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Dimensionality of schizotypy in young people according to sex and age

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Abstract

The dimensionality of schizotypy and differences, according to sex and age, were studied with a new instrument called *The Thinking and Perceptual Style Questionnaire* (TPSQ). Participants were 789 young people with a mean age of 19.7 years ($SD = 1.65$). The results indicated that the TPSQ has adequate psychometric properties, with a Cronbach's α coefficient of 0.91, ranging from 0.73 to 0.87 for the subscales. The construct validity gives a four-dimensional solution of the scales. Furthermore, statistically significant differences in schizotypy were found as a function of sex and age. Men scored higher on Anhedonia and Illusion subscales, whilst women scored higher on Negative Evaluation, Social Paranoia and Hallucination subscales. By age, the youngest participants tend to score higher on the Physical Anhedonia and Hallucination subscales. Thus, the TPSQ would appear to be a useful instrument for measuring schizotypal traits in young people, although future research will be needed to explore its relationship with neurocognitive, clinical and social functioning measures.

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Keywords: Schizotypy; TPSQ; Psychometric properties; Psychosis proneness; Sex differences; Age differences

1. Introduction

Clinical and research experience shows that psychotic symptoms are not specific to certain disorders; rather, they are expressed on a continuum, and can be found with less intensity but in a persistent way in normal persons (Beauchaine, Lenzenweger, & Waller, 2008; Claridge, 1997). However, unusual experiences have been considered as indicating proneness to psychotic disorders, and based on this assumption, “high risk” psychometric studies have been carried out to determine risk of psychosis, often using schizotypy scales which, although measuring personality traits (Verdoux & van Os, 2002), include many items which, in their most extreme form, can resemble psychotic symptoms.

The first attempts to measure schizotypy were made by Golden and Meehl (1979), whose tradition has been

absorbed into what are generally referred to as “psychosis proneness” scales (Chapman, Chapman, & Kwapil, 1995; Mason & Claridge, 2006; Raine, 1991; Venables, Wilkins, Mitchell, Raine, & Bailes, 1990).

One of the contributions to the debate around the concept of schizotypy and psychosis proneness is the empirical evidence that the construct is not one-dimensional, but rather multi-structural, with components that may actually reflect different (dys)functions. Since the 1980s, numerous psychometric studies of schizotypy based on factor analysis with normal population have described schizotypy as a two-dimensional category made up of a positive factor (perceptual-cognitive deficit) and a negative factor (social-interpersonal deficit, of an anhedonic type) (Kwapil, Barrantes Vidal, & Silvia, *in press*), clearly similar to the dimensions observed in schizophrenia; however, the majority of recent solutions based on factor analysis give three or four schizotypy factors (Fonseca Pedrero et al., 2007). The three-factor versions usually add a disorganization, social decline or affective factor to the traditional positive and

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negative ones (Lewandowski et al., 2006; Venables & Rector, 2000). Moreover, in some three-factor solutions, the resulting schizotypy factors appear to be invariant across sex and age (Badcock & Dragovic, 2006; Fossati, Raine, Carretta, Leonardi, & Maffei, 2003).

As regards the four-factor schizotypy structure (Linscott & Knight, 2004; Mason & Claridge, 2006; Rawlings, Claridge, & Freeman, 2001; Stefanis et al., 2004; Suhr & Spitznagel, 2001; Venables & Bailes, 1994), this adds, to the three-factor solution, one of impulsive non-conformity, covering disinhibited characteristics guided by impulses, which may be violent or extreme (Claridge et al., 1996). Finally, some studies have found five-factor (DiDuca & Joseph, 1999) or even six-factor solutions (Mass et al., 2007).

The accumulated empirical evidence also suggests that schizotypal traits, as occurs with the symptoms of schizophrenia, vary according to certain demographic characteristics, and may have different pathognomonic meanings. Thus, for example, research has shown that schizotypal traits (except anhedonia) tend to diminish with age (Mason & Claridge, 2006; Mata, Mataix-Cols, & Peralta, 2005; Rawlings et al., 2001), and that women display more positive symptoms and men more asocial aspects of an impulsive or anhedonic nature (negative symptomatology) (Fonseca Pedrero et al., 2007). Comparison between the different factorial studies of schizotypy becomes complicated, therefore, due to three elements which vary: the model of analysis, the scales employed for its measurement, and the type of sample.

The purpose of the present work was to study the dimensionality of schizotypy in a sample of young people, through a factor analysis of the scales and items of a recent instrument for the measurement of schizotypy (Linscott & Knight, 2004). Furthermore, given the scarcity of consistent data on differences according to sex and age in factorial studies on schizotypy (Fonseca-Pedrero, Lemos-Giráldez, Muñiz, García-Cueto, & Campillo-Álvarez, 2008), we set out to explore the relationship between the schizotypal dimensions, sex, and age.

2. Method

2.1. Participants

A total of 789 young people (72.9% women), made up of college (social sciences) students ($n = 639$) and secondary school (technical courses) students ($n = 150$). Mean age of the sample was 19.7 years ($SD = 1.65$), with a range of 18 to 24. Participants were recruited from schools, selected to cover rural and urban areas, as well as different socio-economic statutes. Participants' cooperation was voluntary, and no incentive was offered for participation.

2.2. Measurement instruments

Thinking and Perceptual Style Questionnaire (TPSQ) (Linscott & Knight, 2004). This is a new instrument for

the measurement of schizotypy in adult and adolescent populations (Linscott, Marid, Arnott, & Clarke, 2006), and which has been subjected to different taxometric and validity studies, showing high convergent validity with the SPQ, VSS, STA and Schizoidia Scale (Linscott, 2007). This instrument has recently been adapted and validated for Spanish populations (Fonseca-Pedrero et al., 2008). The TPSQ has a total of 99 items, all with 5-point Likert-type response format. It is divided into six sections with a total of nine subscales. The first section, Anhedonia, is made up of the subscales Physical Anhedonia (PA) and Social Anhedonia (SA), with 33 items. The second section includes the Hallucination (HS) subscale, with 9 items. The third section, called Social Paranoia and Negative Evaluation, is made up of the subscales Social Paranoia (SP) and Negative Evaluation (NE), with 4 items each. The fourth section includes the Thought Disorder (TD) subscale, with a total of 19 items. The Ideation section is made up of the Magical Ideation (MI) and Self-referential Ideation (SI) subscales, with 12 and 5 items respectively. Finally, the Perceptual Illusion (PI) subscale has a total of 13 items.

2.3. Procedure

The questionnaires were applied in groups of 25–30 students. The study was presented to participants as research on different personality characteristics, and confidentiality was guaranteed. The application took place under the supervision of the researchers, with a view to minimizing errors.

2.4. Data analysis

The data analysis was divided into two clearly distinct parts:

1. Psychometric properties of the TPSQ: We studied the inter-correlations between the different scales of the questionnaire, the factor validity and the internal consistency. Factor analysis was carried out for both the scales and the items. In the case of the items, a second-order factor analysis was also performed. Total internal consistency of the questionnaire and its subscales was calculated in terms of Cronbach's α coefficient.
2. Differences in the TPSQ according to sex and age: K–S subcommand was used for the assessment of normality. Because none of the TPSQ subscales were not normally distributed, we used Multivariate Analysis of Variance (MANOVA), taking the scales as dependent variable, and as fixed factors sex and age recoded in three groups: Group 1 (those aged 18 and 19); Group 2 (those aged 20 and 21); and Group 3 (those aged 22–24). We used Wilks' λ to check whether there were significant differences in the dependent variables considered as a whole. In those cases where Wilks' λ is significant ($p < 0.05$) we examined the individual variance analysis (ANOVA) results. As an index of effect size we used η^2 . When

$\eta^2 > 0.15$ the effect is large in magnitude, and when $\eta^2 > 0.06$ it is moderate. For the data analysis we used the SPSS 14.

3. Results

3.1. Psychometric properties of the TPSQ

3.1.1. Descriptive statistics of the scales

The descriptive study of the Thinking and Perceptual Style Questionnaire scales reveals that the indices of asymmetry and kurtosis range from +1 to -1, except for the Perceptual Illusion scale, which presents an asymmetry of 1.54 and a kurtosis value of 2.57. Correlations between the scales of the questionnaire are shown in Table 1, and the following results are the most noteworthy: (1) the majority of the correlations are statistically significant, except for that of Physical Anhedonia and Anhedonia Social with the rest of the scales; (2) the correlation between the Physical Anhedonia and Social Anhedonia scales is statistically significant; (3) the scales behave differently according to participants' sex: statistically significant inter-correlations between the subscales for men are few, and their intensity low, compared to the case of women; and (4) the correlations found between the subscales suggest the need for factor analysis.

3.2. Factor validity study

Firstly, we carried out a factor analysis of the scales using the method of principal components and varimax rotation. Table 2 shows the results after removal of values under 0.35. The KMO sampling adequacy measure is 0.712, and Bartlett's sphericity index is 2023.412 ($p < 0.001$). Three eigenvalues are higher than unity. In accordance with the scree plot criterion, with the percentage of explained variance, and in line with previous studies (Linscott & Knight, 2004), we opted for the four-factor solution. The four factors, which explain 75.87% of the total variance, are as follows: Distorted Information Processing (Hallucination, Thought Disorder and Perceptual Illusion),

Table 2

Factor analysis of the Thinking and Perceptual Style Questionnaire subscales

Scales	I	II	III	IV	h^2
TD	0.781				0.734
HS	0.777				0.700
PI	0.768				0.674
NE		0.913			0.849
SP		0.873			0.819
MI			0.859		0.790
SI			0.871		0.805
SA				0.853	0.738
PA				0.839	0.720
Eigenvalues	3.07	1.48	1.42	0.86	
% Accumulated variance	34.10	50.50	66.31	75.87	

Note: PA: Physical Anhedonia, SA: Social Anhedonia, HS: Hallucination, SP: Social Paranoia, NE: Negative Evaluation, TD: Thought Disorder, MI: Magical Ideation, SI: Self-reference Ideation, PI: Perceptual Illusion. Factor weights under 0.35 were removed. h^2 : communalities.

Social Fear and Paranoia (Negative Evaluation and Social Paranoia), Aberrant Beliefs (Magical Ideation and Self-referential Ideation), and Anhedonia (Physical and Social Anhedonia).

Next, we carried out an exploratory factor analysis of the items using the method of principal components and Oblimin rotation. The KMO sampling adequacy measure is 0.868, and Bartlett's sphericity index is 28962.03 ($p < 0.001$). A total of 25 components presented eigenvalues higher than unity, explaining 60.40% of the total variance. With the aim of reducing the dimensionality of the data and improving their interpretation we carried out a second-order factor analysis on the correlations matrix of the 25 components. The KMO sampling adequacy measure is 0.723, and Bartlett's sphericity index is 1243.12 ($p < 0.001$). In this analysis a total of eight components present eigenvalues higher than unity, explaining 46.11% of the total variance. Four of them can be clearly interpreted (Table 3), explaining 28.58% of the total variance. In Table 3 factor weights under 0.35 were removed. The remaining factors are considered as residual and difficult to interpret.

Table 1
Pearson correlations between the subscales of the Thinking and Perceptual Style Questionnaire in men (above diagonal) and women (below diagonal)

Scales	PA	SA	HS	NE	SP	TD	MI	SI	PI
PA		0.39**	-0.10	0.01	-0.03	-0.07	0.06	0.05	-0.02
SA	0.43**		-0.10	0.01	0.13	0.05	0.09	0.04	0.03
HS	-0.16**	-0.12**		0.19**	0.33*	0.57**	0.30**	0.29**	0.44**
NE	-0.01	-0.03	0.26**		0.56**	0.32**	-0.01	0.04	0.07
SP	-0.02	-0.02	0.34**	0.70**		0.40**	0.10	0.20**	0.11
TD	-0.11**	-0.02	0.58**	0.39**	0.41**		0.25**	0.24**	0.53**
MI	-0.11*	-0.04	0.33**	0.10*	0.14**	0.32**		0.62**	0.41**
SI	-0.10*	-0.11**	0.36**	0.12**	0.14**	0.30**	0.59**		0.34**
PI	-0.07	-0.02	0.49**	0.19**	0.29**	0.47**	0.38**	0.38**	

Note: PA: Physical Anhedonia, SA: Social Anhedonia, HS: Hallucination, NE: Negative Evaluation, SP: Social Paranoia, TD: Thought Disorder, MI: Magical Ideation, SI: Self-reference Ideation, PI: Perceptual Illusion.

* $p < 0.05$.

** $p < 0.01$.

Table 3
Second-order factor analysis of the Thinking and Perceptual Style Questionnaire

	I	II	III	IV
Thought disorder	-0.67			
Social fear and paranoia	0.66			
Thought disorder II	-0.65			
Thought disorder III	-0.40			
Magical ideation		0.71		
Self-referent ideation		0.70		
Magical ideation II		0.69		
Illusion			0.62	
Illusion II			0.60	
Illusion III			0.57	
Hallucination			-0.40	
Social anhedonia				0.67
Social anhedonia II				-0.60
Social anhedonia				0.47
Anhedonia				0.39
Eigenvalues	2.61	1.80	1.44	1.29
% Variance explained	10.45	17.67	23.43	28.58

Factor weights under 0.35 were removed.

The first second-order factor explains 10.45% of the variance and is called Distorted Information Processing/Social Paranoia. The second explains 7.21% and is called Aberrant Beliefs. The third factor is called Perceptual Illusion and explains 5.77% of the variance, while the fourth explains 5.15% of the total variance and is called Anhedonia. The second-order factors correspond to some extent with those found in the factor analysis carried out on the scales, even though some differences can be observed. Note that the clinical scales were not designed in line with empirical-factorial criteria.

3.3. Internal consistency study

Total Cronbach's α coefficient of the TPSQ is 0.91. The internal consistency values of the scales range from 0.73, for the Physical Anhedonia scale, to 0.87, for the Thought Disorder scale. α coefficients for the remaining scales were: 0.84 for Social Anhedonia, 0.78 for Hallucination, 0.77 for Social Paranoia, 0.84 for Negative Evaluation, 0.84 for Magical Ideation, 0.83 for Self-referential Ideation and 0.80 for Perceptual Illusion.

3.4. Study of differences according to sex and age

3.4.1. Differences according to sex

The MANOVA revealed statistically significant differences on comparing the scores on the TPSQ scales by sex (Wilks' $\lambda = 0.710$, $p < 0.001$). Results of the univariate ANOVAs are shown in Table 4. Men score higher than women on the Anhedonia (Physical and Social) and Perceptual Illusion scales, whilst women score higher than men on the scales of Social Paranoia, Negative Evaluation and Hallucination. No statistically significant interaction was found between participants' age and sex.

Table 4
Gender comparison of mean scores on the Thinking and Perceptual Style Questionnaire subscales

Scales	Male (n = 214) Means (SD)	Female (n = 575) Means (SD)	F	p	η^2
PA	36.11(8.78)	32.69(7.55)	29.17	0.000	0.002
SA	16.92(7.16)	12.31(6.50)	73.87	0.000	0.018
HS	8.95(4.91)	10.01(5.61)	6.01	0.014	0.002
NE	5.28(3.48)	6.95(3.33)	38.09	0.000	0.010
SP	4.34(2.76)	5.73(3.28)	30.51	0.000	0.001
TD	20.20(9.78)	21.51(10.34)	2.59	0.108	0.001
MI	9.11(6.88)	10.14(6.76)	3.58	0.059	0.000
SI	4.33(3.58)	4.42(3.66)	0.09	0.756	0.000
PI	4.69(5.18)	3.75(4.15)	6.99	0.008	0.005

Note: PA: Physical Anhedonia, SA: Social Anhedonia, HS: Hallucination, SP: Social Paranoia, NE: Negative Evaluation, TD: Thought Disorder, MI: Magical Ideation, SI: Self-reference Ideation, PI: Perceptual Illusion.

3.5. Differences according to age

The MANOVA revealed significant effects for participants' age on comparing the three groups' scores on the questionnaire scales (Wilks' $\lambda = 0.916$, $p < 0.001$). In Table 5, which shows the ANOVAs for the scores on the scales by age group, it can be seen that the youngest participants score higher than the other groups on the Physical Anhedonia and Hallucination scales. Significant differences were even more marked when comparing subjects of 18 year old ($n = 245$) and those of 23 and 24 years ($n = 56$) (Wilks' $\lambda = 3.15$, $p < 0.001$), the youngest participants scoring higher on Physical Anhedonia ($F = 5.20$, $p = 0.023$) and Hallucination ($F = 6.65$, $p = 0.01$).

Finally, in the whole sample there is a negative correlation between the scales of Physical Anhedonia ($r = -0.124$), Hallucination ($r = -0.107$), Social Paranoia ($r = -0.083$) and Magical Ideation ($r = -0.120$) and age ($p < 0.01$). In contrast, the correlations between age and the subscales of Social Anhedonia ($r = 0.030$), Negative Evaluation ($r = -0.050$), Thought Disorder ($r = -0.036$), Magical Ideation ($r = -0.010$), Self-referential Ideation

Table 5
Analysis of Variance with subscales scores on the Thinking and Perceptual Style Questionnaire, by age groups

Scales	Group 1	Group 2	Group 3	F	p	η^2
PA	34.47(7.99)	33.16(7.54)	31.54(8.73)	7.067	0.001	0.001
SA	13.24(6.72)	14.02(13.82)	13.82(7.53)	1.032	0.357	0.000
HS	10.22(5.38)	9.21(9.00)	9.00(4.87)	3.969	0.019	0.002
NE	6.67(3.44)	6.30(6.29)	6.29(3.59)	1.121	0.326	0.000
SP	5.49(3.23)	5.35(4.90)	4.90(3.09)	1.682	0.187	0.000
TD	21.42(9.57)	20.61(11.12)	21.28(10.5)	0.487	0.615	0.000
MI	9.89(6.59)	9.76(6.94)	9.97(7.35)	0.047	0.954	0.000
SI	4.50(3.73)	4.24(3.65)	4.35(3.33)	0.393	0.675	0.000
PI	4.03(4.31)	3.84(4.70)	4.25(4.60)	0.356	0.701	0.000

Note: PA: Physical Anhedonia, SA: Social Anhedonia, HS: Hallucination, SP: Social Paranoia, NE: Negative Evaluation, TD: Thought Disorder, MI: Magical Ideation, SI: Self-reference Ideation, PI: Perceptual Illusion. Age groups: (1) 18–19 ($n = 430$); (2) 20–21 ($n = 234$); (3) ≥ 22 ($n = 125$).

($r = -0.04$) and Perceptual Illusion ($r = -0.003$) are not statistically significant.

4. Discussion and conclusions

The first objective of the present work was to study the dimensionality of the schizotypy construct in young people, through a factor analysis of the scales and items of the TPSQ; the second objective was to identify possible differences in schizotypal traits according to sex and age. The results support the TPSQ as a satisfactory measure for the assessment of schizotypy in populations of young people. The psychometric qualities of the questionnaire, as regards its internal consistency and construct validity, are more than acceptable. The subscales that make it up present statistically significant correlations in the classic positive and negative dimensions. Internal consistency values of the scales range from 0.73 to 0.87, the Cronbach's α coefficient being 0.91.

As regards the study of the factor validity of the scales and items, the results found are in accordance with the notion of schizotypy as a four-factor multidimensional construct (Vollema & Van den Bosch, 1995). Specifically, the factor analysis of the scales faithfully replicates that carried out by Linscott and Knight (2004) with a New Zealand sample, both in number and type of factors and in percentage of explained variance, as well as in the order of the factors, even if the weights in each factor were different.

The factor analysis of the items, both first and second-order, is a novel aspect in this work, and did not form part of the original study by Linscott and Knight (2004). The data indicate that the second-order factor analysis on items basically gives four easily-interpreted factors, even if they differ to some extent from the factors derived from the analysis with the scales. The fact that the number of factors obtained through the second-order factor analysis of the items does not correspond faithfully to the four-factor solution of the analysis by scales carried out in our study and in the original work does not detract from the validity of the findings, given that we are talking about different levels of analysis. Moreover, the original subscales were drawn up following a more clinical than empirical-factorial criterion.

Our results of the factor analysis with the TPSQ items in non-clinical samples, based on a psychometric procedure, lend some degree of support to the three-syndrome model of schizophrenia (Gruzelier & Doig, 1996): a positive or perceptual-cognitive factor (unusual perceptions and thoughts related to psychotic experiences); a magical ideation factor, related to strange beliefs/preoccupations or fantasies (especially in adolescence), inconsistent with normal subcultures, and which influence the individual's behaviour (as in the case of superstition, or belief in telepathy, soothsaying or "sixth sense"); and a negative or anhedonic social-interpersonal factor, related to a lack of positive emotions in social relations, flat affect, absence

of pleasure in emotional and physical intimacy, and lack of close friends, with an emphasis on independence. These results support the hypothesis that, as occurs with the identification of schizotypies in clinical samples (Battaglia, Cavallini, Maccierdi, & Bellodi, 1997), three dimensions can be identified in the normal population, in our case using the TPSQ questionnaire.

As far as the second objective is concerned, and in line with previous research, schizotypal personality traits vary according to the sex and age of those under study. Men score higher on the scales measuring Anhedonia and Perceptual Illusion, while women score higher than men on the Hallucination, Social Paranoia and Negative Evaluation scales. As expected, men present more social deficit and women more perceptual aberrations. These results, found with the TPSQ, coincide with those of previous psychometric studies (Linscott & Knight, 2004; Mason & Claridge, 2006; Mata et al., 2005; Rawlings et al., 2001; Venables & Bailes, 1994). The symptomatic differences observed between the two sexes have also been observed in schizophrenia, and may have different pathognomonic meanings (Gruzelier & Doig, 1996).

Participants' age was also seems to have a significant influence. If we observe the variation according to age, the positive traits (the HS, NE, SP and TD scales) loading in the Social Paranoia component increase. It is relevant to stress, moreover, the importance of the Social Paranoia factor in this age group, a factor repeatedly referred to in the schizotypy literature in relation to samples of adolescents and young adults (Cyhlarova & Claridge, 2005; Stefanis et al., 2004; Venables & Bailes, 1994).

Recently, Raine (2006), in an excellent review, raised the possibility of the existence of two forms of schizotypy: neuroschizotypy, of a more stable nature and with a mainly genetic origin, in which there is a predominance of interpersonal and disorganized traits that could benefit from pharmacological intervention; and pseudoschizotypy, of a fluctuating nature, in which the environment and psychosocial influences play a more relevant role, with a predominance of cognitive-perceptual factors, and which could be treated through psychological interventions. Supposedly, those with high scores on the schizotypy scales would initially be defined in terms of pseudoschizotypy. The convergence found at a psychophysiological, biochemical, cognitive, and phenotypic level between schizophrenia and schizotypy suggests the possibility that schizotypal and schizophrenic patients share a path of neurodevelopmental vulnerability (Kwapil et al., in press).

Finally, we opted for the TPSQ as an instrument for measuring schizotypy, despite the existence of other, more widely used schizotypy scales, such as those of Chapman or the SPQ (Raine, 1991). There were two reasons for this choice. On the one hand, the TPSQ has the great advantage of being designed for assessing schizotypy in young populations, and on the other, our interest in calibrating the TPSQ as an indicator of psychometric schizotypy in non-clinical populations. We consider access to a valid instru-

ment for identifying risk subjects in this age range to be a highly relevant goal.

The characteristics of the sample used, however, mean that we must be cautious in attempts to generalize the results. Firstly, with regard to participants' age, maturational processes themselves could be playing an important role, and should be taken into account in efforts to understand the mechanisms underlying schizotypy; hence, it would be hasty to conclude that the schizotypal traits observed are clear indicators of psychosis risk. It should be borne in mind, before reaching any conclusion, that some experiences assessed with the TPSQ may be related to developmental processes themselves (Harrop & Trower, 2003). Another factor restricting generalization of the results obtained is the high representation of women in our sample.

Another limitation of the present study is also that neither participants' information about familiarity for psychiatric disorders and/or current treatment, nor depressive symptoms in this sample were evaluated.

Our future lines of research will focus on the application of the TPSQ in young relatives of patients with schizophrenia, and on longitudinal monitoring, not only of people scoring high on schizotypy measures, but also of those with sustained attention deficit, with a view to identifying the most relevant factor in subjects who make the transition to psychosis. Moreover, the questionnaire should be validated with regard to its convergent, divergent and predictive validity. Also of interest would be the external validation of the questionnaire by means of neurocognitive markers of risk for disorders on the schizophrenic spectrum (Cangas, García, López, & Olivencia, 2003). Finally, further potentially interesting research lines would be the comparison of schizotypy across different cultures, the application of taxometric analysis in adolescent population to determine the dimensional or categorical nature of the construct (Fossati, Raine, Borroni, & Maffei, 2007; Rawlings, Williams, Haslam, & Claridge, 2008), and the study of genetic polymorphism (Smyrnis et al., 2007), using new and more inclusive measures of schizotypy.

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References

- Badcock, J. C., & Dragovic, M. (2006). Schizotypal personality in mature adult. *Personality and Individual Differences*, 40, 77–85.
- Battaglia, M., Cavallini, M. C., Maccierdi, F., & Bellodi, L. (1997). The structure of DSM-III-R schizotypal personality disorder diagnosed by direct interviews. *Schizophrenia Bulletin*, 23, 83–92.
- Beauchaine, T. P., Lenzenweger, M. F., & Waller, N. G. (2008). Schizotypy, taxometrics, and disconfirming theories in soft science: Comment on Rawlings, Williams, Haslam, and Claridge. *Personality and Individual Differences*, 44, 1652–1662.
- Cangas, A. J., García, J. M., López, M., & Olivencia, J. J. (2003). Social and personality variables related to the origin of auditory hallucinations. *International Journal of Psychology and Psychological Therapy*, 3, 195–208.
- Chapman, J. P., Chapman, L. J., & Kwapil, T. R. (1995). Scales for the measurement of schizotypy. In A. Raine, T. Lencz, & S. A. Mednick (Eds.), *Schizotypal personality* (pp. 79–106). New York: Cambridge University Press.
- Claridge, G. (Ed.). (1997). *Schizotypy: Implications for illness and health*. Oxford: Oxford University Press.
- Claridge, G. S., McCreery, C., Mason, O., Bentall, R. P., Boyle, G., Slade, P. D., et al. (1996). The factor structure of 'schizotypal' traits: A large replication study. *British Journal of Clinical Psychology*, 35, 103–116.
- Cyklarova, E., & Claridge, G. (2005). Development of a version of the Schizotypy Traits Questionnaire (STA) for screening children. *Schizophrenia Research*, 80, 253–261.
- DiDuca, D., & Joseph, S. (1999). Assessing schizotypal traits in 13–18 year olds: Revising the JSS. *Personality and Individual Differences*, 27, 673–682.
- 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., Muñiz, J., Lemos Giráldez, S., García Cueto, E., Campillo Alvarez, A., & Villazón García, U. (2007). Multidimensionality of schizotypy under review. *Papeles del Psicólogo*, 28, 117–126.
- Fossati, A., Raine, A., Borroni, S., & Maffei, C. (2007). Taxonic structure of schizotypal personality in nonclinical subjects: Issues of replicability and age consistency. *Psychiatry Research*, 152, 103–112.
- 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.
- Golden, R. R., & Meehl, P. E. (1979). Detection of the schizoid taxon with MMPI indicators. *Journal of Abnormal Psychology*, 84, 217–233.
- Gruzelier, J. H., & Doig, A. (1996). The factorial structure of schizotypy: Part II Cognitive asymmetry, arousal, handedness, and sex. *Schizophrenia Bulletin*, 22, 621–634.
- 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. (in press). The dimensional structure of the Wisconsin schizotypy scales: Factor identification and construct validity. *Schizophrenia Bulletin*, doi:10.1093/schbul/sbm098.
- Lewandowski, K. E., Barrantes-Vidal, N., Nelson-Gray, R. O., Clancy, C., Kepley, H. O., & Kwapil, T. R. (2006). Anxiety and depression symptoms in psychometrically identified schizotypy. *Schizophrenia Research*, 83, 225–235.
- Linscott, R. J. (2007). The latent structure and coincidence of hyphedonia and schizotypy and their validity as indices of psychometric risk for schizophrenia. *Journal of Personality Disorders*, 21, 225–242.
- Linscott, R. J., & Knight, R. G. (2004). Potentiated automatic memory in schizotypy. *Personality and Individual Differences*, 37, 1503–1517.
- Linscott, R. J., Marid, D., Arnott, K. L., & Clarke, B. L. (2006). Overrepresentation of Maori New Zealanders among adolescents in a schizotypy taxon. *Schizophrenia Research*, 84, 289–296.
- 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.
- Mass, R., Girndt, K., Matouschek, A. K., Peter, P. M., Plitzko, N., Andersen, B., et al. (2007). Introducing the Eppendorf Schizophrenia Inventory (ESI) as a psychometric method for schizotypy research. *Personality and Individual Differences*, 42, 525–534.
- Mata, I., Mataix-Cols, D., & Peralta, V. (2005). Schizotypal Personality Questionnaire-Brief: Factor structure and influence of sex and age in a nonclinical population. *Personality and Individual Differences*, 38, 1183–1192.

- Raine, A. (1991). The SPQ: A scale for the assessment of schizotypal personality disorder based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17, 555–564.
- Raine, A. (2006). Schizotypal personality: Neurodevelopment and psychosocial trajectories. *Annual Review of Clinical Psychology*, 2, 291–326.
- Rawlings, D., Claridge, G., & Freeman, J. L. (2001). Principal components analysis of the Schizotypal Personality Scale (STA) and the Borderline Personality Scale (STB). *Personality and Individual Differences*, 31, 409–419.
- Rawlings, D., Williams, B., Haslam, N., & Claridge, G. (2008). Taxometric analysis supports a dimensional latent structure for schizotypy. *Personality and Individual Differences*, 44, 1640–1651.
- Smyrnis, N., Avramopoulos, D., Evdokimidis, I., Stefanis, C. N., Tsekou, H., & Stefanis, N. C. (2007). Effect of schizotypy on cognitive performance and its tuning by COMT val(158) met genotype variations in a large population of young men. *Biological Psychiatry*, 61, 845–853.
- Stefanis, N., Smyrnis, N., Avramopoulos, D., Evdokimidis, I., Ntzoufras, I., & Stefanis, C. (2004). Factorial composition of self-rated schizotypal traits among young males undergoing military training. *Schizophrenia Bulletin*, 30, 335–350.
- Suhr, J. A., & Spitznagel, M. B. (2001). Factor versus cluster models of schizotypal traits I: A comparison of unselected and highly schizotypal samples. *Schizophrenia Research*, 52, 231–239.
- 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.
- Venables, P. H., & Rector, N. A. (2000). The content and structure of schizotypy: A study using confirmatory factor analysis. *Schizophrenia Bulletin*, 26, 587–602.
- Venables, P. H., Wilkins, S., Mitchell, D. A., Raine, A., & Bailes, K. (1990). A scale for the measurement of schizotypy. *Personality and Individual Differences*, 11, 481–495.
- Verdoux, H., & van Os, J. (2002). Psychotic symptoms in non-clinical populations and the continuum of psychosis. *Schizophrenia Research*, 54, 59–65.
- Vollema, M. G., & Van den Bosch, R. J. (1995). The multidimensionality of schizotypy. *Schizophrenia Bulletin*, 21, 19–31.