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Scrutinizing the Relationship between Subjective Anomalous Experiences and Psychotic Symptoms

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HIGHLIGHTS

New analyses show that subjective paranormal experiences do not have the same psychological and statistical patterns as clinical symptoms of psychosis. This finding challenges psychiatric explanations for some reportedly parapsychological phenomena.

ABSTRACT

This research was exploratory, and its main objective was to analyze whether anomalous experiences related to parapsychology had statistical behavior similar to psychotic-like experiences (e.g., hallucinations). If psi phenomena have a different ontology from psychotic-like experiences, then they should have a different statistical representation and measurement. In this hypothetical scenario, there would be empirical–statistical grounds for discriminating between psychotic perceptual distortions and anomalous experiences without clinical origin. Different clinical variables common in psychotic disorders were measured in 562 participants. Psychotic-like experiences (such as hallucinations) and anomalous experiences (such as experiences outside the framework of psychosis) also were quantified. Several forward stepwise multiple regression models and techniques based on Exploratory Factor Analysis were used. The EFA extracted 2 factors; the first grouped the variables that measured anomalous phenomena from the continuum of psychosis models and the second gathered the variables that measured them as anomalous perceptions without scientific explanation. Both EFAs explained more than 70% of the variance. Only 3 clinical variables were necessary to predict 75.9% of psychotic–like experiences assessed from the psychopathological model. Up to 5 indicators were necessary to predict 73.4% of the unexplained anomalous experiences. Empirical–statistical indicators in the sample used enable differentiation of the anomalous phenomena into 2 prominent models: the psychotic-like experiences model and the anomalous experiences unexplained model. Variables that characterize the psychotic phenotype more successfully predict psychotic-like experiences than they do anomalous experiences. The implications of these findings in relation to psi phenomena and how to distinguish them from psychotic symptoms are discussed.

KEYWORDS

Anomalous experiences, schizotypy, psychotic-like experiences, paranormal beliefs, parapsychology

INTRODUCTION

Anomalous experiences can be described in many ways (French & Stone, 2016). Although they represent behavior phenomena that are difficult to explain in scientific terms, two main interrelated conceptions prevail. On the one hand, the clinic model justifies/explains these anomalous phenomena as hallucinatory behaviors (Stefanis et al., 2002; Shapiro et al., 2019) (for example, hearing voices that do not exist) or non-pathological perception disruptions (for example, perceptive distortions, illusions/delusions, pseudo-hallucinations, and cognitive biases) (Jaspers, 1993; Belloch et al., 1995). On the other hand, there is a second model which conceives of anomalous phenomena as events that challenge the foundations of the current scientific paradigm (Jinks, 2019). This is the case with psi phenomena, which cover experiences related to *precognition* (Bem, 2011; Bem et al., 2016), *mind-to-mind communication* (Honorton, 1985), and *mind–matter* interaction (Radin et al., 2012). There are many scholars who do not accept that these phenomena may have any ontological validity and therefore choose to disapprove of their inclusion in scientific subject matter (Shermer, 2011; Wagenmakers et al., 2011; Reber & Alcock, 2020). However, there are several studies with significant results in favor of psi phenomena that can be reported throughout the scientific literature (Bem, 2011; Bem et al., 2016; Utts, 2018). Within the psychiatric field, there is an obvious constraint for understanding anomalous phenomena, and any investigation should be multi-centered (Bell et al., 2005).

There are some events in science, considered unexplained—although not necessarily incomprehensible (Mabbett, 1982)—that can be observed and consequently question the limits of scientific knowledge (Deary, 1999). This does not imply rejecting or denying the ontological basics of contemporary science (Brown, 2004), but reflects the need to review all theories and knowledge accepted so far (Utts, 2018). A case in point is the intoxication with *sodium phenobarbital* which a patient survived after tripling the minimum lethal dose of the drug (Escobar-Román et al., 2012). She was in a coma (in a clinical death situation) and her vital functions required artificial aid. The authors simply speculated they could save her life thanks to the optimal physiological response to the applied treatment. Another example can be found in a patient with no psychiatric history, who claimed to hear voices in his head that warned him of the presence of a brain tumor in a certain part of the organ (Azuonye, 1997). The subject had not had any previous medical tests. After taking several diagnostic tests based on neuro-imaging, the doctors found a meningioma in one of the temporal lobe areas of the brain. The case was published in *Medical Hypotheses* (Bobrow, 2003). For further information about this kind of anomalous phenomena, see Bobrow's other publications (Bobrow, 2003; Nordgaard et al., 2019).

The research activity using the scientific method should be the model for responding to the problems arising from these cases (Carter, 2012). Moreover, calling the conventional theoretical model into question does not imply the denial of scientific laws, nor that the ontological determinism of science should be rejected (Jinks, 2019). The same idea can be extrapolated to psi phenomena as well as to some events that are considered anomalous behaviors close to psychotic experiences (Carter, 2012; French & Stone, 2016). There is no consensus on the ontological and etiological value of anomalous phenomena (whether they are understood as unexplained events or *psychotic-like experiences*) (Bobrow, 1983; David, 2010). Nevertheless, despite these two constructs being conceptually different, in psychiatric practice they are assessed from the same perspective, as they are considered hallucinations close to psychosis (or, at least, attributes of the *psychotic phenotype*) (Fonseca-Pedrero et al., 2011; Nordgaard et al., 2019).

From a psychiatric perspective, the prevailing line of research emphasizes the idea that the most crucial thing, rather than being the empirical and ontological value of anomalous behaviors (Lawrence, 2016), is their psychopathological importance, making this a priority objective. While psychiatric interventions would not have to be modified based on whether the assessed behavior was empirically real or not, they could change—and they should (Shapiro et al., 2019)—when the psychopathological contents also differ or are just not the same (Badcock & Paulik, 2020). Thus, in psychiatry it is not that important whether *telepathy* (which is a psi phenomenon) exists or not. Probably, the most essential fact relies on the analysis of the psychopathological impact any possible telepathic experience could have on the life and well-being of the patient (Lawrence, 2016). In this regard, the *psychosis continuum* model addresses the clinical value of this kind of anomalous phenomena (Johns & van Os, 2001; van Os et al., 2008). This model has been tested and validated because it represents a useful alternative to the predominant categorical model in the old DSM-IV-TR (Bell et al., 2005). Its basic principle states that the classic psychotic symptoms observed in patients with a diagnosis of schizophrenia also show up in the general population. The differences between pathological and non-pathological symptoms are: (1) their level of duration (persistence); (2) the cognitive–affective disruption they cause (impairment); and (3) their intensity levels during the clinical course (pattern/trend/tendency) (Stefanis et al., 2004; Badcock & Paulik, 2020). Likewise, the *psychosis continuum* states that, if anomalous phenomena appear in subjects in the clinical population, they could also

pose a psychopathological risk that would allow specialists to predict future psychotic episodes (Fonseca-Pedrero et al., 2011). That is why the concept of *psychotic phenotype* is proposed as a risk indicator related to the development of crisis or pathological psychotic states (Shapiro et al., 2019). Several studies support this construct and have proposed tools that enable its psychometric assessment (Stefanis et al., 2004; López-Ilundain et al., 2006; Fonseca-Pedrero et al., 2010; Pasricha, 2011).

Although it is a widely recognized model, there is certain scientific evidence that contradicts and questions the *psychosis continuum* when applied to anomalous phenomena (Pasricha, 2011). Three kinds of critique are identified: The first one refers to the majority of studies not differentiating between variability (in terms of all types of anomalous phenomena that are perceived by the patient) and severity (depending on the tendency or intensity of the behavior) (David, 2010). It is not yet clear what dimensions or indicators should be taken into consideration to typify the variability of the anomalous experiences. The second critique states that anomalous phenomena are neither right nor wrong per se and recommends avoiding value judgments about them (Harary, 2012). Thus, their pathological value would depend not only on persistence, tendency, and impairment. It is possible that other subclinical psychological factors moderate and define the *psychotic phenotype* in a different but complementary way to the one that the *psychosis continuum* proposes (Badcock & Paulik, 2020). Moreover, even if the perceived content of the experience is negative (for example "I hear voices in my head that insult me"), the interpretation or opinion that the patient might have about the insults must be properly understood due to its psychopathological impact, but it must not be replicated because doing so would constitute a moralistic decision beyond the psychiatric diagnosis.

Some professionals recommend considering the *systems of beliefs* as information sources to understand the different meanings given to perceived anomalous phenomena (Irwin et al., 2013). Studies that follow this line of research can be classified under two groups: on one side, those who conclude that subjects with paranormal beliefs (about for example ghosts, witchcraft, divinatory arts, etc.) tend to normalize their anomalous perceptions using adaptive interpretations that contribute to a sense of control and "meaning," which lessen their discomfort (see also Irwin, 2009; Lange et al., 2019). On the other hand, other studies question if paranormal beliefs are actually useful as a therapeutic resource in psychiatric evaluations and treatments (Cameron, 2016). Nevertheless, it is essential to remember the difference between "system of meaning" (as a process of cognitive representation of the stimuli) and "belief" (as the act of accepting the real existence of some content with no underlying empirical evidence) (Font, 2016). Studies from the first group refer to the systems of meanings rather than to the beliefs per se. Instead, studies from the second group inform us about the dysfunctional consequences for the patient who accepts the existence of the paranormal as valid.

The third critique arises from other studies that try to explore whether some attributes of psychotic episodes taking place in "healthy" subjects also correlate with the perceived anomalous phenomena (Irwin, 2009). Dissociation is probably the clinical variable related to anomalous experiences that is most commonly investigated in relation to this kind of hallucinatory episode (Jinks, 2019). Many studies have concluded that people with anomalous experiences (outside the psychopathological context) also showed high levels of dissociation (Cardeña & Carlson, 2011; Acunzo et al., 2020). However, this dissociation is not yet clear because there are other studies which did not show statistically significant summaries when the same hypotheses were tested (Vencio et al., 2018). The same can be said about other attributes related to the *psychotic phenotype*, like *schizotypy*. Numerous studies pointed out the presence of positive correlations between this clinical attribute of the personality and perceived anomalous phenomena (Simmonds-Moore et al., 2019), whereas others differed and showed non-significant correlations (Williams & Irwin, 1991; Williams, 1995). This contradiction in the statistical results can also be observed for other clinical variables such as the presence of traumatic experiences during childhood (Velikonja et al., 2019), symptoms related to impulse control, risky behaviors, and cognitive deficits (Irwin, 2009).

Other lines of study have indeed provided strong evidence of psychiatric and psychological factors frequently found in subjects with anomalous experiences (French & Stone, 2016). An example of this is represented by the symptoms associated with subclinical features of the histrionic, narcissistic, and paranoid personality disorders (Font, 2016). Similarly, psychotropic substances use and abuse constitute another element that leads to states of altered perception and is, as well, one present factor in this kind of subject (Sideli et al., 2019). Other symptoms associated with anxiety disorders and emotional lability also have been observed in this context (Roe & Bell, 2016). Another possibility might be related to patients faking or being deceitful about the experienced perceptive distortions (Wilson & French, 2006). In any case, all these variables question what kind of relationship schizotypy and those psychological attributes have.

The objectives of this research are to contrast the predictive value of (1) schizotypy levels, (2) psychotic phenotype, and (3) the existence of paranormal beliefs, in re-

lation to perceived anomalous phenomena. Unlike other studies, the aim is also to examine whether anomalous phenomena have a different characterization either when they are evaluated as attenuated psychotic symptoms, or as unexplained perceptions or abnormalities outside the hallucinatory context. Therefore, the purpose of this study is to analyze to what extent the unexplained anomalous experiences (including psi phenomena) are linked to a vulnerability to psychosis.

METHODS

Participants

There were 562 subjects (of which 49.3% were women and 50.7% were men) aged 18 to 57 (average age = 37.86; standard deviation = 11.952) who willingly participated in this study. 33.1% of the sample completed secondary education or received basic vocational training, 31.5% had an upper secondary education or received advanced vocational training, and 35.4% studied at university at a graduate or post-graduate level. 52.7% of the participants lived in Madrid, whereas the other 47.3% lived in Barcelona. All the subjects came from the non-clinical general population.

Procedure

This is a correlational and multifactorial study. The sample was taken between 2019 and January 2020. Participants were Statistics Consulting and Organizational Psychology college students and active workers. Required informed consent and necessary permits were handled prior to data collection, and the materials were digitally designed and applied through the Internet and email. In some rare cases, pencil-on-paper format materials were used and the data was digitized. Then the data was transferred to a raw matrix. Once the data was stored in the raw matrix, all cases with missing values or outliers, as well as those indicating the presence of psychiatric antecedents, were deleted during the data cleaning exercise. Then, after recoding the study variables, scales scores were calculated for each one of the subjects. In total, 66 cases (41 women and 25 men) were eliminated, and 562 sample subjects were retained. When the data matrix was cleaned, statistical contrast and analysis of the study hypotheses were run. Those hypotheses can be summarized as follows: *Schizotypy and psychotic phenotype significantly predict anomalous phenomena*. The anomalous phenomena were evaluated from both the clinical perspective (including hallucinations and the psychosis continuum) and the model that questions the clinical value of these experiences, considering them as frontier experiences between the scientifically explained and the unexplained (but not unexplicable, see Mabbett, 1982).

Instruments

Community Assessment of Psychic Experiences-42 (CAPE-42). This scale evaluates the psychotic phenotype with three dimensions: (1) *Positive Dimension* (PD) (consisting of 20 items), (2) *Negative Dimension* (ND) (consisting of 14 items), and (3) *Depressive Dimension* (DD) (consisting of 8 items). Answers are coded using a Likert scale between 1 (which means "rarely") and 4 (which means "almost always"). The Spanish adaptation of the scale was used in this study (Fonseca-Pedrero et al., 2012).

The positive dimension of the CAPE-42 contains items expressing anomalous experiences with supernatural and paranormal interpretations (e.g., Have you ever had the feeling that people can communicate telepathically?). It also contains items about delusional tendencies and strange beliefs based on the power of witchcraft. The negative dimension collects the affective symptoms that are common in psychosis: difficulties in relating socially, lack of emotional expression, emotional incomprehension, tendencies to isolation, etc. The depressive dimension is related to deep feelings of sadness, lack of meaning, and suicidal ideation. This dimension feeds psychotic episodes with negative symptoms, as it hinders emotional understanding and affective expression.

CAPE-42 is endorsed for its validity and reliability (Stefanis et al., 2004). CAPE-42 has satisfactory reliability indices in most studies, including the Spanish version (alpha coefficients greater than 0.8). This makes it one of the most widely used questionnaires in the field of psychosis diagnosis.

Launay-Slade Hallucination Scale-Revised (LSHS-R). This scale analyzes predisposition to develop hallucinations that are classed within psychotic behavior. This test has 12 items for anomalous phenomena on a psychosis continuum. It is a one-dimensional scale in which every answer is scored following the same Likert model described for CAPE-42. Therefore, final scores range from 12 to 48 points. The items on this scale focus on anomalous experiences with paranormal, religious, and supernatural interpretations. The content differs from CAPE-42 in that it involves reports of severe and serious perceptual disturbances (e.g., "hearing the voice of the devil").

LSHS-R provides a statistical justification that proves its validity and reliability (Launay & Slade, 1981). In fact, Cronbach's alpha coefficients for this scale were >0.8, and indicated that LSHS-R had good internal consistency. The Spanish adaptation of the scale was used in this study (Fonseca-Pedrero et al., 2010).

Schizotypal Personality Questionnaire (SPQ). This questionnaire evaluates the characteristic features of the schizotypal personality profile. It consists of 74 items

whose answers are coded in a dichotomous form: Value 0 means "no", while value 1 means "yes". The questionnaire has 9 dimensions: (1) *Reference Ideas* (RI) (9 items); (2) *Magical Thinking* or Odd Beliefs (MT) (7 items); (3) *Unusual Perceptive Experiences* (UPE) (9 items); (4) *Paranoid Ideation* (PI) (8 items); (5) *Social Anxiety* (SA) (8 items); (6) *Lack of Friends* (LF) (9 items); (7) *Flat Affect* (FA) (8 items); (8) *Eccentric Behavior* (EB) (7 items); and (9) *Strange Language* (SL) (9 items). SPQ also has a total score that is the sum of the scores of all its dimensions. The total score ranges from 0 to 74. This questionnaire also has evidence for its validity and reliability (Fonseca-Pedrero et al., 2012). As an example, Cronbach's alpha coefficients for this scale were greater than 0.8 and in some cases greater than 0.9. The Spanish version used in this study has reliability indices above 0.8 (Raine, 1991).

Multivariable Multiaxial Suggestibility Inventory-2 (MMSI-2). MMSI-2 is a psychometric inventory developed by Escolà-Gascón (2020a) consisting of 174 broad spectrum items, whose subject matter focuses on anomalous phenomena as frontier experiences that cannot be explained from a psychopathological perspective. In this study only 9 of the 20–22 total scales of the test were used. The scales were: (1) *Visual-Auditory Anomalous Phenomena* (Pva) (11 items); (2) *Tactile Anomalous Phenomena* (Pt) (7 items); (3) *Olfactory Anomalous Phenomena* (Po) (7 items); (4) *Cenesthesic Anomalous Phenomena* (Pc) (9 items); (5) *Inconsistencies* (K) (12 items); (6) *Lies/Fabrications* (L) (23 items); (7) *Frauds* (F) (20 items); (8) *Simulation* (Si) (6 items); and (9) *Schizotypy* (Ez) (11 items). On the one hand, scales K, L, F, and Si form the IMA higher-order scale (*Inconsistent Manipulations*). On the other hand, scales Pva, Pt, Po, and Pc form the APP scale (*Anomalous Perceived Phenomena*). A description of the meaning of these scales may be found in Escolà-Gascón (2020a, 2020b). In general, the MMSI-2 items assessing anomalous experiences do not contain paranormal, parapsychological, or supernatural causal interpretations. Unlike previous scales, these items are limited to the respondent's perceived anomalous or unexplained experience. This feature is important because the MMSI-2 was not designed with the assumption that the anomalous experiences are hallucinations or perceptual disorders. The perspective of this test is neutral and intended to measure perceived unexplained experiences in an aseptic way. MMSI-2 offers guarantees of validity and reliability (ordinal alpha >0.9; omega coefficients >0.8) (Escolà-Gascón, 2020a, 2020b; Escolà-Gascón et al., 2021).

Statistical Analysis

Data underwent analysis using the statistical software JAMOVI (see The Jamovi Project, 2020). A *multiple regression* model, using the *enter* and *forward stepwise* methods, was used. The forward *stepwise* method allowed for the examination of the degree to which each predictor variable contributed to reduce prediction error and by extension, generated an increase in the explained variance (represented by the adjusted R^2). It also facilitates the fit of a more parsimonious model than the one based on the *enter* method (Pardo & San Martín, 2015). This process was only applied to the variables that previously presented *Beta* (β) coefficients that were significantly different from "0" in the *enter* method. Other studies use Pearson correlation coefficients as a reference to decide which independent variables should be included in the model. This choice would only make sense when the theoretical background offers conclusive statements regarding which predictor variables must be tested in the *stepwise* model, whether maximizing R^2 or minimizing the error associated with the predictions is the objective (Pardo & San Martín, 2015). Although the theoretical framework of this study is quite clear, results are more inconsistent and no definitive predictor covariates are specified when the difference between anomalous psychopathological and non-clinical perceptions is introduced (French & Stone, 2016; Houran et al., 2019). In cases like this, the recommendation is reliance on regression coefficients as a decision criterion to establish which variables should be tested in the *stepwise* method (Pardo & San Martín, 2015). By applying a multiple regression using the *enter* method, we can obtain semipartial correlations when the beta coefficients are standardized. These semipartial correlations are more consistent than Pearson's correlations.

An *exploratory factor analysis* (EFA) was also applied to all scales that evaluate anomalous phenomena, from both the psychopathological and the unexplained frontier experiences perspective. The extraction method was the *unweighted least squares*. To set the number of factors to extract, the *parallel analysis* method was used (Reise et al., 2000). Furthermore, no axes rotation was applied. As an assessment of the model fit, several measures were used: *proportion of variance explained* (derived from the EFA eigenvalues), RMSEA index (*root mean square error of approximation*), TLI (*Tucker-Lewis index*), CFI (*comparative fit index*), and BIC (*Bayesian information criterion*), as well as the χ^2 and *normalized* χ^2 values.

In conjunction with the other mentioned independent variables, the *paranormal beliefs* variable also was assessed. This covariate was evaluated on a scale of 0 to 10, in which each subject had to indicate to which degree they believed in the existence of the paranormal, where 0 meant "nothing" and 10 meant "absolute belief" in it. In all analyses, the risk of error was 1%.

RESULTS

Exploratory Factor Analysis

Table 1 shows the descriptive statistics. Taking into account the minimum and maximum scores of each scale, similar average values were obtained for the majority of the perceptive scales (note scales are in different metrics). However, this does not mean that all scales have similar covariances–correlations. Therefore, both the covariance and the correlations between these scales also should be examined.

Considering the previous conceptual background of this study, it is possible that these scales measure different psychological constructs; one could be based on hallucinatory perceptive disruptions, while other scales could be linked to an unexplained/frontier experiences model. Therefore, Tables 2 and 3 show the correlation matrix of these scales, as well as the EFA with 2 extracted factors according to Figure 1. For Table 2, results indicate that psychosis-oriented scales strongly correlate with each other (r's = .76 to .63, p < .01), whereas subscales from the MMSI-2 are much more weakly correlated (r's .34 to .23, p < .01) to psychosis-related measures. As such, findings indicate that MMSI-2 subscales only weakly covary with standardized psychosis measures.

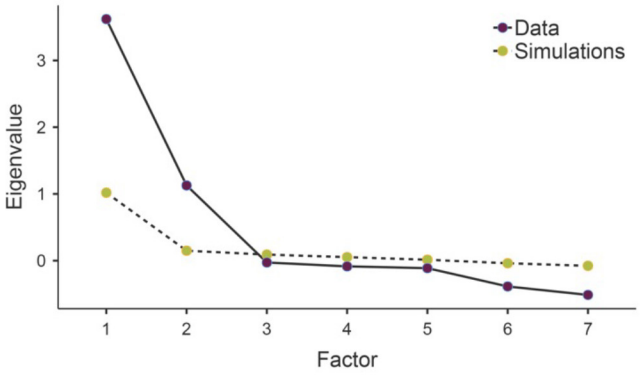

Figure 1. Scree-plot of parallel analysis.

As Tables 1, 2, and 3 display, the factorial model delivers 2 factors that explain a total of 75.5% of the variance. The first factor contains the MMSI-2 scales (which assess the frontier anomalous experiences), and the second factor contains the scales that evaluate the anomalous experiences related to the psychotic symptomatology. Results suggest that the scales specified as dependent variables do not measure the same construct. Specifically, eigenvalues for the psychosis-related measures load equivalently on both factors (λ = .53 to .66) for LSHS-R, UPE, and PD scales. However, per Table 3, MMSI-2 subscales (i.e., Po, Pt, Pva) show factorial differentiation, where these MMSI-2 scales load heavily on Factor 1 (λ = –.82 to 87), while inversely loading on Factor 2 (λ= –.29 to –.33). Given the low correlation between variables in Table 2, the current factor analysis shows MMSI-2 scales heavily weigh within Factor 1 and its theoretical construct but are inversely related to the components of psychosis-oriented scales captured in Factor 2 of this EFA. Meanwhile, fit indices support the validity of the factorial model. Notably, the Chi-square statistics in the EFA model failed to reach appropriate significance against the model fit. However, Chi-Square fit statistics are highly sensitive when there is a large sample size (Brown, 2015).

Multiple Regression Analysis

Table 4 shows the regression coefficients and the model R^2 statistic when using the *enter* method when we regressed subscales of CAPE, SPQ, and MMSI 2 on the LSHS-R scale (in this analysis representing psychopathology), and the APP scale (representing unexplained anomalies). The R^2 statistic makes it possible to quantify the proportion of mismatch reduction. This indicator is added into the analyses in order to know how strongly the psychological variables can explain the variability of the LSHS-R and APP scales per Table 4. All predictor variables that are measured by CAPE-42, LSHS-R, SPQ, and MMSI-2 have been included in the model. As can be seen, the regression was applied taking into consideration the difference between the psychopathological anomalous experiences and the non-clinical ones (following the factorial model from Table 3). Results indicate that the majority of variables were significant predictors in both models (see Table 4), but in many cases show weak predictive power for most variables in both models (For LSHS-R β_z's = –14 to .17, but see Ez subscale, β_z = .52; for APP β_z's = –.17 to .23, but see K subscale, β_z = .46). The R^2 for the LSHS-R criterion variable had a weight of 60.6%. For the APP variable it was 54.2%. Overall, results indicate approximately equal low predictive power for both dependent variables, with the exception of the MMSI-2 Ez subscale strongly predicting LSHS-R, and the MMSI-2 K subscale strongly predicting APP.

Considering the R^2 statistic of unexplained abnormal experiences (APP R^2 = 54.2%) and the R^2 of psychotic-like experiences (LSHS-R R^2 = 60.6%), we can observe that, within the weak prediction made by psychotic variables, the strength of the prediction is lower when the anomalous experiences are not psychotic. This result is aligned with previous observations. It was not possible to merge the scores from the PD, UPE, and LSHS-R scales—in contrast to the other scales, which could in fact join in the APP scale (that was already typified in MMSI-2, see Escolà-Gascón, 2020a, 2020b)—due to their different metrics and the lack of any scale that could

TABLE 1. Summary of Descriptive Statistics

Tests	Scales	Means	Standard Deviation	Variance	Skewness[a]	Kurtosis[b]
CAPE	PD	38.464	9.388	88.132	-0.122	-1.039
	ND	35.173	9.227	85.145	-0.125	-0.766
	DD	18.843	4.696	22.050	-0.226	-0.708
SPQ (complete version)	RI	5.361	2.434	5.925	-0.071	-1.109
	MT	3.181	1.963	3.853	0.186	-0.937
	UPE	3.523	2.229	4.970	0.321	-0.6
	PI	4.028	2.103	4.423	0.007	-1.075
	SA	4.132	2.084	4.343	-0.124	-0.925
	LF	5.429	2.443	5.967	-0.311	-0.808
	FA	4.322	2.226	4.953	-0.049	-1.065
	EB	3.126	1.978	3.911	0.018	-1.107
	SL	4.612	2.529	6.395	-0.143	-1.001
MMSI-2	Ez	35.36	7.48	55.955	-0.058	-0.476
	K	15.97	2.936	8.621	0.817	0.083
	L	52.94	22.715	515.953	0.526	-1.063
	F	49.28	22.347	499.374	0.31	-1.264
	Si	15.63	4.138	17.125	0.871	0.226
	Pva	22.48	9.376	87.904	0.824	-0.57
	Pt	15.48	6.798	46.214	0.689	-0.834
	Po	16.1	7.615	57.993	0.697	-0.807
	Pc	16.11	5.151	26.534	0.757	-0.38
General scales	PF	92.480	19.261	370.988	0.081	-0.998
	SPQ	37.715	16.004	256.129	0.112	-0.729
	APP	70.167	26.736	714.810	0.381	-1.324
	IMA	133.810	44.571	1986.543	0.289	-1.099
	LSHS-R	15.573	2.658	7.065	0.519	-0.598
Beliefs[c]		5.612	2.974	8.844	-0.163	-1.046

[a]Error = 0.103. [b]Error = 0.206. [c]Degree to which the individual believes in the existence of the paranormal (scale of 0 to 10). PD = Positive Dimension; ND = Negative Dimension; DD = Depressive Dimension; RI = Reference Ideas; MT = Magical Thinking; UPE = Unusual Perceptive Experiences; PI = Paranoid Ideation; SA = Social anxiety; LF = Lack of friends; FA = Flat Affect; EB = Eccentric Behavior; SL = Strange Language; Pva = Visual-Auditory Anomalous Phenomena; Pt = Tactile Anomalous Phenomena; Po = Olfactory Anomalous Phenomena; Pc = Cenesthesic Anomalous Phenomena; K = Inconsistencies; L = Lies; F = Frauds; Si = Simulation; Ez = Schizotypy; IMA = Inconsistent Manipulations; APP = Anomalous Perceived Phenomena; LSHS-R = Launay-Slade Hallucination Scale-revised; SPQ = Schizotypal Personality Questionnaire; PF = Psychosis Phenotype.

TABLE 2. Linear Correlations between Scales That Measure Anomalous Perceptions

	PD	UPE	Pva	Pt	Po	Pc	LSHS-R
PD	1						
UPE	0.628*	1					
Pva	0.27*	0.26*	1				
Pt	0.298*	0.309*	0.805*	1			
Po	0.296*	0.3*	0.838*	0.836*	1		
Pc	0.238*	0.23*	0.726*	0.8*	0.779*	1	
LSHS-R	0.679*	0.76*	0.301*	0.346*	0.332*	0.259*	1

*$p < 0.01$. PD = Positive Dimension; UPE = Unusual Perceptive Experiences; Pva = Visual-Auditory Anomalous Phenomena; Pt = Tactile Anomalous Phenomena; Po = Olfactory Anomalous Phenomena; Pc = Cenesthesic Anomalous Phenomena; LSHS-R = Launay-Slade Hallucination Scale-revised.

TABLE 3. Exploratory Factorial Analysis*

	Factor 1	Factor 2	Uniqueness
Po	**0.874**	−0.309	0.14
Pt	**0.872**	−0.293	0.154
Pva	**0.823**	-0.313	0.225
Pc	**0.78**	−0.33	0.283
LSHS-R	0.617	**0.665**	0.178
UPE	0.560	**0.625**	0.296
PD	0.527	**0.533**	0.439
Explained variance	54%	21.5%	

*The model fit indices for this analysis are $\chi^2 = 25.5$ with $p < 0.001$; χ^2 normalized = 3.187; RMSEA = 0.062 (0.036-0.09); TLI = 0.985; CFI = 0.994; BIC = -25.1.
PD = Positive Dimension; UPE = Unusual Perceptive Experiences; Pva = Visual-Auditory Anomalous Phenomena; Pt = Tactile Anomalous Phenomena; Po = Olfactory Anomalous Phenomena; Pc = Cenesthesic Anomalous Phenomena; LSHS-R = Launay-Slade Hallucination Scale-revised.

TABLE 4. Multiple Regression Models Using the "Enter" Method

		LSHS-R (Psychopathological Model)				APP (Unexplained Anomalies)			
Scales		*r*	β	Error	β_z	*r*	β	Error	β_z
CAPE[1]	ND	0.573*	0.017	0.012	0.060	0.401*	0.090	0.126	0.031
	DD	0.606*	0.021	0.022	0.038	0.369*	−0.037	0.244	−0.007
SPQ[1]	RI	0.631*	0.102	0.048	0.094*	0.434*	0.137	0.520	0.013
	MT	0.477*	−0.188	0.056	−0.139*	0.281*	−2.320	0.609	−0.170*
	UPE	0.572*	0.025	0.052	0.019	0.362*	−0.323	0.563	−0.025
	PI	0.591*	0.095	0.054	0.074	0.444*	1.999	0.581	0.156*
	SA	0.663*	0.184	0.047	0.169*	0.452*	0.741	0.505	0.068
	LF	0.63*	0.079	0.053	0.066	0.380*	−0.552	0.571	−0.046
	FA	0.599*	−0.008	0.060	−0.006	0.4*	0.378	0.652	0.028
	EB	0.589*	−0.056	0.050	−0.053	0.39*	−0.038	0.538	−0.004
MMSI-2[1]	Ez	0,746*	0.187	0.032	0.527*	0.493*	0.822	0.351	0.230*
	K	0.37*	0.011	0.033	0.012	0.665*	4.185	0.354	0.460*
	L	0.068	−0.008	0.004	−0.071	0.296*	0.068	0.048	0.058
	F	0.072	−0.004	0.004	−0.033	0.197*	−0.161	0.049	−0.134*
	Si	−0.17*	−0.006	0.023	−0.010	0.158*	0.052	0.254	0.008
Beliefs[4]		−0.033	−0.042	0.031	−0.047	0.411*	2.048	0.332	0.228*

[1] PD, UPE, Pva, Pt, Po, and Pc have been deleted since they had collinearity with LSHS-R y APP.
[2] Concerning LSHS-R model: R^2 (corrected)= 0.606; Intersection= 7.246 (error= 0,722); Durbin-Watson Index= 1.034.
[3] Concerning APP model: R^2 (corrected)= 0.542; Intersection= −39.115 (error= 7,834); Durbin-Watson Index= 0.499.
[4] Degree to which the individual believes in the existence of the paranormal (scale of 0 to 10).
*$p < 0.01$; β = regression coefficients; β = standardized regression coefficients; *r* = Pearson correlation coefficients; ND = Negative Dimension; DD = Depressive Dimension; RI = Referẽnce Ideas; MT = Magical Thinking; UPE = Unusual Perceptive Experiences; PI = Paranoid Ideation; SA = Social anxiety; LF = Lack of Friends; FA = Flat Affect; EB = Eccentric Behavior; K = Inconsistencies; L = Lies; F = Frauds; Si = Simulation; Ez = Schizotypy; APP = Anomalous Perceived Phenomena.

enable the standardization of the scores. As an alternative, the LSHS-R scale has been selected for these regression models as the representative variable for testing the predictive power of other scales on psychopathological abnormalities. In fact, this previous scale has the highest factorial weights; therefore, it will also show a high *commonality*.

The aim of the Table 4 analysis was to select those predictors that generated the highest variability and change on the dependent variable. For this purpose, standardized regression coefficients were used. Results from Table 4 show that the variables that most strongly predict when other variables are being held constant on the LSHS-R scale were RI β_z = .09, MT β_z = –.14, SA β_z = .17, and Ez β_z = .53. For the APP scale, the selected variables were MT β_z = –.17, PI β_z = –.16, Ez β_z = .23, K β_z = .46, F β_z = .13, and Paranormal Belief β_z = .28).

Thus, these scales were selected to fit several stepwise multiple regression models in order to examine the additive or subtractive variance contributed by the subscales toward predicting both LSHS-R and APP scales, respectively. Results can be seen in Tables 5 and 6.

From Table 5, the hallucinations assessed by the LSHS-R scale can be successfully predicted to 75.9% using only Model 3, which includes the Ez, SA, and MT variables. However, it should be noted that predictive weights are low for most of these variables (excluding Ez, β's < .21), and the total variance increase when adding these variables is approximately 0.6% up to Model 3. When introducing the RI variable, the observed increase in R^2 is not significant (see Table 5). Thus, analysis indicates that SA and MT do significantly add to the model that predicts LSHS-R, but not practically so, as the variance explained is minimal. Further, results show that the RI variable does not significantly contribute to the prediction of the criterion variable. Thus, it is not necessary to incorporate the RI scale into estimated models for LSHS-R. In addition, the anomalous perceptions assessed by the MMSI-2 APP scale from the current analysis, are predicted at 73.4% taking the K, paranormal beliefs, Ez, Fraud, and MT covariates into consideration. However, as with LSHS-R, with the exception of variable K, the predictor variables beliefs, Ez, F, and MT contributed only 6.9% of the variance explained. This means that for practical purposes the psychotic spectrum variables (with the exception of K) are not useful in predicting unexplained abnormal experiences. The variable K should be considered the main variable explaining 66.5% of the variance.

DISCUSSION

This research had two main objectives: on one hand, to assess whether the different scales evaluated anomalous perceptions within the same construct or not using an EFA; on the other hand, to test if certain clinical variables related to psychotic phenotype and schizotypy could predict anomalous perceptions understood as hallucinatory and unexplained phenomena. Results indicated that the CAPE-42, SPQ-UPE, and LSHS-R scales evaluated anomalous experiences in a different way than the Pva, Pt, Po, and Pc (from MMSI-2 scales). This result may be due to the fact that the MMSI-2 items examining anomalous experiences do not include paranormal inferences or interpretations. In contrast, the LSHS-R items do include, in addition to psychotic-like experiences, magical and delusional interpretations.

Regression analyses showed that the variables related to psychotic symptomatology (such as RI, MT, SA, and Ez) predicted anomalous perceptions assessed by LSHS-R in a greater and more effective way than the other scales. This leads to further reflection about three critical points. (1) What differences exist between the perceptive scales from MMSI-2 and the CAPE-42, SPQ-UPE, and LSHS-R scales? (2) Why do psychopathological variables predict anomalous perceptions assessed by LSHS-R in a better way than the ones assessed by APP scales? (3) What other variables should be taken into account to optimize the fit indices of the regression models?

Firstly, it should be considered that the CAPE-42 scales (especially the PD), SPQ-UPE, and LSHS-R were designed for the examination of hallucinatory behaviors and psychopathological perceptive disruptions (Fonseca-Pedrero et al., 2011; Fonseca-Pedrero et al., 2012). This means that the evaluated content group observed symptoms in clinical psychotic episodes (Pasricha, 2011). In contrast, APP scales (Pva, Pt, Po, and Pc) were developed to evaluate perceptions that are similar to hallucinations, for whose sensorial objects or content there are experimental studies with significant results that question science's limits (Escola-Gascón, 2020b). An example of these behaviors can be found in psi phenomena (Jinks, 2019). Regardless of whether these phenomena actually exist or not, this kind of research poses the idea of how to investigate if a hallucination or delusion really constitutes a psychopathological psychotic symptom.

The correlation matrix between these scales indicate that they were positively inter-correlated and the EFA could differentiate two predictor factors that grouped the scales into both groups mentioned. The initial correlations represent the basis on which the EFA works. What is done in an EFA is to analyze the pattern of variability and covariability of these variables. This is important to keep in mind, since the Pva, Pt, Po, and Pc scales have high correlations with each other, and in EFA these scales form a different factor from the rest of the scales. This detail is a point in favor of distinguishing between the two factors in the

TABLE 5. Stepwise Multiple Regression Models (Criterion Variable = LSHS-R)

Models	Variables	β	Error	β_z	*r*	R^2	ΔR^2	*F*	*p*
1	Intersection	6.202	0.361	-	0.746*	0.556*	0.556	702.47	p < 0.01
	Ez	0.265	0.010	0.746					
2	Intersection	5.320	0.413	-	0.755*	0.568*	0.014	17.695	p < 0.01
	Ez	0.311	0.015	0.876					
	SA	−0.237	0.056	−0.175					
3	Intersection	5.808	0.446	-	0.759*	0.574*	0.006	7.950	p < 0.01
	Ez	0.277	0.019	0.780					
	SA	−0.238	0.056	−0.176					
	MT	0.136	0.048	0.124					
4	Intersection	6.078	0.460	-	0.762*	0.577	0.004	5.189	p = 0.023
	Ez	0.259	0.021	0.728					
	SA	−0.260	0.057	−0.192					
	MT	0.124	0.048	0.113					
	RI	0.123	0.054	0.096					

[1] Degree to which the individual believes in the existence of the paranormal (scale of 0 to 10). *p < 0.01; β = regression coefficients; β_z = standardized regression coefficients; *r* = Pearson correlation coefficients; Ez = Schizotypy; SA = Social Anxiety; RI = Reference Ideas; MT = Magical Thinking; N.S. = Not significant.

TABLE 6. Stepwise Multiple Regression Models (Criterion Variable = APP)

Models	Variables	β	Error	β_z	*r*	R^2	ΔR^2	*F*	*p*
1	Intersection	−26.472	4.667	-	0.665	0.441*	0.442	443.302	p < 0.001
	K	6.053	0.287	0.665*					
2	Intersection	−25.557	4.551	-	0.686	0.469	0.029	30.526	p < 0.01
	K	5.414	0.303	0.595					
	Beliefs[1]	1.653	0.299	0.184					
3	Intersection	−37.646	4.699	-	0.716	0.511	0.043	48.775	p < 0.01
	K	4.064	0.349	0.446					
	Beliefs[1]	2.067	0.293	0.230					
	Ez	0.886	0.127	0.248					
4	Intersection	−38.214	4.630	-	0.727	0.525	0.016	18.339	p < 0.01
	K	4.408	0.353	0.484					
	Beliefs[1]	2.282	0.293	0.254					
	Ez	0.943	0.126	0.264					
	Fraud	−0.165	0.039	−0.138					
5	Intersection	−45.498	5.066	-	0.734	0.534	0.010	11.460	p = 0.01
	K	4.370	0.350	0.480					
	Beliefs[1]	2.222	0.291	0.247					
	Ez	1.330	0.169	0.372					
	Fraud	−0.146	0.039	−0.122					
	MT	−2.013	0.595	−0.148					

[1] Degree to which the individual believes in the existence of the paranormal (scale of 0 to 10). *p < 0.01; β = regression coefficients; β_z = standardized regression coefficients; *r* = Pearson correlation coefficients; K = Inconsistencies; Ez = Schizotypy; MT = Magical Thinking.

EFA. Nevertheless, the factor loadings indicated that some scales could be correlated with the two extracted latent factors. This is not a problem because the two extracted factors need not be mutually exclusive, but they are not clearly differentiated in the factor solution of our analyses: In the obtained EFA, scales from factor 2 also saturate highly in factor 1, indicating that both factors are not orthogonal or independent.

Therefore, factorial analysis would suggest that scales from factor 2 represent a construct-dimension that identifies the pathological perceptive disruptions (or potentially pathological) and factor 1 describes a different construct, which is related to the magical beliefs systems and frontier perceptive abnormalities. The fact that there are cross-loadings and that some of them are negative can have two interpretations: They can be a statistical artifact that is not useful or justified in the report, or they can be interpreted as meaning that the presence of psychotic-like experiences reduces the number of non-pathological anomalous experiences. Consequently, a distinction must be made between the scientific debate associated with the discussion of the existence or non-existence of psi phenomena and the debate related to the discussion that focuses on the psychopathological impact of anomalous perceptions.

In any case, this evidence is relevant because it supports 2 types of hypotheses: On the one hand, the anomalous experiences related to psi phenomena are not the same at the psychological level as the psychotic-like experiences of psychosis. On the other hand, the correlations and the EFA also support the idea that psychotic symptoms do not predict unexplained anomalous experiences versus psychotic-like experiences in the same way. Therefore, we can question whether the clinical model of psychopathology should be employed as a rational, psychiatric explanation of psi phenomena. However, this will have to be explored and confirmed in further research. Likewise, it would also be advisable to replicate the findings of Stefanis et al. (2004) and van Os et al. (2009), but using the MMSI-2 and APP scales. These results open up the opportunity for a new line of research. Namely, which Factor 1 scales from our EFA constitute an etiologically different phenomenon from the content of the Factor 2 scales? In reality, there is still the variability between 41.2% and 45.5% left to explain, which suggests that there would be other psychological predictor variables apart from the psychotic symptoms.

As mentioned in the Introduction, perhaps the psychological and subclinical features of histrionic, narcissistic, and paranoid personality should be added as covariates (Cardeña & Carlson, 2011; Font, 2016; Acunzo et al., 2019). Moreover, these last features should be followed up with other variables such as psychotropic substances abuse (Sideli et al., 2019) or the symptoms associated with emotional instability (Roe & Bell, 2016). Nevertheless, analysis of these variables was not a priority in this study, which focuses on the relationship between anomalous phenomena and the psychological features of subclinical psychosis. In this regard, the degree to which the subject believes in the existence of the paranormal also seems to predict APP-type anomalous phenomena and leads us to question whether belief systems could covary with these kind of anomalous perceptions, too (Irwin, 2009). In fact, some studies conclude that the belief system—understood as the cognitive representation and meanings ascribed to the perceived object—make a difference between psychopathological anomalous phenomena and those that are considered frontier (Irwin et al., 2013). Therefore, as stated by Lange et al. (2019) in their review, the perceived anomalous experience could be reinforced by the belief in the existence of the paranormal. Paranormal belief is an attribution that in this study is only identified for the CAPE-42 and LSHS-R questionnaire scales. These tests contain items expressing anomalous experiences with paranormal interpretations. In contrast, items in the MMSI-2 scales are neutral and do not contain any interpretation. In this case, each item expresses an anomalous experience without causal inference. This is crucial because it could justify and explain why the prediction of the MMSI-2 scores need more predictor variables than the scores of the other scales. Thus, based on the findings of the regression models and this theoretical background, it can be concluded that this study's results also support this hypothesis. As initially discussed, this conclusion is also supported by the correlations in Table 2, which show how the MMSI-2 scales have a weak association with the PD, UPE, and LSHS-R scales.

Regarding the limitations of this study, it is necessary to outline 2 main points. On one hand is the fact that APP scales could represent a behavioral phenomenon different from the construct assessed by the CAPE-42, LSHS-R, and SPQ-UPE scales. It is clear that APP cannot be the same object as the one in the LSHS-R scale; however, discarding the hallucinations related to the psychotic phenotype does not imply confirming any other alternative theory (nor the psi hypothesis). Although several psychological perception phenomena (for example, the *Barnum effect*, *pareidolia,* and other non-pathological cognitive biases [see Belloch et al., 1995; Shermer, 2011]) could be contributing to the etiological explanation of the abnormalities assessed by the APP scales, it can be said that these results provide evidence that APP scales do not assess pathological hallucinations and perceptive disruptions directly. This is consistent with previous research (Irwin et al., 2013; Vencio et al., 2018), but does not allow us to verify the alternative hypotheses

from these studies (see Belloch et al., 1995; Shermer, 2011).

On the other hand, other limitations can be related to the applied methodology. By using a design based on EFA—instead of *confirmatory factor analysis* (CFA)—it is not possible to confirm the hypothesis or theory that defends both extracted factors being different. For the proposed factorial model to be more valid, it should be tested whether the *parameters* of the measurement and structure model reproduce the *empirical variances-covariances matrix* properly. This inevitably requires the use of *structural equation modeling* and CFAs (Brown, 2015). However, the fact that this hypothesis cannot be validated does not invalidate the second conclusion of this research; in fact, with the obtained results, there are more reasons to support the second conclusion's validity and not the other way around. Nevertheless, statistically and methodologically speaking, it would not be correct to mention any "validity confirmation" of these hypotheses. More research is required to replicate these findings.

As a complement and limitation to this second critique, it is also necessary to remember that there are other psychometric instruments that measure non-clinical perceptive disruptions (French & Stone, 2014). In this regard, it could be interesting to replicate these procedures with other measures of perceptive disruptions within the phenomenological (Jaspers, 1993; Irwin, 2009) and illusion phenomena (Shermer, 2011) frameworks. As a suggestion, the *Australian Sheep-Goat Scale* (ASGS) (Drinkwater et al., 2018) is cited. Likewise, it could be possible to verify if the obtained EFA changes and generates new classifications or, on the contrary, maintains its two-dimensional structure.

Finally, another limitation to be considered is related to the predictor variables of the regression models. Although the multiple regressions used are correct, when forward *stepwise* regression is applied some predictors have very low and significant standardized beta values (the same happens with the *enter* regression). The fact that these values are low and significant warns that we should be cautious with the interpretation of the variance explained (R^2). In particular, it should be noted that the Ez and K scales (see Tables 5 and 6) were the variables that contributed the most weight to the prediction of psychotic-like experiences and abnormal experiences. The other variables also contribute to the variance explained in each step, but they have a smaller contribution that should be analyzed in future studies to check their statistical stability. Low values of standardized beta coefficients have an explanation. As previously mentioned, beta coefficients are partial–semipartial correlations. This means that predictor variables with low beta coefficients share the same source of variation as the other variables that also obtained low values in these coefficients. Since they share the same source of variation, partial–semipartial correlations penalize the original Pearson linear correlation by subtracting the amount of variation they share with respect to the dependent variable. This suggests the following: In future research these variables or scales with low beta values could be operationalized in a more precise way, so as to avoid overlaps between the sources of variability.

IMPLICATIONS AND APPLICATIONS

The results obtained in the current study support the conclusion that anomalous phenomena/experiences have different statistical behavior from hallucinations and perceptive deceptions. Therefore, there is statistical evidence that differentiates unexplained experiences from conventional clinical classifications and explain them as perception errors or pathological behaviors.

This indicates the need for research into new clinical assessment scales that enable the discrimination between patients' hallucinations, perceptual deceptions. and anomalous phenomena. In accordance with the applied EFA, the use of MMSI-2 is proposed for future research in this area.

This research offers an alternative to the conventional clinical approach that explains the anomalous experiences/perceptions that are related to parapsychological beliefs as psychotic hallucinations. Although certain schizotypy psychotic features can correlate with these kinds of abnormalities, there are statistical reasons that support the hypothesis that some anomalous perceptions represent behaviors and frontier science phenomena that seem factorially different from classic psychotic hallucinations.

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