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Peter's delusions inventory in Spanish general population: internal reliability, factor structure and association with demographic variables (dimensionality of delusional ideation)

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Introduction. Several lines of evidence suggest the existence of a continuum on psychotic symptoms, including delusions. Moreover, several studies have reported differences regarding prevalence and intensity of these symptoms in relation to age, gender and educational level. This study tries to analyze distribution and dimensionality of delusional ideation in the general population, as well as relationship between gender, age and educational level with the prevalence of these symptoms.

Method. We used the 21-item Peters. Delusions Inventory (PDI-21) on a general population sample as our measure of delusional ideation. A factor analysis was carried out to determine the dimensionality of delusional ideation. Next, linear regression analyses were performed to analyze the relationship of age, gender and educational level with the different dimensions.

Results. 365 subjects completed the inventory. Factor analysis revealed the presence of 7 easily interpretable factors. Five of these factors were negatively correlated with age. Women had higher scores on the «magical thinking» factor. Finally, lower educational level was correlated with higher scores on those factors of «magical thinking» and «experiences of influence».

Conclusions. It appears that the PDI-21 is a useful instrument to measure dimensionality of delusional ideation in Spanish general population. Results of the influence of gender, age and educational level are in agreement with those reported in psychosis samples, supporting the existence of a continuum in psychoses.

Key words:
Delusional ideation. Continuum. Psychosis. Age. Sex. Educational level.

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El Inventario de experiencias delirantes de Peters (PDI) en población general española: fiabilidad interna, estructura factorial y asociación con variables demográficas (dimensionalidad de la ideación delirante)

Introducción. Numerosos estudios apoyan la existencia de un continuum en los síntomas psicóticos, incluyendo los delirios. Por otro lado, varios estudios han encontrado diferencias en cuanto la frecuencia e intensidad de estos síntomas en relación con la edad, sexo y nivel educativo de los sujetos. Este estudio trata de analizar la distribución y dimensionalidad de la ideación delirante en la población general, así como la relación del sexo, la edad y el nivel educativo con la presencia de estos síntomas.

Método. Para medir la ideación delirante se utilizó el inventario de experiencias delirantes de Peters de 21 ítems (PDI-21) a una muestra de población general. Se realizó un análisis factorial para determinar la dimensionalidad de la ideación delirante. Posteriormente se realizaron análisis de regresión lineal para analizar la relación de la edad, el sexo y el nivel educativo con las diferentes dimensiones.

Resultados. Trescientos sesenta y cinco sujetos cumplimentaron el cuestionario. El análisis factorial reveló la presencia de siete factores fácilmente interpretables. Cinco de los factores se correlacionaron de manera negativa con la edad. Las mujeres obtuvieron puntuaciones significativamente más altas en el factor «pensamiento mágico». Finalmente, un menor nivel educativo se correlacionaba con mayores puntuaciones en los factores «pensamiento mágico» y «vivencias de influencia».

Conclusiones. El PDI-21 resulta ser un instrumento útil para medir la dimensionalidad de la ideación delirante en la población general española. Los resultados obtenidos sobre la influencia del sexo, la edad y el nivel educativo están en consonancia con los obtenidos en muestras de pacientes psicóticos, apoyando la existencia de un continuum en las psicosis.

Palabras clave:
Ideación delirante. Continuum. Psicosis. Edad. Sexo. Nivel educativo.

INTRODUCTION

Schizophrenia is a serious mental disease that affects approximately 1% of the general population. One of the main criteria used by traditional classifications (DSM or ICD) to establish the disease diagnosis has been presence of delusional symptoms. Several studies suggest that these symptoms are not only present in the clinical population but are also found in the general population [1-5]. As in other diseases such as depression (that share many similarities with psychoses in psychopathology, prognosis, risk factors and treatment) [6] in the field of psychosis, the theory of the existence of a continuum in the population seems more plausible than the existence of a dichotomic disease [2-5]. However, presence of these symptoms in form of continuum would not necessarily indicate the presence of a «disorder» continuum. In a study in the United States on general population (US National Comorbidity Survey), approximately 28% of the subjects evaluated scored positively in the items that assessed psychotic symptoms. However, when these were evaluated by professionals, only 0.7% were diagnosed, in spite of using a wide term for psychosis [7]. This would indicate that the presence of these symptoms would not imply a frustrated form of the disease but rather a risk marker for the occurrence of what the professionals would establish as a «case».

Thus, it is interesting to consider that described previously, to know what are the risk markers and how they are distributed in the population.

Two types of findings support the hypothesis of the existence of a critical period in physiological neurodevelopment during late adolescence and youth that would favor the presence of delusional symptoms. On the one hand, several studies in other functional psychoses, such as bipolar disorder, have observed that when the onset of the disease is produced in late adolescence or youth, the presence of psychotic symptoms is more florid than if it occurs in later stages of life [8-10]. On the other hand, we have the findings found in the organic psychiatric syndromes in which a greater presence of psychotic symptoms is observed when these are established at the end of the second and third decade of life than when it occurs before or after [11,12].

Peters et al. elaborated the «Peters et al. delusions inventory» [13] (PDI) to assess the presence of delusional phenomena in the general population. This questionnaire makes it possible to detect delusional symptoms that are found subclinically in the general population.

Using a sample of subjects who came to a health care site in the Aquitania region, in whom psychiatric disease was ruled out, Verdoux et al. [14] detected a negative correlation between age and delusional experiences, a finding that is in agreement with the previously presented theories.

In the present study, we try to analyze the presence and distribution of these experiences in a sample of Spanish general population and its dimensionality. In a second step, we try to analyze the influence of age, gender and educational level on the different dimensions.

METHOD

The PDI-21 is a self-applied 21-item questionnaire that was designed to measure delusional experiences in the general population. The questionnaire was made from the items used in the Present State Examination [15] to measure delusional ideation, but these were modified, introducing expression such as «Have you ever had the sensation that..?» or «Have you ever thought...?» in order to evaluate experiences over the life time or attenuated symptoms. The total score is obtained by adding the positive response for each one of the items with a maximum score of 21. Each one of the items has three subscales to measure the grade of conviction, concern and stress. These subscales are scored from 1 to 5 and are only filled out when the question has been answered affirmatively.

This questionnaire demonstrated that it had good internal consistency, test-retest reliability, concurrent and discriminate validity and criterion validity (in a sample of delusional patients) in the original study [16].

The PDI-21 has already been used in different studies, including: general population studies [14], studies in twins [17], studies of familial aggregation in the tendency to present delusional symptoms [18], in comparisons of cognitive performance based on PDI score [19,20], to evaluate the multidimensionality of the delusional ideation in certain minority religious groups [21] and in cannabis consumers [22].

After requesting permission from the original author, the PDI-21 was translated to Spanish and then was sent to a third person who backtranslated it to English and this was sent to the original author for her approval.

Once the authorization was obtained from the original author, the questionnaire format was designed. The fields were introduced on the first sheet in order to fill out the study sociodemographic variables (appendix 1).

A network distribution system was used to select the sample, using workers from different professions in a mental health clinic who distributed the questionnaires to healthy subjects. To do so, it was stressed that the subject should have no psychiatric background. The remaining study variables were recorded together with the administration of the PDI-21.

In order to determine the different dimensions of delusional ideation, the principal components were analyzed based on the matrix of the correlations of the 21 items. Factors with self-values greater than 1 that initially were not rotated were subjected to varimax rotation. Regression scores

Appendix 1 — Spanish version of Peters delusions inventory

PDI

Este cuestionario ha sido diseñado para medir la frecuencia de determinadas ideas y fenómenos psíquicos que la mayor parte de la gente ha experimentado en algún momento de su vida. Le pedimos su colaboración para un estudio mediante el cual queremos valorar la frecuencia y las características de estos fenómenos en nuestro medio. Puede comprobar que el cuestionario es totalmente confidencial y que los resultados serán únicamente empleados con fines científicos. Si usted, voluntariamente, está dispuesto a colaborar conteste por favor a las siguientes preguntas del modo más sincero posible. No hay respuestas correctas o incorrectas, ni preguntas trampa. Tenga en cuenta que no estamos interesados en las experiencias que se hayan sentido bajo la influencia de las drogas.

ES IMPORTANTE QUE USTED CONTESTE TODAS LAS PREGUNTAS

Cuando usted conteste NO a una pregunta, por favor pase directamente a la siguiente pregunta.

Cuando usted conteste SÍ a una pregunta, estaremos interesados en: *a)* cuánto le inquietan o molestan estas creencias o experiencias; *b)* cuánto piensa en ellas; y *c)* en qué medida piensa usted que estas creencias o experiencias son ciertas. Al final de cada pregunta usted podrá puntuar estos tres aspectos entre 1 y 5 según su intensidad.

Por ejemplo:

- Si usted contesta que SÍ a una pregunta y se trata de una creencia que le preocupa muchísimo tendrá que rodear la cifra 5 en el lugar adecuado:

  No me inquieta en absoluto 1 2 3 4 5 Me inquieta muchísimo

- Si usted contesta que SÍ a una pregunta y se trata de una creencia en la que no piensa casi nunca tendrá que rodear la cifra 1 en el lugar adecuado:

  Casi nunca pienso en ello 1 2 3 4 5 Pienso en ello continuamente

- Su respuesta también podrá ser intermedia, para lo cual podrá contestar 2, 3 ó 4 en el lugar adecuado; por ejemplo, si ha contestado que SÍ a una pregunta pero duda sobre la certeza de la creencia o experiencia a la que se refiere esa pregunta:

  No creo que sea cierto 1 2 3 4 5 Creo que es totalmente cierto

DATOS PERSONALES

Sexo: Varón ☐ Mujer ☐ Edad ..... Fecha ..... / ..... / .....

Nivel educativo (crucear la correcta):
☐ Estudios primarios incompletos ☐ Estudios primarios completos
☐ Formación profesional ☐ Bachillerato
☐ Diplomatura universitaria ☐ Licenciatura universitaria

Edad a la que dejó de estudiar .....

1. ¿Tiene alguna vez la sensación de que la gente insinúa cosas sobre usted o le dicen cosas con un doble sentido?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

2. ¿Tiene alguna vez la sensación de que hay cosas que aparecen en la televisión o en el periódico dirigidas especialmente para usted?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

Appendix 1 | Spanish version of Peters delusions inventory (continuation)

3. ¿Tiene alguna vez la sensación de que algunas personas no son realmente las que aparentan ser?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

4. ¿Tiene alguna vez la sensación de que está siendo perseguido de algún modo?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

5. ¿Tiene alguna vez la sensación de que existe una conspiración contra usted?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

6. ¿Tiene alguna vez la sensación de ser una persona muy importante o de estar destinado a serlo?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

7. ¿Tiene alguna vez la sensación de ser una persona muy especial, fuera de lo común?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

8. ¿Tiene alguna vez la sensación de que usted está especialmente cerca de Dios?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

Appendix 1 | Spanish version of Peters delusions inventory (continuation)

9. ¿Ha llegado usted a pensar que la gente se puede comunicar por telepatía?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

10. ¿Tiene alguna vez la sensación de que algunos aparatos eléctricos, como los ordenadores, pueden influenciar a distancia su forma de pensar?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

11. ¿Tiene alguna vez la sensación de que usted ha sido, de algún modo, elegido por Dios?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

12. ¿Cree usted en el poder de la brujería, del vudú y de las fuerzas ocultas?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

13. ¿Está usted a menudo preocupado porque su pareja le pueda ser infiel?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

14. ¿Tiene alguna vez la sensación de que usted ha cometido más pecados que la mayoría de la gente?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

Appendix 1 | Spanish version of Peters delusions inventory (continuation)

15. ¿Tiene alguna vez la sensación de que la gente le mira de forma extraña por su aspecto o apariencia?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

16. ¿Tiene alguna vez la sensación de que no tiene ningún pensamiento en su cabeza?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

17. ¿Tiene alguna vez la sensación de que el mundo está a punto de terminar?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

18. ¿Tiene alguna vez la sensación de tener pensamientos en su cabeza que usted no reconoce como propios?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

19. ¿Han sido alguna vez sus pensamientos tan intensamente vividos que le ha llegado a preocupar el que otras personas los pudieran oír?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

20. ¿Tiene alguna vez la sensación de oír sus propios pensamientos repetidos como por un eco?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

21. ¿Tiene alguna vez la sensación de ser como un robot o un zombi, como si su cuerpo no obedeciera a su propia voluntad?

NO SÍ (marque la respuesta adecuada)

Si ha contestado NO => pase a la siguiente pregunta
Si ha contestado SÍ => rodee las cifras que mejor describan cómo se siente

No me inquieta en absoluto	1	2	3	4	5	Me inquieta muchísimo
Casi nunca pienso en ello	1	2	3	4	5	Pienso en ello continuamente
No creo que sea cierto	1	2	3	4	5	Creo que es totalmente cierto

Muchas gracias por su colaboración. Por favor, tras comprobar que ha contestado a TODAS las preguntas entregue el cuestionario a la persona que se lo ha facilitado o envíelo por correo con el sobre que se le ha proporcionado

were obtained for each case. The linear regression analysis provided regression coefficients and confidence intervals (95% CI) which were later adjusted for the confounding variables when analyzing the relationships between age, gender and educational level on the one hand and delusional ideation, on the other. The Statistical Package for the Social Sciences (SPSS) in its version 10.1 was used for the statistical analyses.

RESULTS

Sample characteristics

A sample of 356 subjects was obtained, 165 men (45.2%) and 192 women (52.6%) (gender was not determined in 8 subjects [2.2%]). Mean age was 36.06 years (SD 12.4) with age range from 18-82 years (age was not determined in only one). Educational level, expressed as maximum grade acquired, was the following: 42 (11.5%) only had primary studies, 59 (16.2%) vocational training, 47 (12.9%) high school, 87 (23.8%) university diploma and 125 (34.2%) university degree.

Regarding internal reliability of PDI-21 in our sample, Cronbach's alpha coefficient was 0.75. Frequency of each one of the items and item-total correlation are described in table 1.

Regression analysis between study variables and total score of the questionnaire revealed a significant inverse correlation for age (β: –0.373 [95% CI] [–0.114- –0.065]) ($p < 0.000$) and educational level (β: –0.225 [95% CI: -0.674- -0.256] ($p<0.000$). No significant relationship was found for gender. These results are similar to those obtained in delusional ideation studies with other assessment instruments[23].

Factorial analysis

Kaiser-Meyer-Olkin measure of sampling adequacy was 0.758 and Bartlett test of spericity of 1049 ($p<0.0001$) so that the requirement to conduct the analysis of the main components are satisfied.

A total of 7 factors that explain 53.7% of the variance was obtained (table 2). These factors were easily interpretable, having examined the items with greatest load for each one of them. We called factor 1 «experiences of influence» since the items composing this factor refer to, above all, thought control phenomena (influence of electric apparatuses, such as computers, in thought capacity, having thoughts in one's head that are not recognized as one's own or listening to ones own thoughts out loud). Factor 2 items refer to guilty ideas (the person has committed more sins than most of the people) and infidelity so that we call it «depressive». The items in factor 3 refer to conspirations and persecutions (having the sensation that one is being pursued by someone or thought that there is a conspiracy against oneself), so that we call it «paranoid». Factor 4, «grandiosity», deals with megalomanic type aspects (having the sensation of being someone very important or being an unusual person). Factor 5, «referential», deals with messages with different interpretations and feeling observed (people say things to the subject having a double meaning or look at him/her strangely due to his/her appearance). Factor 6, «magic thinking», refers to occult forces and witchcraft. Factor 7, «religiousness», refers to subjects related with God.

Influence of age, gender and educational level on the delusional dimensions

Five of the 7 factors were significantly correlated with age after being adjusted for gender and educational level. These 5 dimensions («experiences of influence», «depressive», «grandiosity», «referentialty» and «magic thinking») correlated negatively with age, so that the younger the subjects, the greater symptom intensity. In regards to gender, a significant difference (β: 0.249; $p = 0.017$) was only observed for the factor «magic thinking», this being more intense among women. In regards to educational level, the factors «experiences of influence» and «magic thinking» significantly correlated with it, symptom intensity of these two dimensions being greater the lower the educational level acquired by the subjects (table 3).

DISCUSSION

Principal findings of the study and comparison with previous studies

The factorial analysis makes it possible to group the combination of delusional symptoms into different dimensions.

Table 1 Frequency of the items and item-total correlation (r)

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Mean	0.51	0.10	0.75	0.13	0.06	0.11	0.16	0.11	0.43	0.08	0.06	0.29	0.11	0.04	0.20	0.10	0.08	0.13	0.08	0.11	0,07
r	0.53	0.49	0.39	0.43	0.36	0.36	0.45	0.26	0.47	0.33	0.25	0.43	0.35	0.49	0.48	0.32	0.32	0.44	0.39	0.43	0,37

Table 2 Factorial analysis of the 21 items of the PDI

	Component						
	Experiences of influence	Depressive	Paranoid	Grandiosity	Referential	Magic thinking	Religiousness
PDI10	**0.627**	−0.037	0.185	0.021	0.026	0.131	−0.141
PDI18	**0.611**	0.298	−0.049	0.055	0.076	0.110	0.093
PDI19	**0.573**	0.076	0.046	0.098	0.327	−0.052	0.128
PDI21	0.204	**0.722**	−0.126	0.066	0.164	0.027	−0.109
PDI14	−0.050	**0.543**	0.394	0.093	0.145	0.202	−0.025
PDI20	0.453	**0.485**	−0.011	−0.065	−0.060	0.076	0.178
PDI13	−0.043	**0.464**	0.248	0.336	0.012	−0.013	0.026
PDI5	0.121	0.064	**0.785**	0.137	−0.071	0.023	0.133
PDI4	0.090	0.052	**0.693**	−0.041	0.415	0.040	0.026
PDI6	0.043	0.012	0.018	**0.792**	−0.043	0.102	0.146
PDI7	0.030	0.150	0.084	**0.707**	0.200	0.048	0.089
PDI15	0.051	0.096	0.264	0.232	**0.607**	0.111	−0.139
PDI1	0.304	0.086	0.082	0.236	0.597	−0.001	0.033
PDI16	0.017	0.078	−0.079	−0.191	**0.558**	0.220	0.208
PDI9	0.095	0.132	0.156	0.076	−0.102	**0.685**	0.127
PDI17	−0.107	0.130	0.000	−0.141	0.234	**0.606**	0.085
PDI12	0.189	0.015	−0.143	0.235	0.174	**0.596**	−0.089
PDI3	0.314	−0.230	0.204	0.176	0.033	**0.419**	−0.039
PDI11	−0.192	0.004	−0.018	0.168	0.181	0.049	**0.760**
PDI8	0.341	−0.062	0.171	0.139	−0.147	−0.066	**0.675**
PDI2	0.237	0.391	0.249	−0.023	0.119	0.192	0.391

Extraction method: analysis of principal components. Rotation method: varimax normalization.

We have obtained a total of 7 factors in our study, «experiences of influence», «depressive», «paranoid», «grandiosity», «referentiality», «magic thinking» and «religiousness». We have called these factors in this way after analyzing the items with greater factorial load. This type of analysis was previously used on many occasions. Specifically, the result obtained by other authors [13,14,16] has been similar to that obtained in our study in the evaluation of delusional symptoms. In this way, the theory that the delusional symptoms are not present unitarily is strengthened. Furthermore, the presence of certain symptoms does not necessarily led to the fact that others are present.

In relationship with age, the results obtained are similar to those obtained by other authors, both when clinical populations have been studied [24-26] as well as in the general population [13,14,27-29]. It is seen that the presence of delusional experiences decreases as age increases. It would be interesting to consider some aspects in relationship to the different factors. On the one hand, the factors «experiences of influence», «magic thinking» and «referentiality», that would form a part of the most schizotypal symptoms of the delusional spectrum negatively correlate with age, as does schizotype in general. On the other hand, the factors «grandiosity» and «depressive», that would make up the delusional spectrum of the affective symptoms, also negatively correlate with age. Kendler and Hewitt [30] found a negative correlation between age and positive symptoms of schizotype, but not with the negative symptoms. Bentall et al. [31] also found a negative correlation between age and «positive schizotype» while Launay and Slade [32] did not find any correlation between age and predisposition to hallucinations. Finally Venables and Bailes [27] found a negative correlation between age and positive schizotypal symptoms, social anxiety, disorganization and physical anhedonia, but not with social anhedonia. These findings would agree with these previous studies, supporting the theory that there is a period in neurodevelopment during late adolescence and youth when the risk of presenting positive symptoms would be increased.

Gender was another one of the variables that we included in the study. As has already been commented on previously, there is an important number of studies that have tried to determine possible differences in practically all the aspects of the disease. We have observed in our study that the dimension «magic thinking» is present in different in-

Table 3 Relationship between scores of the PDI-21 dimensions and age, gender and educational level

	Factor 1 Experiences of influence	Factor 2 Depressive	Factor 3 Paranoid	Factor 4 Grandiosity	Factor 5 Referentiality	Factor 6 Magic thinking	Factor 7 Religiousness
Scores of total sample (median, interquartile range)	−0.22 (−0.57.0.16)	−0.36 (−0.57. 0.22)	−0.17 (−0.42. 0.07)	−0.34 (−0.56. 0.16)	−0.24 (−0.61. 0.46)	−0.24 (−0.70. 0.24)	−0.20 (−0.37. −0.02)
Analysis adjusted with 95 % CI							
Gender	0.046 (−0.159. 0.251) p = 0.65	0.059 (−0.151. 0.270) p = 0.57	0.098 (−0.310. 0.113) p = 0.36	−0.143 (−0.344. 0.057) p = 0.16	−0.117 (−0.322. 0.087) p = 0.26	0.249 (0.044. 0.453) **p = 0.017**	0.187 (−0.025. 0.399) p = 0.084
Age	−0.009 (−0.18. −0.001) **p = 0.033**	−0.011 (−0.020. −0.003) **p = 0.01**	−0.002 (−0.011. 0.007) p = 0.67	−0.024 (−0.032. −0.016) **p < 0.001**	−0.019 (−0.27. −0.010) **p < 0.001**	−0.014 (−0.022. −0.005) **p = 0.002**	−0.005 (−0.004. 0.014) p = 0.26
Educational level	−0.148 (−0.221. −0.076) **p < 0.001**	−0.067 (−0.142. 0.008) p = 0.07	−0.058 (−0.134. 0.17) p = 0.12	−0.051 (−0.122. 0.020) p = 0.15	0.011 (−0.62. 0.084) p = 0.76	−0.081 (−0.154. −0.008) **p = 0.03**	0.039 (−0.036. 0.115) p = 0.30

tensity in men than in women, it being greater in the latter. This result is similar to that found in previous studies on the subject [27,28,34]. It seems that this information could be related with the hypothesis of those studies that propose a greater presence of positive symptoms in women.

Finally, we have evaluated the educational level of the subjects. This aspect has not been taken into account in many of the studies done in this field, although a recent study with 80 subjects has found that the combination of urban residence and greater educational level is associated with higher total scores on the PDI-21 [35]. However, the results of the study referred to are difficult to compare with those of the present study since, on the one hand, the sample comes from a country (Uganda) that is very different from ours sociodemographically and, on the other, upper educational level is considered to be the fact of having done secondary studies. There are some studies that have evaluated neurocognitive functioning in relationship with the total PDI-21 scores [36,37]. They have observed that subjects who present high scores on the PDI-21 obtain worse results on the tasks evaluating cognitive functions. In our study, after adjusting the results by age and gender, score in the dimensions «experiences of influence» and «magic thinking» is greater the lower the educational level reached by the subjects. As has been previously mentioned, these two dimensions would form a part of the schizotypal spectrum and specifically of one of its dimensions, the positive one (within the different schizotypal models, one of the most accepted indicates the existence of three dimensions, positive, negative, and disorganized).

Study limitations

This study has been done with a sample obtained from a distribution system in the network, which has not allowed us to know the percentage of subjects who refused to fill out the questionnaire. Although we know the approximate number of questionnaires distributed and the number of questionnaires received, and apparently, there is not much different, we do not know how many persons were offered the possibility of filling out the questionnaire and refused. It is possible that part of the subjects who refused to fill out the questionnaire were more «untrustful», which would represent a subgroup of characteristics different from the rest of the sample. However, other forms of sample selection are also subject to some type of biases. The possibility of obtaining a sample of subjects who came to the blood bank was considered, however, probably, the type of subjects who come to this type of facility is not representative of the general population, given the necessary conditions required to be able to be a blood donor and the personal characteristics of the donors. The Verdoux et al. [14] sample was made up by subjects who came to the primary health care physician and, although the screening of the presence of psychiatric background was adequate, it is likely that some subjects were «frequent visitors» of the health care site.

In our study, no interviews were made for the screening of personal psychiatric backgrounds. It was decided to maintain anonymity of the questionnaire, supposing that, in this way, the number of subjects who would refuse to do the study would be less. In any event, the need to exclude

those subjects who admitted having personal and/or family background of psychiatric disorders was stressed.

One of the aspects to consider is the high prevalence of subjects who have university studies. This is probably due to the fact that, given that most of the workers of a mental health care service are university graduates, their acquaintances to whom they distribute the questionnaires are also this. The educational level does not directly reflect cognitive performance. However, once this is adjusted by subject's age and gender, it may be useful to use this parameter as an indirect measure of it.

Some of the subjects did not fill out age, gender or educational level. However, they were included when doing the statistical analysis since there was no case in which they did not fill out any of the study variables.

The statistical procedure we have has already been used previously in many studies. When doing the factorial analysis, only factors with self-values greater than one were taken into account, the number of factors being determined by the statistical analysis and not by a previous hypothesis that would make it necessary to predetermine the number of factors. Interpretation of the factors was quite simple, as has been previously described, thus providing sufficient coherence to the factorial analysis. In regards to the statistical methods of inference used (the factorial analysis is a descriptive method), the regression analysis, as it is a multivariate analysis and as the effect of each variable is corrected by the rest of the variables introduced, is seen as a very conservative method.

CONCLUSIONS

The results obtained in our Spanish population sample is similar to those obtained in other populations in regards to the distribution of symptom frequency. Thus it appears that the PDI-21 captures delusional ideation in our setting adequately.

The factors obtained are easily interpreted and represent the spectrum of delusional symptoms that are observed in psychosis in a very high proportion.

The findings obtained in relationship with age and gender are very similar to those described in the psychoses.

The most «schizotypal» dimensions occur in greater intensity in subjects with lower educational level.

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