

## **The Polish version of the Peters et al. Delusions Inventory: factor analysis, reliability and the prevalence of delusion-like experiences in the Polish population**

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### **Summary**

**Aim.** The study aimed at providing the psychometric properties of Polish version of Peters et al. Delusions Inventory (PDI) (1999) and assessing the prevalence of delusion-like experiences among healthy subjects in the Polish population.

**Method.** Polish version of PDI was developed on the basis of back translation procedure. The scale was completed by 421 adult subjects. On the basis of the scores, the factor analysis, the reliability of the scale and the frequency of delusion-like experiences in the Polish population were calculated.

**Results.** The Polish version of Peters et al. Delusions Inventory has satisfactory reliability (Cronbach's alpha ranged from 0.084 to 0.87). The examination of scree plot suggests a single-factor solution. The participants confirmed the incidence of, on average, 12.5 (SD = 6.9), out of 40 different experiences measured using PDI. In the current study the most frequently asserted delusion-like belief is that people say things with double meaning (79.8% of participants), while the least likely beliefs were those similar to delusions observed among psychiatric patients (2.37% of participants).

**Conclusions.** The Polish version of PDI is characterised by good psychometric properties and can be used for delusion-like experiences assessment in non-clinical population. The frequency of delusion-like experiences in the Polish population varies from 2 to 80% depending on their content.

**Key words:** delusions, delusion-like experiences, Peters et al. Delusions Inventory

## Introduction

Despite the fact that delusions are important diagnostic criteria of psychotic disorders, many of current researches indicate that in the more attenuated forms they could also be experienced by healthy individuals [1–3]. This observation has become the basis of the so – called psychosis continuum hypothesis saying that in general population the distribution of psychotic-like experiences delusions could be described as a continuum which involves both clinical symptoms and psychotic-like experiences that do not have clear diagnostic significance. The psychotic-like experience could be considered as a spectrum of psychotic disorders or as the risk factors of psychotic disorders, but not as a manifestation of full-blown psychosis [1–8]. The most recent meta-analysis indicate that the prevalence of psychotic like experiences among healthy subjects in general population vary from 7.2 [9] to 8 % [1].

The continuum of psychosis does not concern only the phenomenological similarities between the experiences laying on its extremes, but they were also associated with similar risk factors, and similar cognitive [10–14], emotional [15, 16] and personality traits [17–20] as the clinically relevant psychotic symptoms. What is more, the recent researches showed that the psychotic-like experiences may have similar neural correlates as psychotic disorders. These anomalies, however, do not reach the same level of intensity as in case of patients revealing clinical symptoms [21].

The psychosis continuum hypothesis is being tested in wide range of empirical studies and contributes to a better understanding of risk factors of psychosis. The researches and observations based on the continuum approach have helped so far to expand the knowledge on disorders such as depression, anxiety disorders and personality disorders [9].

Testing the psychosis continuum hypothesis requires reliable research tools. So far, the instruments for assessing delusion-like experiences [22] and hallucination-like experiences [23, 24] have been developed. The questionnaire for measuring the hallucination-like experiences is available in the Polish language version [25]; however, there is still lack of reliable psychometric instrument for measuring delusion-like experiences.

The most commonly used method for assessing delusional ideation is the Peters et al. Delusions Inventory (PDI) [22]. The PDI contains 40 items related to unusual beliefs. The items used in the construction of the PDI were taken from the Present State Examination (PSE, 9<sup>th</sup> ed.) or they were based on the authors' clinical experience. The items were selected in such a way so as to cover a wide range of delusional beliefs. The categories of delusions included in the PDI were: delusions of control (items 1–5); misinterpretations, misidentifications and delusions of reference (items 6–10); delusions of persecution (items 11–15); expansive delusions (items 16–20); delusions of control and influence (items 21–25); delusions of guilt or sin, depersonalisation, hypochondriasis (items 31–35); other delusions (items 26–30). The list of delusional ideas was extended to 5 other items depicting experiences of disturbed thinking, such

as: delusions of mind being read and thoughts insertion, thoughts echo and broadcast (items 36–40). The items which constitute the PDI were softened by adding ‘as if’ at the beginning of each statement in order to capture the experiences of healthy individuals. What is more, to capture phenomena that occurred over a lifetime rather than during the specific period of time, the words ‘do you ever feel’ or ‘do you ever think’ were added at the beginning of each question. For each item the participants choose ‘yes’ or ‘no’ answer deciding, thus, whether or not he/she has held a particular belief. The PDI total score ranges from 0 to 40 points and represents the number of ‘yes’ responses.

According to the multi-dimensionality of delusion-like experiences the PDI general score reflecting the presence or absence of certain experiences was supplemented by information concerning belief strength, preoccupation, and distress caused by a particular belief. For each one of the PDI items participants rate the degree of conviction, preoccupation and distress on the 5-point Likert subscales. The respondents fill the subscales only if their response to main question was ‘yes’. The score obtained by a participant on each of the subscales ranges from 0 to 200.

Studies have confirmed the utility of the incorporation of the distress, preoccupation and conviction dimensions into the PDI; however, these additional subscales lengthen the process of completing the scale [22, 26–28]. The subjective experience of distress caused by delusion-like beliefs and the level of preoccupation of the unusual experiences allows us to predict whether these experiences are related to high risk of psychotic disorders development more accurately than the PDI total score. The significance of the scores obtained on the subscales of conviction, preoccupation and distress for the assessment of the risk of psychosis has also been confirmed in the researches performed on the groups of patients diagnosed with schizophrenia, schizoaffective disorders, and affective disorders with psychotic symptoms [22, 29–33]. Patients obtained higher scores on the subscales of distress and preoccupation than participants from general population. They could also differ from healthy people in the score on the conviction subscales; however, the patients’ higher scores on conviction subscales have not always been confirmed in empirical studies [30].

The Peters et al. Delusions Inventory (PDI) and its short version (PDI-21) have been translated into several languages so far, i.e. Chinese [33], French [31], Spanish [34], Japanese [35], Korean [32], German [28] and Italian [36]. Various language versions of the PDI are characterised by good reliability, which indicates that PDI could be used as a measurement tool for the delusion-like experiences independently from the cultural context. Moreover, the studies indicate that different populations differ in the incidence of particular delusion-like experiences. The Polish version of the Peters et al. Delusions Inventory has not been elaborated so far.

### **Aim**

The aim of the study was to provide the Polish version of the Peters et al. Delusions Inventory, conduct the factor analysis of the scale, present the reliability of the

tool, and assess the frequency of delusion-like experiences among healthy subject in the Polish population.

### Materials and methods

The sample consisted of 421 participants, 323 women (76.72%) and 98 men (23.27%). The age of participants ranged from 16 to 57, with mean age 24.16 years old ( $SD = 7.64$ ). The mean age in the group of women was 23.91 ( $SD = 7.38$ ), the mean age of men was 24.97 ( $SD = 8.46$ ). The two groups did not differ significantly in terms of age (see Table 1). Participants were mainly women; however, the results of the previous studies indicated that there is no direct relationship between sex and the prevalence of delusion-like experiences among healthy subjects [37]. The educational structure of the respondents was as follows: 163 persons had secondary education, 157 – incomplete higher education, 91 – higher education, 10 people did not provide information about education. The study was approved by the ethics committee.

Polish translation of the 40 items of the Peters et al. Delusions Inventory (PDI) was used in the current study [22]. Due to the cultural universality of questions, and to preserve the possibility of comparing results obtained using a the PDI scale with the results obtained in English-language studies, we adapted translation which is an accurate translation of the original version and allows for modification of items for which literal translation is not possible, as a strategy of language adaptation of the scale. The scale was translated into Polish by a psychologist having philological education, and being familiar with the Polish and British culture. Then, in order to verify the possible differences, a back translation into English was done by another bilingual person. Since no major differences between the two texts have been found, the Polish version of the questionnaire was approved.

### Results

The ‘Yes/No’ score of the PDI ranges from 0 to 40. In the current study the participants endorsed 12.50 on average ( $SD = 6.90$ ). The mean score obtained by women was 12.77 ( $SD = 6.92$ ), whereas the mean score obtained by men was 11.71 ( $SD = 7.17$ ). The sex differences on the total PDI score were not found (see Table 1).

On the subscales (distress, preoccupation, conviction) the participants could obtain the score ranging from 0 to 200 points. The scores obtained by participants on the subscales are shown in Table 1. There were no differences between men and women in the total PDI score and subscale conviction. Women scored higher than men on both distress and preoccupation subscales.

Table 1. Mean scores obtained by participants in the Polish version of the Peters et al. Delusions Inventory

	Total N = 421	Women N = 323	Men N = 98	Differences between women and men	
	M (SD)	M (SD)	M (SD)	U	p
Age	24.16 (7.64)	23 (7.38)	24.97 (8.46)	13501.1	0.04
PDI – total score	12.50 (6.9)	12.77 (6.92)	11.71 (7.17)	14385.5	0.17
PDI – distress	32.20 (22.37)	33.31 (22.34)	28.68 (22.16)	13731.5	0.04
PDI – preoccupation	30.86 (20.26)	31.82 (20.42)	27.02 (19.47)	13528	0.02
PDI – conviction	37.11 (22.41)	37.42 (22.32)	35.38 (22.49)	14937	0.39

M – mean; SD – standard deviation; U – U value; p – level of significance

Since the authors of the original version of the scale did not provide the clear list of well-defined factors that could be the basis for distinguishing subscales relating to different delusion-like experiences [20], authors of other language versions of the PDI also did not receive a clear factor structure [32, 33]. Therefore, we decided to perform the exploratory factor analysis. The distribution of scores obtained by the participants on the PDI was skewed right; however, this is characteristic of the distributions of some psychotic-like experiences in general population [1, 22]. Similarly as in the researches on the original version of the PDI scale, the level of skewness was below 1.

The PDI scores were subject to principal axis factor analysis with oblimin rotation. This gave a total of 14 components, using a Kaiser's criterion of eigenvalue > 1 to determine the number of factors. Overall the 14 components accounted for 58.68% of variance. However, the use of Kaiser's criterion to determinate factor structure may lead to overestimation of the number of factors that should be extracted. An alternative criterion for the numbers of factor to extract is the scree plot test which involves the examination of the scree plot for discontinuity. In our study the examination of the scree plot showed the presence of one dominant factor. The results of the analysis are given in Appendix.

The Polish version of the PDI is reliable with the Cronbach's alpha for the total 'Yes/No' score of the PDI was 0.85, the Guttman's split-half reliability was 0.84. For the distress and preoccupation subscales the value of Cronbach's alpha was 0.87, for the conviction subscales – 0.85. The Guttman's split-half reliability calculated for the distress subscale was 0.84, for the preoccupation subscales – 0.83, and for the conviction subscale – 0.85.

The main part of the analysis deals with the question of the prevalence of the delusion-like experiences in the study sample. Each item of the PDI scale representing a specified delusion-like belief was assessed separately. The participants endorsed the occurrence of 31.25% on average (SD = 17.25%; range 0–85%) from 40 different unusual beliefs measured on the PDI scale. Only 2.1% of participants admitted that they have never held any of the beliefs from the continuum of delusional experiences.

In the current study the range of the PDI total score varied from 0 to 34 points. It means that among participants there was not a person who would confirm all unusual beliefs measured on the PDI scale. It was also revealed that 45.84% of participants scored below 12 points. The most frequently endorsed statement was that “people seem to drop hints about the respondent or say things with a double meaning” (Item 6; 79.80% of participants). The fewest number of participants endorsed the question “Do you ever feel as if your insides might be rotting” (Item 34; 2.37%). The belief that participant’s “insides are rotting” was also indicated as the most distressing one ( $M = 4.00$ ;  $SD = 1.15$ ). For individuals who took part in the study the least distressing was the statement of “being especially close to the God”. ( $M = 1.31$ ;  $SD = 0.74$ ). The participants confirmed that they most often thought about the unfaithfulness of their partner ( $M = 3.19$ ;  $SD = 1.11$ ), they were least preoccupied by the belief that “things in magazines or on TV had been written especially for them” and by the belief in witchcraft, voodoo or the occult ( $M = 2.02$ ;  $SD = 1.03$ ). In terms of conviction the participants were the most certain that there was “the mysterious power working for the good of the world” ( $M = 3.85$ ;  $SD = 1.08$ ), while the lowest certainty was related to the belief that “things in magazines or on TV had been written especially for them” ( $M = 2.04$ ;  $SD = 1.16$ ). The results are shown in Table 2.

Table 2. The prevalence of specified delusion-like experiences in the study sample

PDI – items	PDI	PDI distress			PDI preoccupation			PDI conviction		
		Total score M (SD)	Women M (SD)	Men M (SD)	Total score M (SD)	Women M (SD)	Men M (SD)	Total score M (SD)	Women M (SD)	Men M (SD)
(6) Do you ever feel as if people seem to drop hints about you or say things with a double meaning?	334 (79.8)	2.59 (1.23)	2.72 (1.24)	2.20 (1.11)	2.45 (1.14)	2.49 (1.15)	2.32 (1.17)	3.18 (1.16)	3.13 (1.17)	3.37 (1.11)
(9) Do you ever feel as if some people are not what they seem to be?	239 (58.19)	3.12 (1.30)	3.22 (1.29)	2.85 (1.30)	2.64 (1.09)	2.69 (1.09)	2.54 (1.10)	3.40 (1.1)	3.41 (1.11)	3.39 (1.08)
(4) Do you ever feel as if your feelings or actions are not under your control?	238 (57.21)	3.20 (1.17)	3.20 (1.13)	3.22 (1.32)	2.59 (1.05)	2.66 (1.04)	2.32 (1.06)	3.09 (1.09)	3.04 (1.11)	3.26 (1.07)
(8) Do you ever think that everyone is gossiping about you?	220 (53.20)	2.95 (1.30)	3.1 (1.3)	2.34 (1.14)	2.51 (1.14)	2.64 (1.12)	1.95 (1.05)	2.96 (1.11)	3.41 (1.11)	3.39 (1.08)
(22) Do you ever think that people can communicate telepathically?	221 (53.20)	1.54 (0.92)	1.56 (0.99)	1.45 (0.96)	2.24 (1.14)	2.31 (1.15)	1.87 (0.99)	3.19 (1.27)	3.22 (1.29)	3.00 (1.20)
(15) Do you ever feel, as if someone or something is watching you?	223 (52.96)	2.97 (1.30)	3.00 (1.30)	2.88 (1.31)	2.33 (1.03)	2.35 (1.04)	2.25 (1.03)	2.82 (1.17)	2.86 (1.15)	2.72 (1.23)
(32) Do you ever feel that people look at you oddly because of your appearance?	222 (52.73)	2.76 (1.73)	2.89 (1.73)	2.32 (1.71)	2.69 (1.25)	2.83 (1.25)	2.18 (1.13)	3.09 (1.19)	3.02 (1.15)	3.36 (1.31)

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(20) Do you ever feel that you are a very special or unusual person?	216 (51.54)	1.62 (0.98)	1.64 (1.01)	1.54 (0.88)	2.56 (1.09)	2.61 (1.07)	2.39 (1.16)	3.13 (1.19)	3.11 (1.17)	3.19 (1.25)
(11) Do you ever feel as if someone is deliberately trying to harm you?	179 (42.75)	3.50 (1.38)	3.71 (1.33)	2.91 (1.36)	2.65 (1.16)	2.82 (1.16)	2.17 (1.04)	3.42 (1.16)	3.35 (1.16)	3.61 (1.15)
(17) Do you ever feel as if there is a special purpose or mission to your life?	180 (42.75)	1.59 (0.91)	1.57 (0.86)	1.66 (1.04)	2.75 (1.16)	2.72 (1.14)	2.80 (1.17)	3.24 (1.22)	3.20 (1.16)	3.35 (1.38)
(40) Do you ever feel as if other people can read your mind?	176 (41.56)	2.82 (1.40)	2.81 (1.41)	2.85 (1.40)	2.25 (1.09)	2.29 (1.13)	2.03 (0.80)	2.40 (1.24)	2.41 (1.25)	2.34 (1.19)
(27) Are you often worried that your partner may be unfaithful?	173 (41.33)	<b>3.67 (1.20)</b>	3.68 (1.18)	3.64 (1.35)	<b>3.19 (1.11)</b>	<b>3.19 (1.12)</b>	3.20 (1.08)	2.60 (1.11)	2.63 (1.13)	2.44 (1.00)
(18) Do you ever feel as if there is a mysterious power working for the good of the world?	158 (37.52)	1.49 (0.94)	1.43 (0.85)	<b>1.17 (1.22)</b>	2.97 (1.10)	2.93 (1.12)	3.11 (1.02)	<b>3.85 (1.08)</b>	<b>3.86 (1.07)</b>	3.83 (1.13)
(30) Do you ever think that strangers want to have sex with you?	147 (35.62)	2.43 (1.43)	2.61 (1.40)	1.80 (1.30)	2.14 (1.01)	2.15 (1.01)	2.11 (1.05)	3.36 (1.07)	3.32 (1.11)	3.51 (0.91)
(21) Do you ever feel that you are especially close to God?	140 (35.39)	<b>1.31 (0.74)</b>	1.30 (0.73)	1.38 (0.84)	2.99 (1.17)	3.03 (1.17)	2.72 (1.17)	3.70 (1.18)	3.73 (1.17)	3.44 (1.99)
(7) Do you ever feel as if things in magazines or on TV were written especially for you?	145 (34.91)	1.73 (0.98)	<b>1.17 (0.97)</b>	1.86 (1.05)	<b>2.00 (0.95)</b>	2.01 (0.96)	1.91 (0.94)	<b>2.04 (1.16)</b>	2.14 (1.18)	<b>1.52 (0.84)</b>

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(19) Do you ever feel as if you are or destined to be someone very important?	146 (34.67)	1.63 (0.96)	1.66 (1.0)	1.56 (0.86)	2.73 (1.18)	2.72 (1.18)	2.78 (1.17)	2.97 (1.19)	3.00 (1.18)	2.92 (1.03)
(1) Do you ever feel as if you are under the control of some force or power other than yourself?	132 (30.4)	2.42 (1.27)	2.30 (1.17)	2.96 (1.5)	2.17 (0.94)	2.19 (0.92)	2.11 (1.01)	2.92 (1.25)	3.06 (1.23)	2.37 (1.18)
(10) Do things around you ever feel unreal, as though it was all part of an experiment?	111 (28.74)	2.97 (1.27)	3.00 (1.27)	2.87 (1.29)	2.33 (1.17)	2.32 (1.15)	2.37 (1.24)	2.26 (1.21)	2.26 (1.21)	2.25 (1.25)
(16) Do you ever feel as if you have special abilities or powers?	119 (28.02)	1.81 (1.12)	1.80 (1.14)	1.84 (1.09)	2.33 (1.05)	2.29 (1.01)	2.45 (1.14)	2.68 (1.19)	2.61 (1.16)	2.84 (1.27)
(36) Do your thoughts ever feel alien to you in some way?	117 (28.02)	3.13 (1.30)	3.18 (1.32)	2.96 (1.25)	2.29 (1.06)	2.35 (1.10)	2.04 (0.84)	2.62 (1.04)	2.61 (1.02)	2.66 (1.15)
(37) Have your thoughts ever been so vivid that you were worried other people would hear them?	118 (28.02)	2.98 (1.33)	2.92 (1.34)	3.20 (1.32)	2.36 (1.01)	2.43 (1.00)	2.04 (1.04)	2.49 (1.20)	2.57 (1.22)	2.13 (1.08)
(38) Do you ever feel as if your own thoughts were being echoed back to you?	112 (26.60)	2.42 (1.24)	2.44 (1.27)	2.39 (1.16)	2.28 (1.02)	2.38 (1.07)	1.91 (0.71)	2.99 (1.05)	2.90 (1.03)	3.29 (1.12)
(31) Do you ever feel that you have sinned more than the average person?	107 (26.36)	3.14 (1.46)	3.16 (1.51)	3.13 (1.32)	2.61 (1.15)	2.73 (1.14)	2.05 (1.07)	2.80 (1.09)	2.86 (1.02)	2.52 (1.38)
(23) Do you ever feel as if electrical devices such as computers can influence the way you think?	104 (25.65)	3.21 (1.40)	3.32 (1.34)	2.93 (1.56)	2.26 (1.00)	2.21 (0.91)	2.38 (1.20)	3.44 (1.18)	3.26 (1.15)	3.87 (1.14)

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(12) Do you ever feel as if you are being persecuted in some way?	78 (23.75)	3.55 (1.22)	3.62 (1.23)	3.25 (1.18)	2.56 (1.13)	2.61 (1.16)	2.37 (1.02)	3.05 (1.30)	2.95 (1.33)	3.34 (1.15)
(33) Do you ever feel as if you had no thoughts in your head at all?	100 (23.75)	2.50 (1.38)	2.50 (1.37)	2.47 (1.43)	2.20 (1.18)	2.26 (1.16)	1.95 (1.24)	3.09 (1.27)	2.96 (1.17)	3.57 (1.56)
(13) Do you ever feel as if there is a conspiracy against you?	92 (22.09)	3.50 (1.33)	3.63 (1.30)	3.08 (1.34)	2.42 (1.16)	2.62 (1.16)	<b>1.82 (0.98)</b>	2.85 (1.27)	2.97 (1.30)	2.52 (1.12)
(26) Do you believe in the power of witchcraft, voodoo, or the occult?	91 (21.61)	3.10 (1.53)	3.15 (1.56)	2.86 (1.35)	2.02 (1.03)	<b>1.97 (1.01)</b>	2.26 (1.09)	3.31 (1.05)	3.25 (1.10)	3.66 (0.61)
(35) Do you ever feel as if the world is about to end?	83 (19.71)	3.10 (1.42)	3.24 (1.35)	2.70 (1.64)	2.37 (1.10)	2.41 (1.14)	2.15 (0.80)	2.24 (1.09)	2.24 (1.13)	2.23 (0.92)
(28) Do you ever think that you smell very unusual to other people?	69 (17.57)	3.11 (1.35)	3.08 (1.28)	3.19 (1.53)	2.46 (1.18)	2.41 (1.16)	2.57 (1.24)	2.79 (1.07)	2.62 (1.02)	3.19 (1.12)
(25) Do you ever feel as if you have been chosen by God in some way?	73 (17.33)	1.60 (0.73)	1.62 (0.76)	1.50 (0.57)	2.73 (1.19)	2.71 (1.15)	2.90 (1.44)	3.53 (1.19)	3.47 (1.18)	<b>3.90 (1.19)</b>
(24) Do you ever feel as if there are forces around you which affect you in strange ways?	60 (14.25)	2.61 (1.29)	2.53 (1.28)	2.92 (1.32)	2.19 (0.99)	2.19 (0.94)	2.00 (1.15)	2.70 (1.18)	2.72 (1.19)	2.61 (1.19)
(39) Do you ever feel as if your thoughts were blocked by someone or something else?	59 (14.01)	3.16 (1.28)	3.27 (1.24)	2.86 (1.40)	2.47 (0.98)	2.45 (0.92)	2.53 (1.12)	2.83 (1.00)	2.75 (0.96)	3.06 (1.09)

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(2) Do you ever feel as if you are a robot or zombie without a will of your own?	48 (10.68)	2.98 (1.35)	3.21 (1.24)	2.53 (1.56)	2.40 (1.05)	2.36 (1.11)	2.23 (0.92)	2.54 (1.20)	2.45 (1.20)	2.76 (1.23)
(3) Do you ever feel as if you are possessed by someone or something else?	46 (10.21)	3.14 (1.38)	3.17 (1.36)	3.22 (1.56)	2.04 (1.05)	2.05 (0.90)	2.00 (1.11)	2.11 (0.99)	<b>2.08 (0.98)</b>	2.22 (1.09)
(29) Do you ever feel as if your body is changing in a peculiar way?	43 (9.97)	3.18 (1.49)	3.17 (1.58)	3.21 (1.42)	2.69 (1.28)	2.82 (1.39)	2.42 (1.01)	3.43 (1.13)	3.44 (1.18)	3.21 (1.25)
(5) Do you ever feel as if someone or something is playing games with your mind?	39 (9.26)	3.18 (1.51)	3.00 (1.44)	<b>3.69 (1.31)</b>	2.35 (1.12)	2.38 (1.02)	2.30 (1.37)	2.70 (1.19)	2.57 (1.10)	3.00 (1.29)
(14) Do you ever feel as if some organization or institution has it in for you?	29 (8.78)	3.31 (1.41)	3.25 (1.17)	3.35 (1.22)	2.55 (1.47)	2.08 (1.31)	2.88 (1.53)	3.20 (1.37)	2.91 (1.44)	3.41 (1.32)
(34) Do you ever feel as if your insides might be rotting?	10 (2.37)	<b>4.00 (1.15)</b>	<b>4.25 (1.03)</b>	3.00 (1.41)	2.30 (1.15)	2.00 (1.29)	3.00 (00)	2.60 (1.34)	2.57 (1.13)	2.66 (2.08)

PDI – Peters et al. Delusions Inventory; The mean scores on the distress, preoccupation and conviction subscales were calculated only for participants who endorsed the experience of particular beliefs. Values in bold type show the highest and the lowest mean values obtained by participants on each subscale of the Peters et al. Delusions Inventory. M – mean; SD – standard deviation.

The correlation analysis showed the negative relationship between the PDI total score, the PDI subscales scores and the participants' age ( $r = -0.22$ ). The value of correlation coefficients between participants' age and the PDI subscales are: for the distress subscale  $r = -0.27$ , for the preoccupation subscale  $r = -0.27$ , for the conviction subscale  $r = -0.22$ . The detailed analysis revealed that the significant, negative correlation between participants' age and the PDI score concerned the items: "(8) Do you ever think that everyone is gossiping about you"  $r = -0.16$ ; "(19) Do you ever feel as if you are or destined to be someone very important?"  $r = -0.16$ ; "(20) Do you ever feel that you are a very special or unusual person?"  $r = -0.17$ ; "(27) Are you often worried that your partner may be unfaithful?"  $r = -0.18$ ; "(32) Do you ever feel that people look at you oddly because of your appearance?"  $r = -0.21$ ; "(35) Do you ever feel as if the world is about to end?"  $r = -0.18$ .

### Discussion

The current study dealt with the psychometric properties of the Polish version of the Peters et al. Delusions Inventory (PDI) [22]. The prevalence of delusion-like experiences in Polish population was also analysed.

The Polish translation of the PDI was characterised by good reliability, similar to that which characterises the English version of the scale. This result confirmed that the Polish version of the PDI can be used as a tool for measuring delusion-like experiences in the general population.

The Peters et al. Delusions Inventory was invented as a one-factor questionnaire for measuring a wide variety of delusions. It results in relative independence of each item. According to authors' assumption, on the PDI scale a participant obtains only one score which reflects the amount of delusion-like experiences, but are not related to the contents of delusion-like experiences. The additional subscales measuring the level of distress, preoccupation and conviction that the beliefs are true, are independent from the main PDI score, and they do not affect the factor structure of the scale. The lack of a limited number of well-defined subscales within the PDI is the reason that exploratory factor analyses performed on the scale usually reveal the existence of a large number of components which are not consistent among various studies [22, 32, 33]. The exploratory factor analysis on the Polish version of the PDI revealed the fourteen-factor structure, which differed from the 11 components solution obtained by Peters et al. [22] in terms of a number of components and contents of components. The differences in the content of the questions loading individual factors may result from cultural differences. The presence of between-group cultural differences are also confirmed by the different frequency of the particular delusion-like experiences confirmed by participants, as well as by higher overall prevalence of the delusion-like experiences in the Polish group compared with the British one. The relatively large number of components separated both in Polish and in British studies on the PDI, confirmed that the scale has not a clear factor structure. The unidimensionality of the

Polish version of the PDI was also supported by the results of scree plot examination and by the good reliability of the PDI.

More than 98% of the participants who took part in the study endorsed at least one of the 40 experiences listed on the PDI. It means that in the study sample the prevalence of delusion-like experiences is relatively high. This result is consistent with the results of the previous studies conducted in other countries [22, 38, 39], and supports the hypothesis that the delusion-like beliefs are distributed in general population as a continuum from the middle to the clinically relevant forms [1, 3]. This result is also consistent with the data on the prevalence of other psychotic-like experiences in the Polish population [25]. However, it should be noted that the most frequently endorsed delusion-like experiences were the beliefs that are distant from the psychosis symptoms (e.g. "People seem to drop hints about you or say things with a double meaning"). The beliefs which occurred most frequently were also relatively little disturbing to and preoccupying respondents. The last likely occurred beliefs were those similar to the clinical symptoms (e.g. "Do you ever feel as if your insides may be rotting?") and they also caused the highest level of distress.

In the current study the sex differences in the prevalence of delusion-like experiences were not found, which is consistent with results of previous studies [37]. Although, women were more distressed than men because of the unusual beliefs, they were also more preoccupied by those experiences. These results are inconsistent with the results of the previous research conducted by Peters et al. [22]; however, similar differences in distress and preoccupation subscales were observed in Taiwanese study using the PDI [33], and in studies conducted with the use of different methods for delusional beliefs measurement [22, 30, 40]. Sisti et al. [20] indicate that the preoccupation about unusual beliefs might be distressing in themselves, the results obtained by women in the current study could reflect this relationship between preoccupation and distress.

In our study the significant differences in the prevalence of various delusion-like experiences were observed. Most participants (80%) endorsed the belief that people seem to drop hints about the respondent or say things with a double meaning. Fewer participants confirmed that they experienced phenomenon similar to delusions observed among psychiatric patients. Similar results were obtained in the previous research concerning hallucination-like experiences in the Polish population [25]. These findings are also consistent with the results of the studies conducted in other populations [22, 32, 33, 35, 39, 41], although the number of participants endorsing the beliefs of particular contents differ depending on the study sample.

In the Polish sample the particularly high level of distress was evoked by the beliefs relating to suspiciousness and unfaithfulness of the partner. The latter belief was also the most frequent theme of preoccupation and caused strong discomfort. The high level of preoccupation was also related to the feeling of being especially close to God, being chosen by God in some way, and to the belief that there is a mysterious power working for the good of the world. Those beliefs were also accompanied by a strong conviction and the lowest level of distress (Table 2). The frequent occurrence of the

delusion-like experiences of the religious content were also observed in the studies conducted in other Catholic countries [41]; however, those beliefs were rare in the Asian cultures [33]. It indicates that the cultural factors could influence the content of delusion-like experiences [33].

The results of the current study show that the unusual beliefs are common in the Polish population, and the frequency of their occurrence depends on their content. However, on the basis of the present study we could not draw conclusions about the factors underlying the occurrence of delusion-like experiences. The results of the previous study indicate that the cognitive [42, 43], emotional [33, 39, 43] and personality factors (e.g. [17]) play a role in the emergence of delusion-like and hallucination-like experiences. The current findings suggest also that the interaction between different emotional, cognitive as well as personality features is involved in the formation of psychotic-like experiences [17].

Despite the fact that our findings show good reliability of the Polish version of the Peters et al. Delusion Inventory (1999), in the current study the validity of the PDI was not assessed. It limits the possibility to draw the firm conclusions about the usefulness of the Polish version of the PDI in future studies. Although the scree plot suggested the single-factor solution, the unidimensionality of the PDI could not be confirmed by the confirmatory factor analysis (the asymptotically distribution free method) because of the small size of the study sample. What is more, specifying the prevalence of delusion-like experiences on the basis of the results of self-reports can distort these results and show higher values than real prevalence of delusion-like experiences [44, 45]. However, the results of previous studies show that scale scores on the basis of self-reports also allow to accurately calculate the risk of psychotic disorders [9, 15] and to predict the development of psychosis [27, 46, 47]. People with high scores on the PDI scale can therefore be treated as a group of a higher risk of psychosis [27]. Moreover, the participants taking part in the study were not assessed in respect of the presence of psychotic disorders, since it was not possible to exclude that the individuals were suffering from psychotic disorders. The study sample was not randomised and consisted mainly of women, therefore may not be representative for the Polish population.

### Conclusions

1. The Polish version of the Peters et al. Delusions Inventory (1999) has good reliability and can be used for delusion-like experiences assessment in non-clinical population.
2. The scree plot suggests a single-factor solution for the PDI scale.
3. The conducted research indicates that delusion-like experiences are common in the Polish population.

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Appendix 1. The results of the factor analysis of the Polish version of the PDI (n = 421).

	Fourteen-factor solution														Single-factor solution
	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C 10	C 11	C 12	C 13	C 14	
Eigenvalue	6.198	2.278	1.702	1.612	1.371	1.306	1.300	1.256	1.195	1.154	1.099	1.040	1.011	0.955	
% of variance	15.49	5.696	4.255	4.029	3.427	3.264	3.251	3.139	2.987	2.885	2.747	2.599	2.528	2.388	
PDI items															
1	0.035	-0.187	0.280	-0.025	-0.099	-0.239	0.065	0.061	0.061	0.064	0.119	-0.014	-0.125	0.140	0.469
2	0.120	0.012	-0.022	-0.118	-0.037	-0.196	0.152	-0.014	0.051	-0.008	-0.016	0.100	-0.140	0.180	0.257
3	-0.048	-0.076	0.900	-0.032	-0.004	0.086	0.040	0.012	0.071	-0.035	0.038	0.072	0.042	-0.028	0.338
4	-0.064	-0.046	-0.003	0.040	0.070	-0.002	0.096	0.113	-0.060	0.019	0.104	-0.035	-0.600	0.032	0.372
5	0.061	0.207	0.290	-0.022	0.050	-0.087	-0.112	0.030	-0.065	0.075	-0.110	-0.049	-0.064	0.034	0.248
6	0.011	-0.099	-0.130	-0.054	0.194	-0.034	0.118	0.040	-0.175	0.107	0.037	-0.022	-0.164	-0.080	0.397
7	-0.055	-0.061	0.062	0.025	0.001	-0.055	0.000	0.513	-0.070	0.053	0.079	0.150	-0.031	-0.175	0.393
8	0.034	0.014	-0.007	-0.079	-0.003	-0.109	0.046	0.170	-0.476	0.037	0.058	0.206	0.022	-0.198	0.457
9	0.456	-0.049	-0.066	-0.063	0.187	-0.007	0.034	0.037	0.014	0.054	-0.067	-0.008	-0.037	0.017	0.413
10	0.076	0.056	0.059	-0.142	-0.037	-0.197	-0.208	0.002	-0.067	0.111	0.110	-0.048	-0.201	0.085	0.475
11	0.170	0.017	0.012	0.000	0.510	0.032	-0.019	-0.176	-0.115	0.082	0.104	-0.039	-0.085	0.054	0.408
12	0.135	-0.070	0.045	0.107	0.088	-0.084	-0.274	-0.034	-0.305	0.146	0.300	-0.078	0.057	-0.140	0.388
13	0.090	0.038	0.028	-0.023	0.492	-0.056	-0.017	0.121	-0.045	-0.086	0.083	0.128	-0.007	-0.050	0.321
14	0.034	0.011	0.084	0.078	0.149	-0.460	-0.172	0.144	0.022	-0.053	-0.085	-0.130	0.069	0.025	0.242
15	0.195	0.005	-0.077	-0.029	0.044	-0.021	-0.016	0.183	-0.258	0.123	0.129	-0.076	0.079	0.226	0.423
16	0.112	-0.012	0.112	-0.258	0.119	-0.072	-0.001	-0.043	0.035	0.226	-0.006	0.035	-0.020	0.085	0.480
17	0.117	-0.333	0.050	-0.383	-0.024	0.032	-0.124	0.008	-0.040	0.084	-0.165	0.002	-0.091	-0.031	0.483
18	-0.156	-0.494	0.018	0.026	0.039	-0.131	-0.111	0.063	-0.098	0.060	-0.296	-0.088	-0.234	0.066	0.328

19	-0.007	-0.017	0.015	-0.729	-0.125	-0.052	-0.056	-0.082	-0.145	0.036	-0.026	-0.036	-0.008	-0.124	0.430
20	-0.067	-0.057	0.017	-0.642	0.120	0.044	-0.002	0.079	0.049	0.052	0.077	0.043	0.072	0.117	0.452
21	0.049	-0.728	0.001	0.001	0.017	0.019	-0.022	0.035	0.112	0.004	0.016	0.027	-0.061	-0.066	0.310
22	0.011	0.061	-0.039	-0.051	-0.061	0.001	0.008	0.084	0.095	0.795	0.012	0.049	0.029	-0.021	0.419
23	0.347	-0.100	0.014	0.035	0.096	-0.048	0.006	0.075	0.011	0.057	-0.039	-0.037	0.090	0.021	0.289
24	0.104	-0.048	0.188	-0.077	-0.092	-0.197	-0.029	0.052	-0.111	0.054	0.048	-0.028	-0.058	0.269	0.451
25	0.089	-0.614	0.044	-0.102	-0.054	0.020	0.047	-0.017	-0.058	-0.056	0.012	0.029	0.112	0.069	0.295
26	-0.123	-0.123	0.149	0.019	0.059	0.026	0.051	-0.114	-0.123	0.150	-0.037	-0.012	-0.012	0.238	0.193
27	-0.108	0.060	-0.010	-0.019	0.087	0.041	0.040	0.074	-0.001	0.033	0.419	-0.029	-0.087	0.028	0.178
28	0.019	0.001	0.097	-0.096	0.136	-0.018	0.055	0.036	-0.226	-0.037	0.133	-0.247	0.094	-0.072	0.288
29	-0.062	-0.011	0.167	-0.099	0.192	-0.043	0.166	0.025	-0.047	0.151	-0.110	-0.192	0.041	-0.289	0.235
30	0.002	-0.027	0.030	-0.267	0.217	-0.172	0.001	0.063	0.068	-0.040	0.300	0.022	-0.044	-0.017	0.439
31	-0.019	-0.026	0.088	-0.041	0.095	0.012	0.025	0.140	-0.152	0.049	-0.035	0.433	0.079	0.024	0.252
32	-0.035	0.020	-0.014	-0.054	0.056	0.029	0.028	0.003	-0.568	-0.055	-0.041	0.040	-0.087	0.081	0.329
33	0.082	-0.002	0.026	0.094	0.005	-0.081	0.416	0.018	-0.082	0.053	0.069	-0.013	-0.093	-0.002	0.213
34	-0.037	0.008	-0.072	-0.037	-0.041	-0.624	0.111	-0.077	-0.014	0.031	0.010	0.044	-0.006	-0.034	0.210
35	0.018	-0.117	0.025	-0.029	0.034	0.026	-0.201	0.007	-0.029	0.137	0.030	0.221	-0.159	-0.036	0.287
36	0.368	-0.062	0.147	0.018	-0.153	0.040	0.141	-0.021	-0.116	0.120	0.247	0.002	-0.098	0.029	0.442
37	0.189	-0.030	-0.022	-0.143	-0.063	0.094	-0.121	0.386	-0.090	0.008	-0.037	-0.223	-0.133	0.075	0.394
38	0.167	0.006	0.084	-0.089	0.004	0.041	0.149	0.174	0.014	0.116	-0.026	-0.029	-0.176	-0.010	0.393
39	0.361	0.082	0.207	-0.060	0.000	-0.097	-0.017	-0.073	-0.055	-0.075	-0.050	0.151	-0.262	-0.108	0.380
40	0.036	0.002	-0.005	0.027	0.019	0.019	0.066	0.514	0.004	0.164	0.054	0.071	-0.055	0.116	0.412

C 1 – ideation of reference and misidentification; C 2 – religiosity; C 3 – ideation of influence; C 4 – grandiosity; C 5 – suspiciousness; C 6 – ideation of persecution and ideation of body distortion; C 7 – derealization; C 8 – ideation of reference and thoughts broadcast; C 9 – ideation of persecution; C 10 – telepathy; C 11 – sexual ideation; C 12 – ideation of guilt and catastrophic ideations; C 13 – ideation of control and thought echo; C 14 – paranormal belief

**Appendix 2. Scree plot for the factor analysis**