics for the subscales and second-order dimensions of the ESQUIZO-Q including the number of items, mean, standard deviation, asymmetry and kurtosis values, score range, and levels of internal consistency. As can be observed, most of the asymmetry and kurtosis values fall within the normality range, and the levels of internal consistency ranged from 0.62 to 0.90.

TABLE 1. Descriptive Statistics for the ESQUIZO-Q Subscales and Second-Order Dimensions

ESQUIZO-Q	No. of Items	Mean	SD	Asymmetry	Kurtosis	Range	Cronbach
REF	4	6.37	2.70	1.40	2.16	4–20	0.82
MAG	5	8.05	3.211	1.31	1.79	5–25	0.81
EXP	7	10.86	4.71	1.79	3.87	7–35	0.90
OTL	6	14.26	4.69	0.40	-0.22	6–30	0.79
PA	5	8.47	3.42	1.19	1.53	5–25	0.86
PhysAnh	4	7.76	2.56	0.69	0.53	4–20	0.68
SocAnh	5	7.63	2.43	1.16	1.66	5–19	0.77
OB	4	7.05	2.89	1.23	1.60	4–20	0.76
LCF	4	9.91	3.7	0.30	-0.59	4–20	0.62
ANX	7	15.37	5.13	0.70	0.35	7–35	0.83
Reality Distortion	21	33.75	11.03	1.49	3.33	21–97	0.88
Negative	9	15.38	4.09	0.85	1.13	9–35	0.67
Social Disorganization	21	46.59	11.73	0.44	0.17	21–92	0.83

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

DIFFERENCES ACCORDING TO GENDER IN THE ESQUIZO-Q SUBSCALES AND DIMENSIONS

The MANOVA revealed statistically significant differences due to gender (Wilk's $\lambda = 0.884$, $p < 0.001$). In Table 2, the mean scores for the ESQUIZO-Q subscales and second-order dimensions are shown as well as the effect-size estimates as a function of gender. The results showed that the females obtained higher mean scores than the males in the Magical Thinking, Lack of Close Friends (LCF) subscales and in the Social Disorganization dimension; however, the male participants obtained higher mean scores than the females in the Physical and Social Anhedonia subscales as well as in the Negative dimension. The effect-size estimates showed small size effects in all subscales with the exception of Physical and Social Anhedonia (Negative dimension), whose effects were high.

DIFFERENCES ACCORDING TO AGE IN THE ESQUIZO-Q SUBSCALES AND DIMENSIONS

The MANOVA revealed statistically significant differences due to age (Wilk's $\lambda = 0.962$, $p = 0.014$). Table 3 shows the mean scores for the ESQUIZO-Q subscales and second-order dimensions in the five age groups as well as the effect-size estimates. When the subscales and the dimensions of the ES-QUIZO-Q were analyzed, statistically significant differences were found as a function of age in the mean scores on the Odd Thinking and Language (OTL), LCF, Excessive Social Anxiety (ANX) subscales, and the Social Disorganization dimension. The effect-size estimates indicated that the practical significance of the results is low. Specifically, in the case of the OTL,

TABLE 2. Differences According to Gender for the ESQUIZO-Q Subscales and Second-Order Dimensions

ESQUIZO-Q	Males (*n* = 776)		Females (*n* = 842)				
Subscales and Dimensions	*M*	*SD*	*M*	*SD*	*F*	*p*	*Partial* η2
REF	6.44	2.84	6.30	2.57	1.011	0.315	0.001
MAG	7.61	3.14	8.45	3.22	21.509	0.001	0.013
EXP	10.80	4.94	10.92	4.49	0.056	0.812	0.000
OTL	14.18	4.73	14.34	4.67	0.183	0.669	0.000
PA	8.47	3.55	8.47	3.30	0.073	0.787	0.000
PhysAnh	8.16	2.72	7.38	2.34	22.265	0.001	0.014
SocAnh	8.34	2.49	6.97	2.17	115.151	0.001	0.067
OB	6.98	2.75	7.12	3.01	0.124	0.725	0.000
LCF	9.42	3.74	10.36	3.71	18.262	0.001	0.011
ANX	15.15	5.079	15.57	5.17	3.004	0.083	0.002
Reality Distortion	33.32	11.67	34.15	10.38	0.825	0.364	0.001
Negative	16.49	4.26	14.36	3.63	87.459	0.001	0.052
Social Disorganization	45.73	11.71	47.39	11.69	5.663	0.017	0.004

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

the 15-year-old, 16- year-old, and 17-year-old participants presented lower mean scores than the 18-year-old participants. In regard to the LCF scale and the Social Disorganization dimension, the groups of the 14-year-olds, 15-year-olds, and 16-year-olds scored lower than the group of the 18-year-olds; likewise, the 14-year-old group also obtained lower mean scores in both factors than the 17-year-old group. In the ANX subscale, the group of 15-year-olds presented lower mean scores than the groups of 16-year-olds and 18-year-olds. Finally, a statistically significant interaction was found between gender and age in the ANX subscale (*F* = 4.190; *p* = 0.002). In this regard, as age increases the mean score for females also increases, while in the case of males it decreases.

DISCUSSION AND CONCLUSIONS

The main objective of the present investigation was to examine the influence of gender and age in the phenotypic expression of schizotypal traits in a representative sample of nonclinical adolescents. The results allow a better comprehension of the phenotypic expression of schizotypy and show that schizotypal traits behaved in a differentiated pattern when their expression was analyzed across gender and age of the adolescents. Moreover, the results found in the present study offer clues for new models of developmental psychopathology and aid in attaining a deeper understanding of the role played by these variables within the dimensional models of personality.

In regard to gender, females obtained higher mean scores than males in the Magical Thinking and Lack of Close Friends subscales and in the Social

TABLE 3. Differences According to Age for the ESQUIZO-Q Subscales and Second-Order Dimensions

ESQUIZO-Q	14-year-olds (n = 207)		15-year-olds (n = 432)		16-year-olds (n = 477)		17-year-olds (n = 348)		18-year-olds (n = 154)				
Subscales and Dimensions	M	SD	M	SD	M	SD	M	SD	M	SD	F	p	Partial η²
REF	6.18	2.61	6.62	2.85	6.17	2.64	6.34	2.62	6.60	2.76	2.081	0.081	0.005
MAG	7.94	2.80	8.10	3.40	7.83	3.16	8.15	3.29	8.45	3.14	1.170	0.322	0.003
EXP	10.81	4.79	10.96	4.91	10.60	4.62	10.91	4.49	11.37	4.77	0.946	0.437	0.002
OTL	13.90	4.28	14.13	4.91	13.99	4.73	14.59	4.52	15.23	4.77	2.650	0.032	0.007
PA	8.63	3.61	8.34	3.41	8.35	3.51	8.58	3.28	8.77	3.24	0.810	0.519	0.002
PhysAnh	8.05	2.66	7.81	2.65	7.72	2.54	7.78	2.51	7.28	2.26	2.150	0.072	0.005
SocAnh	7.90	2.58	7.80	2.62	7.45	2.23	7.51	2.38	7.58	2.31	1.595	0.173	0.004
OB	6.90	3.06	6.95	2.88	7.03	2.76	7.18	2.93	7.34	3.02	0.792	0.530	0.002
LCF	9.35	3.84	9.79	3.96	9.82	3.64	10.15	3.57	10.75	3.64	3.269	0.011	0.008
ANX	15.07	4.83	14.80	5.11	15.69	5.24	15.47	5.16	16.13	5.01	2.504	0.041	0.006
Reality Distortion	33.56	10.53	34.02	11.71	32.95	10.90	33.99	10.57	35.18	11,02	1.370	0.242	0.003
Negative	15.94	4.51	15.60	4.32	15.16	3.89	15.30	4.03	14.87	3.40	1.766	0.133	0.004
Social Disorganization	45.22	11.67	45.67	12.03	46.53	11.68	47.39	11.57	49.45	10.94	3.479	0.008	0.009

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

Disorganization dimension; on the other hand, males obtained higher mean scores in the Physical Anhedonia and Social Anhedonia subscales as well as in the Negative dimension. Although we have found statistically significant results, the effect size obtained was small, which is indicative of the reduced practical significance of the data. Few previous studies in the field of schizotypy in adolescents have reported data regarding the effect size. These results are consistent with those found in the previous literature, both in clinical and in nonclinical samples, with the exception of the Lack of Close Friends subscale. In nonclinical adults, women tend to score higher than men in the Cognitive-Perceptual and Excessive Social Anxiety factors; in contrast, men tend to score higher than women in the Negative, Constricted Affect, Odd Behavior, and Lack of Close Friends subscales (Fossati et al., 2003; Kwapil et al., 2008; Mason & Claridge, 2006; Paino et al., 2008; Wuthrich & Bates, 2006). On comparing the data with those of studies that used only adolescent samples, we also found that males tend to score higher in the Negative dimension, while females score higher in the Positive dimension (Cyhlarova & Claridge, 2005; Fonseca-Pedrero, Lemos-Giráldez et al., 2008; Venables & Bailes, 1994; Wolfradt & Straube, 1998). For instance, Venables and Bailes (1994) found that females scored higher than males in the Positive dimension, whereas males scored higher in the Physical and Social Anhedonia dimensions. Fossati et al. (2003) using a sample of 929 Italian students, found that males showed higher scores than females in the Odd Behavior, Blunted Affect, and No Close Friends subscales and that females scored higher than males in the Ideas of Reference and Social Anxiety subscales. More recently, Fonseca-Pedrero, Lemos-Giráldez, et al. (2008) in a sample of 321 Spanish adolescents, found that females obtained higher scores than males in the Positive dimension and in the Social Paranoia and Negative Evaluation subscales, whereas males obtained higher scores in the Anhedonia, Aberrant beliefs, and Impulsive Nonconformity dimensions.

With regard to age, the data suggest that this variable does influence the phenotypic expression of schizotypy, but only for a limited set of traits. The older participants obtained higher scores in the Odd Thinking and Language, Lack of Close Friends, Excessive Social Anxiety subscales, and in the Social Disorganization dimension. Previous studies have also found differences according to age in schizotypal traits (Bora & Arabaci, 2009; Claridge et al., 1996; Mason & Claridge, 2006). In this regard, when groups of adolescents are compared with adults (university students or general population), the younger participants tend to score higher than the older ones in most of the schizotypy dimensions (Bora & Arabaci, 2009; Chen et al., 1997; Fossati et al., 2003; Venables & Bailes, 1994). However while previous studies compared two different age groups (adolescents vs. adults), the present work compared only adolescents finding similar results to those reported by Fonseca-Pedrero, Lemos-Giráldez et al. (2008) and Wigman et al. (2011). For instance, Fonseca-Pedrero, Lemos-Giráldez et al. (2008) found that the younger adolescents obtained lower scores in the Positive, Hallucination, Negative Evaluation, Social Paranoia, Ideas of Reference, Thought Disorder, and Perceptual Illusion subscales as compared to the older adolescents. More recently, Wigman et al. (2011) found that the levels of psychotic-like

experiences (or positive schizotypy) increase with age in early adolescence. The data also indicate that some schizotypal traits continue to develop during adolescence, whereas others seem to remain more stable throughout this developmental stage. For example, in the case of Excessive Social Anxiety, we find in the present study that this characteristic tends to increase during adolescence in females while in men it remains stable or even decreases. Recently, Bora and Arabaci (2009) have reached similar results, finding that social anxiety increases with age in adolescent females. The present findings obtained in a representative sample of the general adolescent population, and by means of a self-report specifically designed for its use in this age group may be valid and a step forward in relation to previous studies.

Adolescence is a developmental period characterized by great changes at biological, individual, and social levels, and when schizotypal experiences are frequent (McGorry et al., 1995; Walker & Bollini, 2002). It is worth mentioning that this developmental stage is characterized by the emotional turbulence and tensions generated by the quest for independence and by the family itself, as well as to other processes characteristic of adolescence, such as egocentrism, fantasy and imaginary audiences, feelings of uniqueness, or unrealistic optimism (Harrop & Trower, 2003).

The results obtained in this study should be interpreted in the light of some possible limitations. First, we only assessed schizotypal traits by means of self-reports, and it would have been interesting to use hetero-reports from parents or teachers. Second, the use of self-reports is not free from limitations: on the one hand, the capacity of adolescents to self-report or to be aware of their own behavior and feelings must be considered; on the other, the exclusive use of paper-and-pencil self-reports could be identifying a combination of schizotypal and nonschizotypal subjects. Third, the use of the ESQUIZO-Q as a screening method may be associated with the detection of false positives and stigma, which does not take into consideration schizotypy dimensions found in adolescents such as Impulsive Nonconformity (Fonseca-Pedrero, Linscott, Lemos-Giráldez, Paino, & Muñiz, 2010). Finally, no information was obtained about antecedents of psychological problems in participants' families.

Future studies should continue to examine the possible impact of other psychological variables, such as depression, anxiety, or personality disorder traits, that could be behaving as mediating factors in the expression of schizotypal traits in adolescent populations, and attempt to integrate schizotypy research within the recent models of personality (Samuel & Widiger, 2010) and developmental psychopathology (Tackett, Balsis, Oltmanns, & Krueger, 2009).

REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed revised). Washington, DC: Author.

Bora, E., & Arabaci, L. A. (2009). Effect of age and gender on schizotypal personality traits in the normal population. *Psychiatry and Clinical Neurosciences*, *63*, 663–669.

Chapman, J. P., Chapman, L. J., Raulin, M. L., & Eckblad, M. (1994). Putatively psychosis-prone subjects 10 years later. *Journal of Abnormal Psychology*, *87*, 399–407.

Chen, W. J., Hsiao, C. K., & Lin, C. C. H. (1997). Schizotypy in community samples: The three-factor structure and correlation with sustained attention. *Journal of Abnormal Psychology*, *106*, 649–654.

Claridge, G. (1997). *Schizotypy: Implications for illness and health*. Oxford: Oxford University Press.

Claridge, G., McCreery, C., Mason, O., Bentall, R., Boyle, G., Slade, P., & Popplewell, D. (1996). The factor structure of 'schizotypal' traits: A large replication study. *British Journal of Clinical Psychology*, *35*, 103–115.

Cohen, A. S., Matthews, R. A., Najolia, G. M., & Brown, L. A. (2010). Toward a more psychometrically sound brief measure of schizotypal traits: Introducing the SPQ-brief revised. *Journal of Personality Disorders*, *24*, 516–537.

Cyhlarova, E., & Claridge, G. (2005). Development of a version of the schizotypy traits questionnaire (STA) for screening children. *Schizophrenia Research*, *80*, 253–261.

Dominguez, M. G., Wichers, M., Lieb, R., Wittchen, H.-U., & van Os, J. (2011). Evidence that onset of clinical psychosis is an outcome of progressively more persistent subclinical psychotic experiences: An 8-year cohort study. *Schizophrenia Bulletin*, *37*, 84–93.

Fonseca-Pedrero, E., Lemos-Giráldez, S., Muñiz, J., García-Cueto, E., & Campillo-Álvarez, A. (2008). Schizotypy in adolescence: The role of gender and age. *Journal of Nervous and Mental Disease*, *196*, 161–165.

Fonseca-Pedrero, E., Lemos-Giráldez, S., Paino, M., Villazón-García, U., & Muñiz, J. (2009). Validation of the schizotypal personality questionnaire brief form in adolescents. *Schizophrenia Research*, *111*, 53–60.

Fonseca-Pedrero, E., Linscott, R. J., Lemos-Giráldez, S., Paino, M., & Muñiz, J. (2010). Psychometric properties of two measures for the assessment of schizotypy in adolescents. *Psychiatry Research*, *179*, 165–170.

Fonseca-Pedrero, E., Muñiz, J., Lemos-Giráldez, S., Paino, M., & Villazón-García, U. (2010). *ESQUIZO-Q: Cuestionario Oviedo para la Evaluación de la Esquizotipia* [ESQUIZO-Q: Oviedo Schizotypy Assessment Questionnaire]. Madrid: TEA Ediciones.

Fonseca-Pedrero, E., Paino, M., Lemos-Giráldez, S., García-Cueto, E., Campillo-Álvarez, A., Villazón-García, U., & Muñiz, J. (2008). Schizotypy assessment: State of the art and future prospects. *International Journal of Clinical and Health Psychology*, *8*, 577–593.

Fonseca-Pedrero, E., Paino, M., Lemos-Giráldez, S., Sierra-Baigrie, S., Ordoñez-Camblor, N., & Muñiz, J. (2011). Early psychopathological features in Spanish adolescents. *Psicothema*, *23*, 87–93.

Fonseca-Pedrero, E., Paino, M., Lemos-Giráldez, S., Villazón-García, U., García-Cueto, E., Bobes, J., & Muñiz, J. (2009). Versión reducida del Cuestionario TPSQ de Estilos Perceptuales y de Pensamiento [A reduced version of the thinking and perceptual style questionnaire (TPSQ)]. *Psicothema*, *21*, 499–505.

Fossati, A., Raine, A., Carretta, I., Leonardi, B., & Maffei, C. (2003). The three-factor model of schizotypal personality: Invariance across age and gender. *Personality and Individual Differences*, *35*, 1007–1019.

Goldstein, J. M., & Link, B. G. (1988). Gender and the expression of schizophrenia. *Journal of Psychiatric Research*, *22*, 141–155.

Gooding, D. C., Tallent, K. A., & Matts, C. W. (2005). Clinical status of at-risk individuals 5 years later: Further validation of the psychometric high-risk strategy. *Journal of Abnormal Psychology*, *114*, 170–175.

Harrop, C., & Trower, P. (2003). *Why does schizophrenia develop at late adolescence? A cognitive-developmental approach to psychosis*. Chichester, UK: Wiley.

Kwapil, T. R., Barrantes Vidal, N., & Silvia, P. J. (2008). The dimensional structure of the Wisconsin schizotypy scales: Factor identification and construct validity. *Schizophrenia Bulletin*, *34*, 444–457.

Lenzenweger, M. F. (2006). Schizotaxia, Schizotypy, and Schizophrenia: Paul E. Meehl's blueprint for the experimental psychopathology and genetics of Schizophrenia. *Journal of Abnormal Psychology*, *115*, 195–200.

Lenzenweger, M. E. (2010). *Schizotypy and schizophrenia: The view from experimental psychopathology*. New York: Guilford Press.

Mason, O., & Claridge, G. (2006). The Oxford-Liverpool inventory of feelings and experiences (O-LIFE): Further description and extended norms. *Schizophrenia Research*, *82*, 203–211.

McGorry, P. D., McFarlane, C., Patton, G. C., Bell, R., Hibbert, M. E., Jackson, H. J., & Bowes,

G. (1995). The prevalence of prodromal features of schizophrenia in adolescence: A preliminary survey. *Acta Psychiatrica Scandinavica*, *92*, 241–249.

Meehl, P. E. (1962). Schizotaxia, schizotypy, schizophrenia. *American Psychologist*, *17*, 827–838.

Moreno, R., Martínez, R., & Muñiz, J. (2006). New guidelines for developing multiple-choice items. *Methodology*, *2*, 65–72.

Paino, M. M., Fonseca-Pedrero, E., Lemos-Giráldez, S., & Muñiz, J. (2008). Dimensionality of schizotypy in young people according to sex and age. *Personality and Individual Differences*, *45*, 132–138.

Poulton, R., Caspi, A., Moffitt, T. E., Cannon, M., Murray, R., & Harrington, H. (2000). Children's self-reported psychotic symptoms and adult schizophreniform disorder: A 15-year longitudinal study. *Archives of General Psychiatry*, *57*, 1053–1058.

Raine, A. (2006). Schizotypal personality: Neurodevelopmental and psychosocial trajectories. *Annual Review of Clinical Psychology*, *2*, 291–326.

Samuel, D. B., & Widiger, T. W. (2010). Comparing personality disorder models: Cross-method assessment of the FFM and DSM-IV-TR. *Journal of Personality Disorders*, *24*, 721–745.

Schmeiser, C. B., & Welch, C. (2006). Test development. In R. L. Brennan (Ed.), *Educational Measurement* (4th ed.) (pp. 307–353). Westport, CT: American Council on Education/Praeger.

Spauwen, J., Krabbendam, L., Lieb, R., Wittchen, H.-U., & van Os, J. (2003). Sex differences in psychosis: Normal or pathological? *Schizophrenia Research*, *62*, 45–49.

Tackett, J. L., Balsis, S., Oltmanns, T. F., & Krueger, R. F. (2009). A unifying perspective on personality pathology across the life span: Developmental considerations for the fifth edition of the diagnostic and statistical manual of mental disorders. *Development and Psychopathology*, *21*, 687–713.

van Os, J., & Kapur, S. (2009). Schizophrenia. *Lancet*, *374*, 635–645.

van Os, J., Linscott, R. J., Myin-Germeys, I., Delespaul, P., & Krabbendam, L. (2009). A systematic review and meta-analysis of the psychosis continuum: Evidence for a psychosis proneness-persistence-impairment model of psychotic disorder. *Psychological Medicine*, *39*, 179–195.

Venables, P. H., & Bailes, K. (1994). The structure of schizotypy, its relation to subdiagnoses of schizophrenia and to sex and age. *British Journal of Clinical Psychology*, *33*, 277–294.

Walker, E., & Bollini, A. (2002). Pubertal neurodevelopmental and the emergence of psychotic symptons. *Schizophrenia Research*, *54*, 17–23.

Welham, J., Scott, J., Williams, G., Najman, J., Bor, W., O'Callaghan, M., & McGrath, J. (2009). Emotional and behavioural antecedents of young adults who screen positive for non-affective psychosis: A 21-year birth cohort study. *Psychological Medicine*, *39*, 625–634.

Wigman, J. T., Vollebergh, W. A., Raaijmakers, Q., Iedema, J., van Dorsselaer, S., Ormel, J., Verhulst, F. C., & van Os, J. (2011). The structure of the extended psychosis phenotype in early adolescence—A cross-sample replication. *Schizophrenia Bulletin*, *37*, 850–860.

Wolfradt, U., & Straube, E. R. (1998). Factor structure of schizotypal traits among adolescents. *Personality and Individual Differences*, *24*, 201–206.

Wuthrich, V., & Bates, T. C. (2006). Confirmatory factor analysis of the three-factor structure of the schizotypal personality questionnaire and Chapman schizotypy scales. *Journal of Personality Assessment*, *87*, 292–304.