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Dimensionality of hallucinatory predisposition: Confirmatory factor analysis of the Launay-Slade Hallucination Scale-revised in college students

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Título: Dimensionalidad de la predisposición alucinatoria: Análisis factorial confirmatorio de la Escala Launay-Slade Hallucination – revisada en estudiantes universitarios.

Resumen: La predisposición alucinatoria, medida a través de la Escala de Alucinaciones de Launay-Slade-Revisada (LSHS-R) (Bentall y Slade, 1985), constituye un constructo multidimensional, si bien su estructura factorial no se encuentra todavía bien establecida. El objetivo de este trabajo fue analizar la estructura dimensional de la predisposición alucinatoria en población no-clínica. La muestra la formaron 807 adultos jóvenes, 562 mujeres (63,3%), con una edad media de 20,19 (*DT* = 2,98). Los resultados mostraron que la LSHS-R presentó un adecuado comportamiento psicométrico. El coeficiente alfa de Cronbach ascendió a 0,90. Los análisis factoriales confirmatorios realizados indicaron que el modelo tridimensional de Waters *et al.* (2003) y el modelo tetradimensional de Levitan *et al.* (1996) fueron los que mejor se ajustaron a los datos en comparación con los modelos alternativos propuestos. Estos datos confirman la naturaleza multidimensional de la predisposición alucinatoria medida a partir de la LSHS-R. Futuros estudios deberían seguir investigando las dimensiones subyacentes a la LSHS-R en poblaciones clínicas y no-clínicas, así como examinar su invarianza a través del sexo y la edad de los participantes.

Palabras clave: LSHS-R; alucinaciones; predisposición alucinatoria; síntomas psicóticos subclínicos; propiedades psicométricas.

Abstract: Hallucinatory predisposition, as measured by the Launay-Slade Hallucination scale-revised (LSHS-R) (Bentall & Slade, 1985), is a multidimensional construct, although its factor structure is not yet well established. The purpose of this work was to analyze the dimensional structure of hallucinatory predisposition in nonclinical population. The sample comprised 807 young adults, 562 female (63.3%), with a mean age of 20.19 (*SD* = 2.98). The results showed that the LSHS-R presented adequate psychometric properties. Cronbach's alpha coefficient reached 0.90. The confirmatory factor analyses conducted indicated that Waters *et al.* 's (2003) three-factor model and Levitan *et al.*'s (1996) four-factor model were those that showed the best fit to the data in comparison to the alternative proposed models. These data confirm the multidimensional nature of hallucinatory predisposition as measured by the LSHS-R. Future studies should continue to investigate the dimensions underlying the LSHS-R in clinical and nonclinical populations and examine its invariance across participants' gender and age.

Key words: LSHS-R; hallucinations; hallucinatory predisposition; subclinical psychotic symptoms; psychometric properties.

The hypothesis of the continuity of the psychotic phenotype suggests that psychotic experiences can also occur in the general population (Fonseca-Pedrero, Lemos-Giráldez, Paino, Sierra-Baigrie, Villazón-García, & Muñiz, 2009; Kendler, Gallagher, Abelson, & Kessler, 1996; Scott, Chant, Andrews, & McGrath, 2006), without necessarily indicating the existence of a disorder (Verdoux & van Os, 2002). Prevalence rates found in the general population depend on the sample and the instrument used, with the mean prevalence around 5% (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). The presence of subclinical psychotic experiences suggests that the psychotic phenotype is distributed along a severity continuum that ranges from a normal state of functioning to a state of illness (van Os *et al.*, 2009). Empirical evidence also indicates that such symptoms (i.e., hallucinatory experiences) have predictive value, with their presence in an individual being related to a higher risk of developing schizophrenic-spectrum disorders (Krabbendam *et al.*, 2004; Poulton, Caspi, Moffitt, Cannon, Murray, & Harrington, 2000; Welham *et al.*, 2009), although they do not necessarily have to evolve towards psychosis (Dhossche, Ferdinand, Van der Ende, Hofstra, & Verhulst, 2002; Verdoux, van Os, & Maurice-Tison, 1999).

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In the last few years, interest in the study of subclinical psychotic experiences in the general population has prompted the development of self-reports to measure the predisposition to psychotic symptoms or psychosis proneness (Fenigstein & Vanable, 1992; Fonseca-Pedrero, Paino *et al.*, 2008; Launay & Slade, 1981). Among the most frequently used scales for the specific assessment of hallucinatory predisposition is the Launay-Slade Hallucination Scale (LSHS) (Launay & Slade, 1981). The LSHS was revised by Bentall and Slade (1985) (LSHS-R), introducing a Likert-type response format and changing the negatively formulated items into positive items. Likewise, due to the fact that the LSHS does not take into account the entire range of possible hallucinatory experiences (i.e., olfactory), various authors have carried out some modifications in this sense, introducing items of tactile, olfactory (Larøi, Marczewski, & Van der Linden, 2004), or visual hallucinatory experiences (Morrison, Wells, & Nothard, 2000) for this purpose.

Since Bentall and Slade (1985) developed the revised version of the LSHS, many studies have examined its psychometric properties, factor structure, and relation to a broad array of psychological variables (Badcock, Chhabra, Maybery, & Paulik, 2008; Cella, Cooper, Dymond, & Reed, 2008; Larøi, DeFruyt, van Os, Aleman, & Van der Linden, 2005). The works carried out to date show that hallucinatory predisposition is a multidimensional construct (Larøi *et al.*, 2004; Paulik, Badcock, & Maybery, 2006) made up of two (Morrison *et al.*, 2000; Serper, Dill, Chang, Kot, & Elliot,

2005), three (Aleman, Nieuwenstein, Boecker, & De Haan, 2001; Paulik *et al.*, 2006; Waters, Badcock, & Maybery, 2003), or even four factors (Larøi *et al.*, 2004; Levitan, Ward, Catts, & Hemsley, 1996). This heterogeneity of results is a clear indication that there is still no unified notion of the structure and content of hallucinatory predisposition in clinical and nonclinical populations, possibly due to the diversity of samples and statistical techniques used across the studies.

Various exploratory and confirmatory factor analyses have been carried out using the LSHS-R (Bentall & Slade, 1985). Levitan *et al.* (1996), in a sample of psychiatric patients, found a four-factor solution specified in the factors of vivid daydreams, clinical auditory hallucinations, intrusive or vivid thoughts, and subclinical auditory hallucinations. In contrast, Aleman *et al.* (2001), using the Dutch translation of the LSHS-R in a sample of 243 university students, proposed a three-factor model comprising the factors: tendency towards hallucinatory experiences, subjective externality of thoughts, and vivid daydreams. On the other hand, Waters *et al.* (2003), in an exploratory factor analysis in a sample of 562 university students, found a factor solution made up of the following factors: vivid mental events, hallucinations with a religious theme, and auditory and visual hallucinatory experiences. Serper *et al.* (2005), analyzing the factor structure in patients with schizophrenia (hallucinatory and non-hallucinatory) and in college students, found a two-factor solution comprising a subclinical and a clinical factor. Lastly, Paulik *et al.* (2006) tested the factor models by Aleman *et al.* (2001), Waters *et al.* (2003), and Serper *et al.* (2005) through a confirmatory factor analysis. The factorial model that presented the best fit indices in comparison to the remaining models was the three-factor model proposed by Waters *et al.* (2003).

The study of the dimensionality of hallucinatory predisposition in nonclinical populations allows us to investigate participants without the effects of medication, stigmatization, or the deteriorating course of the illness, frequently associated in patients with schizophrenia. Likewise, it is interesting to analyze and understand the dimensionality of hallucinatory predisposition in the general population, thus improving the delimitation of the construct, as well as the possibility of establishing links with hallucinatory experiences found in clinical populations. Nevertheless, as previously mentioned, the dimensional structure of hallucinatory predisposition is not yet firmly established. In this sense, few exploratory and confirmatory factor analyses have been performed using the polychoric correlation, and the multifactor structure of hallucinatory predisposition has not been replicated in an independent sample. The main goal of the present work was to analyze the dimensional structure of hallucinatory predisposition assessed using the LSHS-R (Bentall & Slade, 1985) in nonclinical young adults. Moreover, other psychometric properties of the scale were also rigorously analyzed.

Method

Participants

A total of 807 university students from various branches of study at the University of Oviedo (Psychology, Teaching, Computer Science, Industrial Engineering, Nursing, Speech Therapy, and Physiotherapy) participated in the study. The sample was comprised of 245 males (30.4 %) and 562 females (69.6%). The participants' mean age was 20.19 years (*SD* = 2.98), ranging from 17 to 32 years. The mean number of years of education was 16.25 (*SD* = 2.78).

Measurement Instrument

Launay-Slade Hallucination Scale-revised (LSHS-R) (Bentall & Slade, 1985). The LSHS-R was developed based on the assumption that hallucinatory experiences are part of a continuum of normal-psychosis functioning. It has been used in patients with schizophrenia (Serper *et al.*, 2005) and in relation to diverse psychological variables. It has shown adequate psychometric properties (Cella *et al.*, 2008; Lipp, Arnold, & Siddle, 1994; Waters *et al.*, 2003), presenting high correlations with the Peters *et al* Delusion Inventory-21 (PDI-21) (Peters, Joseph, Day, & Garety, 2004) and the Winconsin schizotypy scales (Chapman, Chapman, & Kwapil, 1995) as well as adequate temporal stability (Morrison, Wells, & Northard, 2002). In this study, we used the 12-item version adapted to Spanish, which uses a Likert-type response format with 4 categories (1= "*certainly does not apply to you*"; 2= "*possibly does not apply to you*"; 3= "*possibly applies to you*"; 4 = "*certainly does apply to you*") (Garcia-Montes, Perez-Alvarez, Soto Balbuena, Perona Garcelan, & Cangas, 2006). Scores range from 12 to 48, with higher scores indicating a greater predisposition toward hallucinating. Items in the LSHS-R Spanish version are presented in Appendix A.

Procedure

The questionnaire was administered collectively in groups of 15 to 40 participants. Participants were informed of the confidentiality of their responses and the voluntary nature of their participation, and no incentives were offered for their collaboration in this study. The questionnaire was administered within a broader battery of tests to assess emotional and behavioral problems.

Data Analysis

Firstly, we determined that the assumptions of normality and sphericity were met and we calculated the descriptive statistics of the items and of the total score. In addition, a Differential Item Functioning (DIF) analysis was conducted as a function of gender. The presence of DIF presumes that the probability of a subject obtaining a correct response does not depend solely on the subject´s level in the object of

measurement, but rather it is also conditioned by whether the subject belongs to a certain social, cultural, linguistic group, etc., which generates a lack of metric equivalence among scores (Elosúa, 2003). In order to detect DIF as a function of gender the Mantel-Haenszel chi-square statistic (Mantel, 1963; Zwick, Thayer, & Mazzeo, 1997) and the Liu-Agresti Cumulative Common Log-Odds Ratio (Liu & Agresti, 1996) were employed for polytomous items. The type I error was 0.01. The stratification variable was the LSHS-R total score. Internal consistency was estimated by means of Cronbach's alpha coefficient for ordinal categories (Elosúa & Zumbo, 2008).

Secondly, in order to study the structure of hallucinatory predisposition, we performed a Principal Components Analysis (PCA) with direct oblimin rotation. The polychoric correlation matrix was used for the PCA. The procedure for determining the number of components was Parallel Analysis. Thirdly, we performed different Confirmatory Factor Analyses (CFA), where we tested five factor models (see Table 1). In order to perform CFA, we used the matrix of polychoric correlations with the unweighted least squares estimation method (Jöreskorg & Sörbom, 1993). To establish the scale for each latent variable one of the loadings for each factor was fixed to 1.0. We used the following goodness-of-fit indices: chi-square test (χ^2), Comparative Fit Index (CFI), General Fit Index (GFI), Root Mean Square Error of Approximation (RMSEA) (and its confidence interval), Standardized Root Mean Square Residual (SRMR), and Akaike Information Criterion (AIC). The FACTOR program (Lorenzo-Seva & Ferrando, 2006), SPSS 15.0, DIFAS (Penfield, 2005) and LISREL 8.7 (Jöreskorg & Sörbom, 1993) were used for data analysis.

Results

a) Descriptive statistics

The means and standard deviations of the items in the LSHS-R for the total sample, and for males and females, are presented in Table 2. The LSHS-R total score is not normally distributed (Kolmogorov-Smirnov test, $Z = 3.93$, $p < 0.001$). The mean of the total score for the total sample was 17.38 ($SD = 3.57$, range 12-31) whereas for males it was 17.66 ($SD = 3.91$) and for females 17.25 ($SD = 3.41$). No statistically significant differences as a function of gender were found ($t = 1.47$, $p = 0.14$). The correlation between the total score and age was -0.11, and it was statistically significant ($p < 0.01$). The Cronbach's alpha coefficients for the two scales comprising the items that load on the factors were higher than 0.83 (see Table 3). The internal consistency of the LSHS-R total score was 0.90. The discrimination indices ranged from 0.15 to 0.46. No item in the LSHS-R showed differential functioning as a function of participants' gender.

Table 1: Models proposed for confirmatory factor analysis.

Model	Factors	Items
One-factor	General hallucinatory predisposition	1-12
Two-factor	Subclinical factor	1-7
(Serper *et al.*, 2005)	Clinical factor	7-12
Three-factor	Tendency towards hallucinatory experiences	1, 2, 7-10 and 12
(Aleman *et al.*, 2001)	Subjective externality of thoughts	3, 4 and 11
	Vivid daydreams	5, 6 and 12
Three-factor	Vivid mental events	1-7
(Waters *et al.*, 2003)	Hallucinations with a religious theme	10-12
	Auditory and visual hallucinatory experiences	7-9 and 12
Four-factor	Vivid daydreams	2, 3, 5, 6 and 9
(Levitan *et al.*, 1996)	Clinical auditory hallucinations	7 and 9-12
	Intrusive or vivid thoughts	1, 3, 4 and 12
	'Sub-clinical forms' of auditory hallucinations	8 and 9

b) Principal components analysis

Table 3 shows the factor loadings and the communalities and percentage of variance explained for the two components obtained. The measure of sample adequacy (Bartlett's statistic) was 4766.2 ($p < 0.001$), with a Kaiser-Meyer-Olkin index of 0.81. The advised number of dimensions for Parallel Analysis was two. The first component corresponded to the items 7, 8, 9, 10, 11 and 12 and explained 42.24% of the total variance. This component was called Hallucinatory Experiences. The second component comprised the items 1, 2, 3, 4, 5 and 6 and explained 12.21% of the total variance; it was called Vivid Mental Events. The correlation between the two components was high and statistically significant ($r = 0.46$, $p < 0.01$). For this factorial solution Bentler's simplicity index was 0.99 and the Root Mean Square of Residuals (RMSR) was 0.08.

Table 2: Descriptive statistics for the items of the Launay-Slade Hallucination Scale-Revised.

	Total (n = 807)		Males (n = 245)		Females (n = 562)	
Items	*M*	*SD*	*M*	*SD*	*M*	*SD*
1. No matter how hard I try to concentrate, unrelated thoughts always creep into my mind	2.22	0.80	2.20	0.86	2.23	0.78
2. In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it	2.42	0.95	2.46	1.00	2.40	0.93
3. Sometimes my thoughts seem as real as actual events in my life	1.52	0.69	1.52	0.74	1.51	0.67
4. Sometimes a passing thought will seem so real that it frightens me	1.50	0.64	1.47	0.60	1.51	0.65
5. The sounds I hear in my daydreams are generally clear and distinct	1.50	0.74	1.53	0.76	1.48	0.73
6. The people in my daydreams seem so true to life that sometimes I think they are	1.41	0.72	1.46	0.75	1.38	0.71
7. I often hear a voice speaking my thoughts aloud	1.34	0.75	1.45	0.85	1.29	0.69
8. In the past, I have had the experience of hearing a person's voice and then found that no-one was there	1.23	0.45	1.23	0.49	1.22	0.43
9. On occasions, I have seen a person's face in front of me when no-one was in fact there	1.07	0.30	1.08	0.33	1.07	0.28
10. I have heard the voice of the Devil	1.02	0.20	1.03	0.28	1.01	0.15
11. In the past, I have heard the voice of God speaking to me	1.03	0.20	1.05	0.28	1.02	0.15
12. I have been troubled by hearing voices in my head	1.14	0.44	1.16	0.44	1.13	0.44

c) Confirmatory factor analysis

Subsequently, diverse confirmatory factor analyses were performed to test the five theoretical models (Table 1). The fit indices of the proposed models are displayed in Table 4. As can be observed, the models that presented the best fit to the data in comparison to the alternative models were Waters *et al.'s* (2003) three-factor model and Levitan *et al.'s* (1996) four-factor model. Waters *et al.'s* (2003) model had CFI and GFI values higher than 0.95. The RMSEA was less than 0.05 and the AIC value was lower in comparison with the remaining proposed models. The standardized loadings ranged from 0.38 to 0.89 and the percentage of explained variance from 0.15 to 0.80. The correlations between the latent variables were 0.32 (FI-FII), 0.74 (FI-FIII), and 0.68 (FII-FIII). Similarly, the fit indices for Levitan *et al.'s* (1996) model were adequate in comparison to the remaining models. The standardized loadings ranged from 0.12 to 0.75, with the exception of item 8 which presented a value of -0.85. The percentage of explained variance ranged from 0.21 to 0.71.

The correlations between the latent variables ranged from 0.27 (FII-FIII) to 0.61 (FI-FIII), except for the latent variable "Sub-clinical forms" (FIV) which was negatively correlated to the remaining dimensions (ranging from -0.28 to -0.45).

Table 3: Principal Components Analysis of the items in the Launay-Slade Hallucination Scale-Revised.

	Components		
Items	I	II	Communalities
1. No matter how hard I try to concentrate, unrelated thoughts always creep into my mind	-0.164	**0.611**	0.307
2. In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it	-0.113	**0.721**	0.457
3. Sometimes my thoughts seem as real as actual events in my life	0.070	**0.672**	0.500
4. Sometimes a passing thought will seem so real that it frightens me	0.062	**0.607**	0.407
5. The sounds I hear in my daydreams are generally clear and distinct	0.152	**0.618**	0.492
6. The people in my daydreams seem so true to life that sometimes I think they are	0.112	**0.649**	0.501
7. I often hear a voice speaking my thoughts aloud	**0.475**	0.310	0.459
8. In the past, I have had the experience of hearing a person's voice and then found that no-one was there	**0.607**	0.058	0.405
9. On occasions, I have seen a person's face in front of me when no-one was in fact there	**0.794**	0.070	0.686
10. I have heard the voice of the Devil	**0.982**	-0.104	0.880
11. In the past, I have heard the voice of God speaking to me	**0.877**	0.002	0.771
12. I have been troubled by hearing voices in my head	**0.758**	0.116	0.669
Eigenvalue	5.07	1.46	
% variance	42.24	12.21	
% accumulated variance	42.24	54.45	
Alpha coefficient	0.94	0.83	

Note: the most representative items of each factor are in boldface.

Table 4: Goodness-of-fit indexes for the proposed theoretical models.

Model	χ^2	*df*	GFI	CFI	RMSEA	RMSEA 90% CI	SRMR	AIC
One-factor	167.8	54	.92	.98	.051	.042-.060	.12	215.8
Two-factor (Server, *et al.* 2005)	105.9	52	.95	.99	.036	.026-.046	.10	157.9
Three-factor (Aleman, *et al.* 2001)	135.5	50	.93	.98	.046	.037-.055	.11	191.5
Three-factor (Waters, *et al.* 2003)	76.1	49	.96	.99	.026	.014-.037	.083	134.1
Four-factor (Levitan, *et al.* 1996)	68.3	44	.96	.99	.026	.013-.038	.081	136.3

Note: GFI = Goodness of Fit Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; SRMR = Standarized Root Mean Square Residual; AIC = Akaike Information Criterion.

Discussion

The objective of the present study was to analyze the dimensional structure of hallucinatory predisposition assessed using the Launay-Slade Hallucination Scale-Revised (LSHS-R) (Bentall & Slade, 1985) in nonclinical young adults. The psychometric properties of the LSHS-R were also examined. The results show that the LSHS-R self-report presents adequate psychometric properties to measure hallucinatory experiences in nonclinical populations and, moreover, that hallucinatory predisposition is a multifactorial structure similar to the one found in previous studies (Aleman *et al.*, 2001; Levitan *et al.*, 1996; Paulik *et al.*, 2006; Serper *et al.*, 2005).

The reliability of the LSHS-R, estimated by means of Cronbach's alpha coefficient for ordinal data (Elosúa & Zumbo, 2008) for the subscales was higher than 0.83. The Item Differential Functioning (DIF) analysis showed that the probability of responding to the items in the LSHS-R did not differ as a function of participants' gender. A large majority of previous studies have not reported data of the reliability of the scales based on the application of factor analysis (Aleman *et al.*, 2001; Levitan *et al.*, 1996; Paulik *et al.*, 2006; Serper *et al.*, 2005) or if items presented differential functioning as a function of participants' gender. These are two aspects we have attempted to address in the present work, which allow us to deepen our knowledge regarding the psychometric properties of the LSHS-R in nonclinical populations, with a view to endorsing and maximizing the inferences extracted from the data.

The Principal Components Analysis, using the matrix of polychoric correlations, indicated the presence of two components: Hallucinatory Experiences and Vivid Mental Events. Precise comparison of studies is hindered by the type of sample and statistical analysis employed, although there are some points of coincidence in the works. The factorial solution found in the Principal Components Analysis in the present work is consistent with the two-factor model proposed by Serper *et al.* (2005). The Hallucinatory Experiences component found in this study is similar to the auditory and visual hallucinatory experiences factor proposed by Waters *et al.* (2003), or to the clinical auditory hallucinations proposed by Levitan *et al.* (1996). The Vivid Mental Events component found in this study is similar to that found by Serper *et al.* (2005), or Waters *et al.* (2003). When the Confirmatory Factor Analysis was conducted it was observed that Waters *et al.*'s (2003) three-factor model and Levitan *et al.*'s (1996) four-factor model showed adequate fit to the data in comparison to the theoretical models proposed. These results are fairly similar to those obtained by Paulik *et al.* (2006), although it is true that these authors did not test the model proposed by Levitan *et al.* (1996) in their study. In relation to Levitan *et al.´*s (1996) model, in the present study negative correlations were found among the latent variables. This fact is clearly indicative of its structural complexity (e.g., some items saturate simultaneously in several factors) which, together with the fact that it has been validated in clinical populations, has led us to consider the model by Waters *et al.´*s (2003) as the most correct and parsimonious in explaining the dimensionality underlying the LSHS-R. In this regard, the data confirm the replicability and consistency of Waters *et al.´*s (2003) three-factor model and indicate that hallucinatory predisposition, measured using the LSHS-R, is a multidimensional construct.

With regard to gender and age, no differences were found as a function of participants' gender, but a low correlation between the total LSHS-R score and age was found (-0.11, $p < 0.01$). With regard to gender, and in a similar vein as in previous works (Lipp *et al.*, 1994; Paulik *et al.*, 2006; Waters *et al.*, 2003), no statistically significant differences were found between males and females in the total LSHS-R score. Nevertheless, when examining the positive subclinical symptoms measured with schizotypal or psychosis proneness scales, gender differences were found (Fonseca-Pedrero, Muñiz, Lemos-Giráldez, García-Cueto, Campillo-Álvarez, & Villazón García, 2007; Kwapil, Barrantes Vidal, & Silvia, 2008). Regarding age, few studies have examined this association using the LSHS-R (Larøi *et al.*, 2005). Previous investigations indicate that hallucinatory predisposition can vary as a function of participants' age. Thus, Larøi *et al.* (2005) found that youths score higher on some dimensions of hallucinatory predisposition (vivid daydreams and vivid and intrusive thoughts) whereas older people score higher in other dimensions (sleep-related hallucinations and auditory and visual hallucinations). However, diverse studies have found that subclinical psychotic experiences, or positive symptoms of schizotypy tend to correlate negatively with age (Fonseca-Pedrero, Lemos-Giráldez, Muñiz, García-Cueto, & Campillo-Álvarez, 2008; Paino, Fonseca-Pedrero, Lemos-Giráldez, & Muñiz, 2008; Peters *et al.*, 2004; Scott *et al.*, 2008; van Os, Hanssen, Bijl, & Vollebergh, 2001). Future studies should continue to analyze and advance in the com-

prehension of the role played by gender and age in the expression of hallucinatory predisposition.

Interest in hallucinatory experiences in general and clinical populations is not a new topic, although it has recently increased in the scientific community. The literature shows that psychotic experiences can occur in the absence of a psychopathological disorder, and that they are frequent in adolescents, adults, and the elderly (Fonseca-Pedrero *et al.*, 2009; Fonseca-Pedrero, Lemos-Giráldez, Paino, Villazón-García, & Muñiz, 2009; Kendler *et al.*, 1996; Scott *et al.*, 2006). Hallucinatory experiences are located on a severity continuum that ranges from health to illness (van Os, Hanssen, Bijl, & Ravelli, 2000). In this sense, most hallucinatory experiences are not persistent, they are transitory and not necessarily related to future psychotic disorders (Dhossche *et al.*, 2002); however, approximately 10-25% of these subclinical psychotic experiences can interact synergetically or additively with genetic and environmental risk factors (i.e., cannabis, urbanicity, etc.) becoming abnormally persistent and clinically relevant (van Os *et al.*, 2009). Lastly, early identification of these individuals with hallucinatory predisposition or subclinical psychotic experiences, and subsequent implementation of prophylactic treatments is of particular interest; therefore, instruments with adequate psychometric properties to measure these aspects are needed.

The dimensional structure of hallucinatory predisposition has been verified by studying the psychometric properties of the LSHS-R, although the results of the present study should be interpreted in the light of some limitations. Firstly, while in the international literature a 5-point Likert response format is used for the LSHS-R (0= "*certainly does not apply to you*"; 1= "*possibly does not apply to you*"; 2= "*you're unsure";* 3= "*possibly applies to you*"; 4 = "*certainly does apply to you*"), a 4-point Likert format was employed in this study and, therefore, we must be cautious when making comparisons to the results of other studies. By using a 4-point Likert response format and eliminating option 2 "*you're unsure*" we avoided the tendency to respond with the central value, and we restricted the score range, thus, preventing the distribution from having high values of asymmetry and kurtosis. Secondly, we used a single self-report measure, and the complementary use of other self-reports that assess anxious-depressive symptomatology or their combination with structured interviews would have been interesting. Thirdly, early adulthood is a stage of great hormonal and/or neurochemical changes, which can affect the phenotypal expression of these experiences. . Fourthly, we point out that we did not gather information about the possible existence of a psychiatric disorder in the participants or if they were taking any medication. Lastly, the sample employed in this study was composed of college students with a limited age range and mostly women, which, to some extent, limits the generalization of the results to other samples.

Future studies should continue to advance in the measurement of predisposition to hallucinatory experiences, as well as investigate the invariance of these experiences across different cultures, thereby guaranteeing cross-cultural comparability and equivalence of the construct (Byrne, 2008) as well as its relationship to other psychological constructs (Fonseca-Pedrero, Paino, *et al.*, 2009). It would also be interesting to use this instrument in longitudinal studies in order to examine its predictive validity, sensitivity, and specificity.

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Appendix A

Spanish version of the Launay-Slade Hallucination Scale-Revised

1. Por mucho que intente concentrarme, siempre irrumpen en mi mente pensamientos que no guardan relación con lo que hago.
2. Cuando sueño despierto puedo oír el sonido de una melodía casi con la misma claridad que si la estuviera escuchando realmente.
3. A veces mis pensamientos parecen tan reales como las cosas que me ocurren de verdad.
4. A veces un pensamiento pasajero parece tan real que me asusta.
5. Los sonidos que oigo en mis ensoñaciones generalmente son claros y nítidos.
6. Las personas que aparecen en mis ensoñaciones parecen tan reales que a veces pienso que existen.
7. A menudo oigo una voz que dice mis pensamientos en voz alta.
8. En el pasado, he tenido la experiencia de oír la voz de una persona y luego me he dado cuenta de que no había nadie allí.
9. En ocasiones, he visto el rostro de una persona delante de mí cuando en realidad allí no había nadie.
10. He oído la voz del diablo.
11. En el pasado he oído la voz de Dios dirigiéndose a mí.
12. He estado preocupado por oír voces en mi cabeza.