

PARANORMAL BELIEF, SCHIZOTYPY, AND TRANSLIMINALITY

BY NEIL DAGNALL, GARY MUNLEY, ANDREW PARKER, AND KEN DRINKWATER

ABSTRACT: The current study investigated the relationship between paranormal belief and cognitive-perceptual personality measures. Participants completed a questionnaire battery containing a paranormal belief measure, the Schizotypal Personality Questionnaire (SPQ-B), and the Revised Transliminality Scale (RTS). Scores on the SPQ-B and RTS were found to be positively correlated with overall paranormal belief. Differences in level of paranormal belief for participants scoring high and low on each cognitive-perceptual measure were assessed. Participants above the median demonstrated higher levels of endorsement across all paranormal belief subscales (hauntings, aliens, superstition, other life, religion, PK, ESP, astrology, and witchcraft) than those scoring below the median. Partial correlation and hierarchical regression revealed the majority of the variance was explained by the cognitive-perceptual factor of the SPQ-B. In addition to this, within the regression model, the RTS was found to explain additional variance to that accounted for by the cognitive-perceptual factor of the SPQ-B.

Keywords: paranormal belief, transliminality, schizotypy

Schizotypy is a multifactorial psychological construct, which describes a continuum of personality characteristics and experiences related to psychosis, and in particular schizophrenia (Goulding, 2004). Three models have commonly been used to define schizotypy (Claridge, 1997; McCreery & Claridge, 2002). These view schizotypy as: (a) a disease, a milder form of schizophrenia (Meehl, 1962; Rado, 1953); (b) a personality dimension (Eysenck, 1960), psychoticism being the upper end of the normality-psychosis continuum (Goulding, 2004); and (c) both a healthy variation and a predisposition to psychosis, compromise model (Claridge, 1997). The latter two models suggest that level of schizotypy may influence cognitive-perceptual experiences within the general population and thus contribute to the formation and maintenance of paranormal belief.

This notion is supported by Irwin (2009), who postulates that clinically oriented variables, such as schizotypy, correlate with paranormal belief because they intrinsically entail reality testing deficits. It has been previously proposed that reality testing deficits per se may be fundamentally involved in the formation of paranormal beliefs (Alcock, 1981, 1995; Goode, 2000; Irwin, 2004; Vyse, 1997; Zusne & Jones, 1982). Consistent with this view, Irwin (2009) argues that reality-testing deficits bias individuals towards intuitive-experiential interpretations of anomalous events. Such interpretations lack analytical-rational processing and are likely to facilitate the generation of nonconventional “paranormal” explanations.

Once advanced, paranormal hypotheses are then maintained because subsequent evidence is not subjected to critical evaluation. Thus according to Irwin (2009), paranormal beliefs are formed and maintained because individuals fail to rigorously test self-generated explanations of the world (Irwin, 2004).

Studies examining the structure of schizotypy have consistently identified three underlying factors: aberrant perceptions and beliefs in other worlds (the positive symptoms of psychosis, i.e., hallucinations and delusions); cognitive failures (thought blocking and attentional difficulties) together with social anxiety; and introverted anhedonia (inability to experience pleasure and social withdrawal; Goulding, 2004). These factors are reflected by the three domains of the Schizotypal Personality Questionnaire (SPQ; Raine, 1991): cognitive-perceptual, disorganised, and interpersonal. The SPQ was designed to reflect the major groups of schizophrenia symptoms (i.e., positive, negative and disorganised) (Andreasen, Arndt, Alliger, Miller, & Flaum, 1995; Compton, Goulding, Bakeman, & McClure-Tone, 2009). It is worth noting that there has been considerable recent debate regarding the factorial structure of schizotypy, which has resulted in some authors proposing the existence of a fourth (paranoid) factor (Compton et al., 2009; Stefanis, et al., 2004). Given the controversial status of this additional factor, the current paper will concentrate upon the traditional three-factor model of schizotypy.

Pertinently, schizotypal personality disorder has been found to be associated with cognitive and perceptual distortions, including odd beliefs or magical thinking (Goulding & Parker, 2001). Magical thinking in this context is defined as the belief in forms of causation which by conventional standards are considered to be invalid (Eckblad & Chapman, 1983). Thalbourne (2009) further explicates that magical ideation is a “belief, quasi-belief, or semi-serious entertainment of the possibility that events which, according to the casual concepts of this culture, cannot have a causal relation with each other, might somehow nevertheless do so” (Eckblad & Chapman, 1983, p. 215). Collectively, these findings explain the commonly reported positive correlation between schizotypy and paranormal belief (Genovese, 2005; Goulding, 2004, 2005; Wolfradt, Oubaid, Straube, Bischoff, & Mischo, 1999). Irwin (2009) reports the strength of correlation between schizotypy and paranormal belief to be about .6 or less (e.g., Thalbourne, 1985; Thalbourne & Delin, 1994).

Hergovich, Schott, and Arendasy (2008) expanded upon previous research when they explored the relationship between paranormal belief and schizotypy among adolescents. Hergovich et al. (2008) found that schizotypy was a predictor of some Revised Paranormal Belief (R-PBS; Lange, Irwin, & Houran, 2000a; Tobacyk, 1988; Tobacyk, 2004; Tobacyk & Milford, 1983) subscales (i.e., precognition, psi, witchcraft and spiritualism). Their findings also support the notion that paranormal belief is related to the positive symptoms of schizotypy (Genovese, 2005; Hergovich & Arendasy,

2007; Wolfradt et al., 1999); a stronger relationship was observed between paranormal belief and the cognitive-perceptual component of schizotypy than with the interpersonal and disorganised factors. While of great interest, the extent to which these findings can be generalised to adults is limited by the use of an adolescent sample. There is evidence that the factorial structure underlying paranormal belief in adolescents differs from that of adults (Wolfradt & Straube, 1998).

Work with schizotypy has been paralleled within the personality and paranormal literature by use of the perceptual-personality construct of transliminality (Thalbourne & Houran, 2000; Thalbourne & Maltby, 2008). Transliminality has been defined as hypersensitivity to psychological material (Thalbourne & Maltby, 2008), “a hypothesised tendency for psychological material to cross (*trans*) thresholds (*limines*) into or out of consciousness” (Thalbourne & Houran, 2000, p. 853; see also Houran & Thalbourne, 2003; Storm & Thalbourne, 1998–99; Thalbourne, 1999; Thalbourne, Keogh, & Witt, 2005). Thalbourne (1998) posits that high scores on paranormal belief measures correlate with scores on psychopathology measures because of this “leaky” mental threshold. Similarly, Hartmann (1991) adopted the notion of mental boundaries to explain the relative ease with which psychological material moves between different states of consciousness (Soffer-Dudek & Shahar, 2009). As Rabeyron and Watt (2010) point out, studies have frequently reported there to be a link between “thinner” mental boundaries and paranormal experiences (Houran, Thalbourne, & Hartmann, 2003; Kennedy, 2005; Palmer & Braud, 2002; Richards, 1996).

While a unitary construct, transliminality possesses seven underlying psychological variables: mystical experience, magical ideation, fantasy proneness, absorption, manic experience, dream interpretation, and hyperesthesia (Thalbourne, Crawley, & Houran, 2003). The construct of transliminality arose from a factor analysis of several variables related to paranormal belief and experiences and hence paranormal belief/experience is a core constituent of transliminality (Thalbourne & Houran, 2000). This explains why strong positive correlations have been reported between the Transliminality Scale and paranormal belief/experience, mystical experiences and magical thinking (Thalbourne, Bartemucci, Delin, Fox & Nofi, 1997; Thalbourne & Houran, 2000).

Thalbourne and Houran (2000) administered the Mental Experience Inventory (Kumar & Pekala, 1992) to respondents in Australia and the United States and found strong positive correlations between paranormal belief (subscales measuring belief in psi-related and unusual events, paranormal unusual experiences, and paranormal experience) and transliminality; no differences were found between the two national samples, and correlations ranged from .59 to .82. Similarly, Houran and Thalbourne (2001a), using measures derived from Kumar and Pekala (2001; Pekala, Kumar, & Marcano, 1995), found that the Revised

Transliminality Scale positively correlated with the encounters subscale (alleged encounters with beings and entities such as angels, the dead, and UFOs), .61; the poltergeist subscale (general phenomena associated with hauntings and poltergeists), .51; and seeing a ghost (a single item on apparitions), .38.

In addition to these findings, transliminality has been reported to be highly positively correlated with temporal lobe lability (Thalbourne et al., 2003). Furthermore, temporal lobe lability has been demonstrated to be associated with mystical experiences, paranormal beliefs, and psychic experiences (Persinger & Makarec, 1987; Persinger & Valliant, 1985). Indeed, Persinger (1995) reports having induced paranormal experiences by applying fluctuating magnetic fields across the temporal lobes of participants.

While schizotypy and transliminality have been psychometrically evaluated, validated, and established as independent constructs, it is clear that they share considerable common variance. Consequently, the present study sought to determine the extent to which each construct explained unique variance in a measure of paranormal belief. Particularly, the current study expanded upon previous research in several ways. Firstly, schizotypy and transliminality were considered in combination. While it was predicted that these constructs would be positively correlated with paranormal belief and each other, it is unclear which construct best predicts paranormal belief. The approach adopted in the present study was similar to that used by Thalbourne and Maltby (2008), who examined the relationship between transliminality (Houran, Thalbourne, & Lange, 2003; Lange, Thalbourne, Houran, & Storm, 2000; Thalbourne, 1998) and three correlated measures: Hartmann's Boundary Questionnaire (the Sumbound measure; Hartmann, 1991; Houran, Thalbourne, & Hartmann, 2003); the unusual experiences scale of the O-LIFE (Claridge, 1997; Mason, Claridge & Jackson, 1995; Mason, Claridge, & Williams, 1997); and a measure of temporal lobe lability (Persinger, 1984).

Thalbourne and Maltby (2008) found that transliminality and the three measures could be reduced to a single factor. Boundary thinness (Boundary Questionnaire; Sumbound) was the best measure of the underlying factor, however, transliminality was considered to be the most representative variable because: it had been Rasch-scaled, it was the shortest of the four measures, and transliminality had previously been found to be significantly related to performance on psychophysical threshold tasks using visual and vibro-tactile stimuli. Similarly, the current study intended to determine which of the inter-related measures (schizotypy and transliminality) best explained variance in a measure of paranormal belief.

Secondly, the present study examined whether paranormal belief was more highly correlated with the cognitive-perceptual of schizotypy than the interpersonal and disorganised factors (Genovese, 2005; Hergovich

et al., 2008; Wolfradt et al. 1999). Irwin and Green (1998) using the SPQ found that the cognitive-perceptual factor of schizotypy was related to belief in precognition and spiritualism, especially in females. Also, Houran, Irwin, and Lange (2001) reported the cognitive-perceptual factor predicted scores on the New Age factor of the R-PBS (Irwin, 2009; Lange et al, 2000a). Irwin (2009) suggests this is because the cognitive-perceptual factor of schizotypy, which parallels schizophrenia such as delusional symptoms in the normal population, is associated with intuitive-experiential reasoning. Such reasoning is likely to produce beliefs which are not based on reliable, objective evidence, and which are not subjected to critical analysis. In line with previous research it was predicted that the cognitive-perceptual factor would explain the majority of variance shared between schizotypy and paranormal belief.

Interestingly, Irwin and Green (1998) also found differences with regard to the disorganisation and interpersonal factors of the SPQ. Scores on the disorganisation scale were associated with endorsement of beliefs in extraordinary life forms and witchcraft, and disavowing belief in precognition and traditional religious views in men. People with schizotypal interpersonal deficits were found to be relatively inclined to embrace spiritualist beliefs but to disbelieve in psi and witchcraft. On the basis of these findings, Irwin and Green (1998) concluded that the relationship between paranormal beliefs and schizotypy was a complex one; beliefs vary across the three factors of schizotypy and each factor makes a positive and negative contribution to beliefs. Similarly, the relationship between schizotypy and subjective evaluation of paranormal experiences has been found to be complex. Schofield and Claridge (2007) found that highly cognitively organised participants reported positive schizotypy/pleasant experiences, whereas cognitively disorganised participants expressed negative schizotypy/distressing experiences.

Finally, a few studies have extended research beyond conventional measures of paranormal belief; the R-PBS (Lange et al., 2000a; Tobacyk, 1988; Tobacyk, 2004; Tobacyk & Milford, 1983) and the Australian Sheep-Goat Scale (Thalbourne, 1995; Thalbourne & Delin, 1993). The current study employed a broader measure of the paranormal, including subscales measuring other life and alien visitations alongside standard paranormal belief subscales (superstition, ESP, PK, etc.) (Dagnall, Munley, Parker, & Drinkwater, in press). Subdividing belief in this way enabled the current study to examine Hergovich et al.'s (2008) finding that only certain aspects of paranormal belief (i.e., belief in precognition, psi, witchcraft, and spiritualism) are predicted by schizotypy.

This approach is based upon a more comprehensive definition of paranormality than that enshrined within the R-PBS. The Paranormal Belief Scale (Tobacyk, 1988) was based upon Broad's (1949/1978) definition of paranormality, which delineates paranormal phenomena as those that, if genuine, would violate the basic limiting principles of science.

This definition was later criticised by Lawrence (1995), who proposed a more exact definition, which focused upon hypothesized processes that are in principle physically impossible or outside the realm of human capabilities, as presently conceived by conventional scientists (Irwin, 1993). Considering this conceptual debate, the current study adopted a definition of paranormal consistent with the working definition proposed by Irwin: “a proposition that has not been empirically attested to the satisfaction of the scientific establishment but is generated within the nonscientific community and extensively endorsed by people, who might normally be expected by their society to be capable of rational thought and reality testing” (Irwin, 2009, p. 16-17).

Hergovich et al. (2008) argued that paranormal belief can be divided into components of paranormal belief that are strongly associated with schizotypy and those which are not. Using subscale measurements alongside a measure of overall paranormal belief enabled the present study to determine whether respondents high in transliminality demonstrate a similar pattern of paranormal endorsement to that found with schizotypy. In addition to this, the present study tested whether the findings of Hergovich et al. (2008) generalised beyond adolescents to a broader adult sample.

METHOD

Respondents

The participant pool comprised 320 respondents. Eighty-five respondents were males (27%) and 235 (73%) female. The ages ranged between 17 and 60 years with a mean age of 26.45 ($SD = 9.86$). Respondents were recruited from the psychology program at the Manchester Metropolitan University and by research students using snowball sampling, which involved asking people to participate and encouraging contacts to take part in a study concerned with measuring a “variety of different types of beliefs.”

Materials

A booklet containing four questionnaire measures was presented: paranormal belief, the Schizotypal Personality Questionnaire, Version B (SPQ-B; Raine & Benishay, 1995), and the Revised Transliminality Scale (RTS; Lange et al., 2000). Presentation order was counter-balanced across booklets.

The paranormal belief measure was a composite measure derived from principal component analysis of several existing measures: Revised Paranormal Belief Scale (R-PBS; Lange et al., 2000a; Tobacyk, 1988; Tobacyk, 2004; Tobacyk & Milford, 1983); Australian Sheep-Goat Scale (Thalbourne, 1995; Thalbourne & Delin, 1993); Paranormal Short

Inventory (PSI; Randall, 1997); Manchester Metropolitan University Scale of Paranormal Belief (Foster, 2001); Superstition Scale (Wiseman & Watt, 2004); Poltergeists and Hauntings Scale (Kumar & Pekala, 2001); and Extraterrestrial Life and UFO-related Beliefs (Chequers, Joseph, & Diduca, 1997; Dagnall et al., 2009).

Overall there were 58 items corresponding to nine belief clusters: hauntings and communication with the dead (8 items), internal reliability .96 (Hauntings); existence of life on other planets (6 items), .91 (Other Life); superstition (7 items), .90 (Superstition); religious belief and belief in the after life (6 items), .91 (Religion); extra-terrestrial visitations (8 items), .95 (Aliens); extrasensory perception (7 items), .89 (ESP); psychokinesis (6 items), .93 (PK); astrology (7 items), .91 (Astrology); and witchcraft (3 items), .84 (Witchcraft). All items were responded to on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) and were randomly ordered so that they appeared in a single self-report questionnaire.

Schizotypy was assessed using the SPQ-B (Raine & Benishay, 1995). The SPQ-B is an easy-to-administer, 22-item instrument derived from the 74-item SPQ; it was used in the current study because of time constraints. The SPQ-B correlates highly with the longer version of the SPQ and is a widely used research tool (Bailey & Swallow, 2004). The SPQ-B includes items from each of the three subscales of the SPQ: cognitive-perceptual, (8 items); interpersonal (8 items); and disorganized (6 items). The SPQ-B consists of questions or statements that are responded to with “yes” or “no” answers. All yes responses are totalled to produce an overall score ranging from 0 to 22; higher scores indicate higher levels of self-reported schizotypy. Internal consistency reliability, test–retest reliability, and criterion validity of the SPQ-B have been demonstrated to be good (Raine & Benishay, 1995). Raine and Benishay (1995) found the internal reliabilities of the three subscales ranged from .72 to .80, with a mean of .76. Similarly, Axelrod, Grilo, Sansilow, and McGlashan (2001) observed reliabilities ranging from .74 to .76.

The RTS is a Rasch (1960/1980) scaled version of Thalbourne’s (1998) original 29-item, true/false scale (Lange et al., 2000). While all 29 items are administered, 12 items from the original scale are excluded from scoring due to age and gender biases (see Houran et al., 2003). The Rasch reliability of this scale is .82, which translates to a KR-20 reliability coefficient of .85. Additionally, the scale possesses good test–retest reliability, .82 (Houran et al., 2003). The RTS has established construct validity, and it has been found to correlate with experimental measures and experiential and attitudinal phenomena (Crawley, French, & Yesson, 2002; Thalbourne, 2000b). The RTS produces scores at an interval-level of measurement. The Rasch scaled score has a mean of 25 ($SD = 5$); scores above the Rasch mean indicate high levels of trait transliminality compared to scores below the Rasch mean.

Procedure

All respondents were approached individually or in small groups and were asked to complete the questionnaire. A statement was attached to the front of each questionnaire outlining the topic and content. A brief sheet was also included which indicated that participation was voluntary and that responses would remain anonymous. Participants were asked to ensure that they responded to each questionnaire item as openly and spontaneously as possible. They were also asked to ensure that they responded to all the presented items.

RESULTS

Reliability Analysis and Descriptive Statistics

The SPQ-B overall was found to have good internal reliability (George & Mallery, 2003); Cronbach's $\alpha = .85$. The subscales of the SPQ-B were also found to have acceptable to good reliability; cognitive-perceptual ($\alpha = .67$), interpersonal ($\alpha = .80$), and disorganised ($\alpha = .72$). The RTS also demonstrated acceptable internal reliability ($\alpha = .79$). See Table 1 for summary statistics.

TABLE 1
SUMMARY STATISTICS FOR THE SPQ-B, PDI, AND RTS

	<i>M</i>	<i>SD</i>	α
SPQ-B	8.28	5.08	.85
Cognitive-perceptual	3.33	2.13	.67
Interpersonal	3.09	2.46	.80
Disorganised	1.86	1.77	.72
RTS	21.45	4.15	.79

Principal Component Analysis

To ensure that the nine-factor solution was applicable to the current sample, a principal component analysis (PCA) was undertaken. Prior to the PCA, the suitability of the paranormal belief scale data was assessed. Inspection of the correlation matrix revealed the presence of coefficients .3 and above. The Kaiser-Meyer-Okin value was .94, exceeding the recommended value of .6 (Kaiser, 1970, 1974). Bartlett's Test of Sphericity was significant, supporting the factorability of the correlation matrix, $\chi^2(1653) = 17454.70, p < .001$. A cut-off point of .50 for factor loadings was adopted, that is, only those items scoring higher than this threshold were retained for further analyses (Comrey & Lee, 1992). The PCA accounted for 71.12% of the total variance (see Table 2). All

emergent factors had eigenvalues exceeding 1¹ (Kaiser, 1960) as indicated by a step change in the scree slope (Cattell, 1966), demonstrated good levels of internal consistency, and were conceptually distinct (see Table 3).

TABLE 2
FACTOR LOADINGS FOR THE TOTAL PARANORMAL BELIEF SCALE
AND THE VARIANCE EXPLAINED BY EACH FACTOR

	Eigenvalue	Variance Explained	Cumulative Variance
Hauntings	20.96	36.1%	36.1%
Alien	6.62	11.4%	45.5%
Superstition	3.59	6.2%	53.7%
Other life	3.14	5.4%	59.1%
Religion	2.32	4.0%	63.1%
PK	1.86	3.2%	66.3%
ESP	1.68	2.9%	69.2%
Astrology	1.49	2.6%	71.8%
Witchcraft	1.31	2.3%	74.1%

The overall Paranormal Belief Scale and interscale correlations are contained in Table 4. Paranormal belief overall was found to have excellent internal reliability, $\alpha = .97$. The paranormal belief subscales/scales were also found to have excellent internal reliability; Hauntings $\alpha = .96$, Alien $\alpha = .94$, Superstition $\alpha = .91$, Other life $\alpha = .92$, Religion $\alpha = .91$, PK $\alpha = .95$, ESP $\alpha = .90$, Astrology $\alpha = .93$, and Witchcraft, $\alpha = .88$. See Table 3 for summary statistics.

TABLE 3
SUMMARY STATISTICS FOR THE PARANORMAL BELIEF SCALE AND SUBSCALES

	<i>M</i>	<i>SD</i>	α
Overall	2.86	0.65	.97
Hauntings	3.04	1.07	.96
Alien	2.41	0.78	.94
Superstition	2.70	0.97	.91
Other life	3.66	0.80	.92
Religion	3.11	1.01	.91
PK	2.53	0.94	.95
ESP	2.99	0.95	.90
Astrology	2.40	0.86	.93
Witchcraft	2.89	1.11	.88

¹ The most frequently used method for identifying factors is the eigenvalue-greater-than-1 rule (Henson & Roberts, 2006; Thompson & Daniel, 1996).

Interparanormal belief scale correlations are presented in Table 4.

TABLE 4
PARANORMAL BELIEF SCALE AND SUBSCALE CORRELATIONS

	1	2	3	4	5	6	7	8	9	10
1. Overall										
2. Hauntings	.88*									
3. Aliens	.60*	.49*								
4. Superstition	.53*	.41*	.13**							
5. Other life	.33*	.20*	.41*	-.06						
6. Religion	.63*	.54*	.14**	.29*	.03					
7. PK	.80*	.67*	.57*	.24*	.27*	.37*				
8. ESP	.81*	.69*	.40*	.38*	.19*	.44*	.62*			
9. Astrology	.79*	.69*	.36*	.56*	.07	.43*	.58*	.67*		
10. Witchcraft	.74*	.61*	.37*	.23*	.13**	.47*	.59*	.54*	.48*	

* $p < .001$. ** $p < .01$. Significance levels are one-tailed.

Correlational Analysis: Schizotypy, Delusional Ideation, and Transliminality

Correlations between the paranormal belief scale, SPQ-B, and RTS were explored. Scores on the paranormal belief scale were positively correlated with SPQ-B, $r(318) = .26, p < .001$; and RTS, $r(318) = .42, p < .001$. Significant positive correlations were also observed between the SPQ-B and RTS, $r(318) = .52, p < .001$.

The relationship between the paranormal belief scale and the SPQ-B subscales (cognitive-perceptual, interpersonal, and disorganised) was examined further. Significant positive correlations were observed between the paranormal belief scale and the cognitive-perceptual factor, $r(318) = .47, p < .001$; and the paranormal belief scale and the disorganised factor, $r(318) = .11, p = .026$. The correlation between the paranormal belief scale and the interpersonal factor was not found to be significant, $r(318) = .04$.

This pattern of results suggests that scores on the cognitive-perceptual measures of the SPQ-B are more strongly associated with scores on the paranormal belief scale. Indeed, partial correlations between the paranormal belief scale interpersonal and disorganised factors, controlling for the cognitive-perceptual factor, produced small significant negative correlations: paranormal belief scale and interpersonal, $r(317) = -.17, p = .001$, and paranormal belief scale and disorganised, $r(317) = -.12, p = .017$. For this reason, the interpersonal and disorganised factors were omitted from subsequent analyses.

Tests of Difference

Three one-way between-groups multivariate analyses of variance (MANOVAs) were performed for above and below the median scores on cognitive-perceptual, PDI, and RTS to investigate differences in paranormal belief. Nine dependent variables were used: Hauntings, Alien, Superstition, Other life, Religion, PK, ESP, Astrology and Witchcraft.

For below versus above scores on the cognitive-perceptual factor, a significant difference was observed on the combined dependent variables, $F(9, 310) = 7.93$, $p < .001$; Wilks' Lambda = .81; $\eta_p^2 = 0.19$.² Respondents above the median on the cognitive-perceptual factor scored higher on the paranormal belief scale ($M = 3.14$, $SD = 0.56$) than those below the median ($M = 2.63$, $SD = 0.63$). Differences on each of the dependent variables were found to be significant (see Table 5).

TABLE 5
THE COGNITIVE-PERCEPTUAL FACTOR AND SCORES ON EACH
PARANORMAL BELIEF SCALE AND SUBSCALE

Factor	Cognitive-perceptual median split				F	df	p	η_p^2
	Below		Above					
	M	SD	M	SD				
	(n = 177)		(n = 143)					
Hauntings	2.72	1.02	3.44	0.99	40.49	1,318	< .001	0.11
Alien	2.26	0.72	2.60	0.82	15.27	1,318	< .001	0.05
Superstition	2.49	0.91	2.96	0.98	19.13	1,318	< .001	0.06
Other life	3.52	0.78	3.83	0.79	12.59	1,318	< .001	0.04
Religion	2.87	1.02	3.41	0.91	24.39	1,318	< .001	0.07
PK	2.32	0.93	2.80	0.89	21.95	1,318	< .001	0.07
ESP	2.67	0.92	3.39	0.82	52.74	1,318	< .001	0.14
Astrology	2.16	0.81	2.69	0.84	33.33	1,318	< .001	0.10
Witchcraft	2.64	1.10	3.19	1.04	19.96	1,318	< .001	0.06

For below versus above scores on the RTS, a significant difference was observed on the combined dependent variables, $F(9, 310) = 5.62$, $p < .001$; Wilks' Lambda = .86; $\eta_p^2 = 0.14$. Respondents above the median on the RTS scored higher on the paranormal belief scale ($M = 3.07$, $SD = 0.61$) than those below the median ($M = 2.66$, $SD = 0.62$). Differences on Hauntings, Alien, Other, life PK, ESP, Astrology, and Witchcraft were found to be significant. With

² Cohen (1988) suggested that partial η_p^2 effects should be interpreted using the following rule of thumb: values between .01 and .06 reflect a small effect size, values within the .06-.13 range a medium effect size, and a value of .14 or higher indicates a large effect.

Bonferroni adjustment for multiple comparisons, differences on Superstition and Religion were not found to reach significance (see Table 6).

TABLE 6
RTS FACTOR AND SCORES ON EACH PARANORMAL BELIEF SUBSCALE

Factor	Transliminality median split				F	df	p	η_p^2
	Below		Above					
	M (n = 164)	SD	M (n = 156)	SD				
Hauntings	2.74	1.02	3.36	1.03	28.62	1,318	< .001	0.08
Alien	2.28	0.71	2.54	0.83	9.14	1,318	= .003	0.03
Superstition	2.58	0.91	2.83	1.00	5.29	1,318	= .022	0.02
Other life	3.50	0.79	3.82	0.77	13.68	1,318	< .001	0.04
Religion	2.97	1.03	3.27	0.96	7.40	1,318	= .007	0.02
PK	2.33	0.89	2.74	0.94	16.35	1,318	< .001	0.05
ESP	2.70	0.88	3.30	0.92	34.84	1,318	< .001	0.10
Astrology	2.16	0.80	2.65	0.85	28.19	1,318	< .001	0.08
Witchcraft	2.64	1.03	3.15	1.13	17.36	1,318	< .001	0.05

Regression

A hierarchical regression with the predictor variables (cognitive-perceptual and RTS) entered in order of zero-order correlation with paranormal belief scale was performed. Multicollinearity was assessed using the variance inflation factor (VIF). Multicollinearity is generally considered to be severe if the VIF is greater than 5 (Yang, 2007). In the current study the VIF for all variables considered within the model was within the recommended tolerance (maximum observed value was 2.16).

A significant model was observed at each step of the regressions: Step 1, when the cognitive-perceptual factor was entered, $F(1, 318) = 94.08$, $p < .001$; and Step 2, when RTS was added to the cognitive-perceptual factor, $F(2, 317) = 59.04$, $p < .001$. A significant R^2 change was observed in Step 2 when RTS was added to the cognitive-perceptual factor, $F_{\text{change}}(1, 317) = 18.75$, $p < .001$. There was a 4.1% increase in adjusted R^2 , which improved from 22.6% to 26.7%. Partial correlation between scores on the paranormal belief scale and RTS, controlling for the cognitive-perceptual factor, found a significant correlation, $r(317) = .19$, $p < .001$; $d = .39$. It is clear from this pattern of results that scores on the paranormal belief scale are best predicted by the cognitive-perceptual factor of SPQ-B, and that RTS scores contribute additional significant variance to the model (see Table 7).

TABLE 7
HIERARCHICAL REGRESSION PREDICTING PARANORMAL BELIEF

	B ₁	B (SE)	B ₂	R ²	t	p	R ²	F _{Change}	p
<i>Step 1</i>									
Cognitive-perceptual	.15	.02	.48	.23	9.70	< .001			
<i>Step 2</i>									
Cognitive-perceptual	.10	.02	.32	.27	5.28	< .001			
RTS	.04	.01	.26		4.33	< .001	.04	18.75	<.001

Bivariate Correlations

Finally, a series of correlations were conducted between the cognitive-perceptual factor and each of the paranormal belief subscales/scales identified in the Hergovich et al. (2008) study; ESP, witchcraft and hauntings with superstition and religion (see Table 8).

TABLE 8
COGNITIVE-PERCEPTUAL FACTOR AND PARANORMAL BELIEF
SUBSCALE CORRELATIONS

	1	2	3	4	5	6
1. Cognitive-perceptual						
2. Hauntings	.40*					
3. ESP	.48*	.69*				
4. Witchcraft	.27*	.61*	.54*			
5. Superstition	.30*	.41*	.38*	.23*		
6. Religion	.27*	.54*	.44*	.47*	.29*	

* $p < .001$. Significance levels are one-tailed.

The strength of relationship between subscales previously found to be strongly associated with schizotypy (ESP, Witchcraft, and Hauntings) was compared with subscales found to be less strongly associated (superstition and religion). ESP was found to be more strongly correlated with cognitive-perceptual scores than superstition ($z_{\text{diff}} = 3.24, p < .001$) and religion ($z_{\text{diff}} = 3.95, p < .001$). Similarly, haunting beliefs were found to be more strongly

correlated with cognitive-perceptual scores than superstition ($z_{\text{diff}} = 1.79$, $p = .037$) and religion ($z_{\text{diff}} = 2.61$, $p = .0045$). Witchcraft was not found to correlate more strongly with cognitive-perceptual scores than superstition ($z_{\text{diff}} = 0.46$) and religion ($z_{\text{diff}} = 0.00$).

Schizotypy, transliminality and paranormal belief. The expected positive correlation between schizotypy and transliminality was observed. In addition, schizotypy was found to be positively correlated with paranormal belief. Examination of the SPQ-B subscale correlations together with partial correlation established that the cognitive-perceptual factor was more strongly associated with paranormal belief than the interpersonal and disorganised factors. Similarly, transliminality was found to be positively correlated with paranormal belief.

Considering scores on each of the paranormal subscales, a similar pattern of endorsement was found for participants above and below the median on the cognitive-perceptual SPQ-B factor and the RTS. Finally, hierarchical regression revealed that scores on the paranormal belief scale were best predicted by the cognitive-perceptual factor, and that the RTS predicts additional variance.

Paranormal subscale and the cognitive-perceptual factor of schizotypy. As predicted, both ESP and haunting beliefs were found to be more strongly correlated with cognitive-perceptual scores than superstition and religion. However, the predicted difference between witchcraft and superstition and religion was not observed.

DISCUSSION

The current study found that paranormal belief was most strongly correlated with the cognitive-perceptual factor of the SPQ-B. This factor is comprised of items tapping into atypical cognitions and perceptions (i.e., ideas of reference, odd beliefs/magical thinking, unusual perceptual experiences and paranoid ideation). As predicted, the cognitive-perceptual factor was also positively correlated with transliminality. This relationship is explained by the fact that both constructs share considerable common variance; for example, magical ideation is included within both scales. Despite this overlap, the RTS accounted for additional variance in the paranormal belief scale. This may be because transliminality is a broad construct containing several underlying psychological domains: (fleeting) hypomanic or manic experience, mystical experience, absorption, hyperesthesia, positive attitude towards dream interpretation, magical ideation, and fantasy-proneness (Thalbourne et al., 2003; Thalbourne & Houran, 2005).

Interestingly, the cognitive-perceptual factor in combination with the RTS accounted for only 27% of the variance in the paranormal measure. This indicates that other variables must play an important role in the formation, development, and maintenance of paranormal beliefs. One explanation for this finding is provided by Irwin (2004, 2009), who

posits that clinically oriented variables correlate with paranormal belief because they intrinsically contain items tapping into reality testing deficits. Several previous studies have reported that reality testing deficits may be fundamentally involved in the formation of paranormal beliefs (Alcock, 1981, 1995; Goode, 2000; Irwin, 2004; Vyse, 1997; Zusne & Jones, 1982). Thus it is not schizotypy and transliminality per se that are related to the formation, development, and maintenance of paranormal beliefs but the reality testing deficits inherent within both measures.

Comparing participants above and below the median on each of the paranormal belief subscales revealed important findings. Firstly, significant differences were observed on each of the nine subscales (Hauntings, Alien, Superstition, Other life, Religion, PK, ESP, Astrology, and Witchcraft). Secondly, the pattern of results for the cognitive-perceptual factor and transliminality were similar, although marginally higher effect sizes were observed for the cognitive-perceptual factor. The observed effect sizes overall were typically within the small range (partial eta-squared between .01 and .06; Cohen, 1988). Differences on the Hauntings, ESP, and Astrology scales produced effect sizes within the medium range (partial eta-squared between .06–.13; Cohen, 1988). Finally, similar large effect sizes were found for overall paranormal belief (partial eta-squared .14 or higher; Cohen, 1988); participants above the median on the cognitive-perceptual factor and transliminality were more accepting of paranormal beliefs.

The differential endorsement rate of paranormal subscales provides some support for Hergovich et al. (2008). Using a sample of adolescents, Hergovich et al. (2008) found that schizotypy was a predictor of R-PBS subscales measuring precognition, psi, witchcraft, and spiritualism, whereas subscales measuring belief in traditional religious contents, superstitious thoughts, and belief in extraordinary life forms were better predicted by paranormal belief scores. Hergovich et al.'s (2008) specific findings were difficult to evaluate in the context of the current study because a different measure of paranormal belief was employed. The closest correspondence was found comparing ESP, Witchcraft, and Hauntings with Superstition and Religion. Comparing the correlation strengths of these subscales revealed that ESP and Hauntings were more strongly correlated with the cognitive-perceptual factor than Superstition and Religion. However, Witchcraft did not differ from Superstition and Religion; all three subscales were similarly correlated with the cognitive-perceptual factor. This difference may be explained by the fact that Hergovich et al. (2008) used a sample of adolescents, whereas the current study used an older, more heterogeneous sample. There is evidence to suggest that the underlying beliefs of adolescents differ from those of adults (Hergovich et al., 2008).

The results of the current study support previous research demonstrating a strong relationship between the cognitive-perceptual factor of schizotypy and paranormal belief (Genovese, 2005; Hergovich & Arendasy,

2007; Hergovich et al., 2008; Wolfradt et al., 1999). The disorganised factor was found to be only weakly correlated with paranormal belief, while the interpersonal factor failed to produce a significant correlation. In line with Hergovich et al. (2008), the current results suggest that the disorganised and interpersonal factors do not directly contribute to the formation and maintenance of paranormal beliefs. As in other similar studies, it is evident that paranormal belief is related to positive schizotypy (Brugger & Graves, 1997; Hergovich et al., 2008; Mohr, Graves, Gianotti, Pizzagalli, & Brugger, 2001). Future studies may wish to explore this relationship further by exploring differences between positive symptom clusters (ideas of reference, odd beliefs/magical thinking, unusual perceptual experiences, and paranoid ideation).

Overall, the schizotypy findings require cautious interpretation because both the disorganised and interpersonal factors have been found to influence the evaluation of paranormal experiences. For example, Schofield & Claridge (2007) reported that highly disorganised participants showed a negative schizotypy/distressing experiences relationship, while cognitively organised participants demonstrated a positive/pleasant experiences relationship. Thus, while the disorganised and the interpersonal factors may not be directly involved with the development of paranormal beliefs, they appear to play an important role in the pathologisation of anomaly proneness. For this reason, future studies may wish to consider the interaction between scores on the cognitive-perceptual, disorganisation, and interpersonal factors. Particularly high scores on the cognitive-perceptual factor could be subdivided on the basis of high versus low disorganisation scores. This may provide useful insights into the complex relationship between schizotypy and paranormal beliefs (Irwin & Green, 1998).

Finally, it is worth noting that several self-report measures have been developed to measure schizotypy in nonclinical individuals (Chapman, Chapman, & Kwapil, 1995; Mason et al., 1997b). While these measures focus upon the schizophrenia spectrum and schizophrenia, there is considerable variation in item content (Mason & Claridge, 2006). The SPQ-B (Raine & Benishay, 1995) used in the present study has a broad remit and was designed to represent the DSM symptoms of Schizotypal Personality Disorder. This measure has the advantage of being quick to administer and provides a valid and reliable measure of overall and subscale scores (cognitive-perceptual, interpersonal, and disorganised); however, the measure is not capable of providing reliable and valid indices of the individual features of schizotypal personality disorder (Raine & Benishay, 1995). Consequently, subsequent studies may wish to use a more comprehensive measure.

Particularly important in this context is the distinction between scales based on the full (e.g., O-LIFE; Mason et al., 1995) and quasi-dimensional (e.g., Chapman scales; Chapman et al., 1995) approaches to schizotypy. The fully dimensional model describes schizotypy on a personality

continuum, with traits representing a healthy variation and a predisposition to psychosis (Claridge, 1997). By contrast, the quasi-dimensional or disease model views schizotypy as a milder form of schizophrenia (Meehl, 1962). Therefore, future studies examining the relationship between schizotypy and paranormal belief need to consider carefully the impact of scale choice on the generality of their research findings.

The current research findings are important for a number of reasons. Firstly, they contribute to the burgeoning literature examining the relationship between cognitive-perceptual factors and paranormal belief. Secondly, they offer further insights into the role of schizotypal ideation (Pizzagalli et. al, 2000). Finally, the paper explores the relationship between schizotypy and transliminality. This is important because although the SPQ-B and RTS were developed and originated separately, in the context of paranormal belief they appear to overlap and complement each other.

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Manchester Metropolitan University
 Faculty of Health, Psychology, & Social Care
 Department of Psychology
 Gaskell Campus, Hathersage Road
 Manchester, M13 0JA, UK
 N. Dagnall@mmu.ac.uk

ABSTRACTS IN OTHER LANGUAGES

French

CROYANCE PARANORMALE, SCHIZOTYPIE ET TRANSLIMINALITE

RESUME : La présente étude étudie la relation entre la croyance paranormale et des mesures de la personnalité cognitivo-perceptuelle. Les participants ont complété une batterie de questionnaires dont une mesure de la croyance paranormale, le Questionnaire de la Personnalité Schizotypique (SPQ-B), et l'Echelle Révisée de la Transliminalité (RTS). Les scores sur la SPQ-B et la RTS furent positivement corrélés avec la croyance paranormale. Des différences dans les niveaux de croyance paranormale furent détectées entre les participants qui avaient des scores élevés ou faibles à une mesure cognitivo-perceptuelle. Les participants au-dessus de la médiane montraient des niveaux plus élevés d'acceptation de toutes les sous-échelles de la croyance paranormale (hantises, extraterrestres, superstition, autres vies, religion, PK, ESP, astrologie et sorcellerie) que ceux ayant des scores en-dessous de la médiane. Une corrélation partielle et une régression hiérarchique révèlent que la majorité de la variance s'expliquait par le facteur cognitivo-perceptuel de la SPQ-B. En plus de cela, au sein du modèle de régression, la RTS expliquait la variance additionnelle à celle dont rendait compte le facteur cognitivo-perceptuel de la SPQ-B.

*Spanish*CREENCIA EN LO PARANORMAL,
ESQUIZOTIPIA Y TRANSLIMINARIDAD

RESUMEN: El siguiente estudio, investigo la relación entre creencia en lo paranormal y medidas de personalidad cognitivo-perceptuales. Los participantes completaron una batería de cuestionarios que contenía una medida de creencia en lo paranormal, el Cuestionario de Personalidad Esquizotípica (CPE), y la Escala de Transliminaridad Revisada (ETR). Puntajes del CEP y ETR fueron encontrados que correlacionaban positivamente con los índices generales de creencia en lo paranormal. Diferencias en el nivel de creencia en lo paranormal, para los participantes con puntajes altos y bajos en cada medida cognitivo-perceptual, fueron realizadas. Participantes sobre la media demostraron altos niveles de aprobación a través de todas las subescalas de creencia en lo paranormal (apariciones, alienígenas, superstición, otras vidas, religión, PK, PES, astrología y brujería), con respecto a los que puntuaron bajo la media. Análisis de correlaciones parciales y regresión jerárquica, revelaron que la mayoría de la varianza era explicada por el factor cognitivo-perceptual del CPE. Además de esto, dentro del modelo de regresión lineal, se encontró que el ETR explicó un nivel de varianza adicional a la correspondiente al nivel de varianza identificado al factor cognitivo perceptual del CPE.

*German*PARANORMALE GLAUBENSEINSTELLUNG,
SCHIZOTYPIE UND TRANSLIMINALITÄT

ZUSAMMENFASSUNG: Die vorliegende Studie untersucht den Zusammenhang zwischen paranormaler Glaubenseinstellung und kognitiv-perzeptuellen Persönlichkeitsmaßen. Die Teilnehmer füllten eine Fragebogenbatterie bestehend aus einem Maß für paranormale Glaubenseinstellung, dem Schizotypal Personality Questionnaire (SPQ-B) und der Revised Transliminality Scale (RTS) aus. Die Punktwerte auf dem SPQ-B und der RTS korrelierten positiv mit der paranormalen Glaubenseinstellung insgesamt. Unterschiede in der Ausprägung der paranormalen Einstellung bei solchen Teilnehmern, die hoch bzw. niedrig bei den jeweiligen kognitiv-perzeptuellen Maßen abschnitten, wurden überprüft. Die über dem Median liegenden Teilnehmer zeigten höhere Zustimmungswerte auf den Subskalen für paranormale Glaubenseinstellung (Spukhäuser, Aliens, Aberglaube, außerirdisches Leben, Religion, PK, ASW, Astrologie und Hexerei) als die unter dem Median liegenden. Mittels partieller Korrelation und hierarchischer Korrelation ließ sich zeigen, dass der Hauptanteil der Varianz durch den

kognitiv-perzeptuellen Faktor, gemessen durch den SPQ-B, aufgeklärt wurde. Zusätzlich zeigte sich innerhalb des Regressionmodells, daß die RTS zusätzliche Varianz aufklärte neben der durch den kognitiv-perzeptuellen Faktor des SPQ-B.