

Creation and Validation of the Belief in the Supernatural Scale¹

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Abstract: This study aimed to create and validate a new scale, the “Belief in the Supernatural Scale.” Study one used an Exploratory Factor Analysis (EFA) to reduce an initial item pool of 71 items to 44 and to identify a factor structure with 382 participants. A five factor structure was proposed: “mental and psychic phenomena,” “religious belief,” “psychokinesis,” “supernatural entities,” and “common paranormal perceptions.” We then analyzed the proposed scale in study two using a Confirmatory Factor Analysis (CFA) with 318 new participants. The new scale provides a wide range of items and indicates that while religious and paranormal beliefs show a clear division, spiritual belief is spread among those factors, indicating that spirituality might be the concept that links religiosity and paranormality. The Belief in the Supernatural Scale (BitSS) provides a valuable tool that can be used alone, or alongside previous measures, for research into supernatural belief.

Keywords: supernatural belief, religious belief, paranormal belief, spiritual belief, scale development

This study presents the development and validation of a scale to measure supernatural belief. This scale acknowledges the nuanced nature of religious and paranormal beliefs and enables researchers to measure them together, or separately, with equal degrees of clarity. The measurement of these concepts has been problematic with the primary measure in the field, the Revised Paranormal Belief Scale (rPBS) (Tobacyk & Milford, 1983), containing a “traditional religious belief” subscale. The incorporation of this subscale indicates that religious belief is regarded by researchers as being an aspect of paranormal belief. In reality, the relation between religious and paranormal belief is unclear and has provided mixed results at best (Aarnio & Lindeman, 2007). Moreover, “supernatural belief” has been used to refer to either “paranormal” (Randall & Desrosiers, 1980) or “religious” (Jong, Halberstadt, & Bluemke, 2012) concepts; such arbitrary use depends on what the researcher is investigating. In contrast, Metaphysical Chauvinism (Beck & Miller, 2001) suggests that people can believe in different “supernatural” concepts and that there should be a separation of religious and paranormal beliefs. This theory posits that peo-

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ple can believe in one phenomenon while not believing in another, when both are arguably similar in nature. For example, one person might believe in ghosts and not believe in angels, which illustrates that people can believe exclusively in either a religious or a paranormal phenomenon. This indicates that a scale is needed to measure the overarching concept of supernatural beliefs, incorporating both religious and paranormal beliefs while maintaining the distinctions between them.

A new scale should consider these definitions while acknowledging the overlaps between them. For example, the term “supernatural” has been debated (Lindeman & Svedholm, 2012), with one definition being anything that is beyond nature (Sagan, 1995). Similar debates abound when defining paranormal phenomena, which have been defined as violating the “basic limiting principles” of science (Broad, 1949 p. 291), and religiosity, defined as something that relates to an ultimate truth and higher power (Koenig, 2012). The spiritual has been particularly difficult to define but is often characterized as being something more personal than the religious (Zinnbauer et al., 1997). According to the theory of Metaphysical Chauvinism, it is important that any new scale take into account how individuals can group or cluster together in terms of their beliefs. Several studies have been carried out to group people into different types of believers, with four groups often emerging (Aarnio & Lindeman, 2007; Irwin, 1997; Rice, 2003; Schofield, Baker, Staples, & Sheffield, 2016). Schofield et al. (2016) named these groups “believers,” “paranormal believers,” “sceptics,” and “religious believers.” This grouping clearly indicates that some people only hold religious beliefs and others only paranormal beliefs. Research that has looked at the relations between the beliefs, rather than how individuals group together regarding their beliefs, has provided mixed results, with some studies finding that paranormal and religious beliefs are similar (Goode, 2000; Haraldsson & Houtkooper, 1996; Orenstein, 2002) and others finding differences (MacDonald, 2000; Rice, 2003). This ambiguity may indicate an issue with the measurement of these concepts and the complex interplay between paranormal and religious beliefs.

Scales that measure “religiosity” number in the hundreds (Hill & Hood Jr., 1999). Unlike paranormal scales that are typically phenomenological in focus, religiosity scale dimensions look at constructs such as belief, behavior, and experience. Religiosity scale dimensions are mainly based on those posited by Allport and Ross (1967): “intrinsic,” a more personal idea of what a person believes, and “extrinsic,” what a person does for their religion (e.g., do they go to church?). A further dimension was added about how a person might question their beliefs, referred to as “quest” (Batson & Schoenrade, 1991). Variations on these three dimensions have been used but are often criticized for being too arbitrary (Gorsuch, 1984). For example, Saroglou (2011) proposed four distinct and connected dimensions of religion: “believing,” “bonding,” “behavior,” and “belonging.” These map onto the psychological processes “cognitive,” “emotional,” “moral,” and “social.” Saroglou called this the big four religious dimensions model, illustrating the subjective nature of dimension naming. One of the major issues with religiosity scales is the overlap between religiosity and spirituality. Many scales measure spirituality (Kapusinski & Masters, 2010) and the term itself is used in an arbitrary fashion depending on the researcher (Kim, Martin, & Nolty, 2015). Items on the scales may refer to religious concepts (e.g., God), but the measure may be labeled as examining “religious” or “spiritual” belief. Although the link between spirituality and religiosity has been acknowledged (Hill & Pargament, 2008) and might seem obvious, the complexity of their relation needs further investigation.

However, as highlighted in the rPBS, the links between religious, spiritual, and paranormal belief

need to be considered. Scales that measure paranormal constructs are less plentiful than those about religiosity, with one of the main differences being the factors. Although religiosity scales measure factors such as intrinsic and extrinsic, the factors on paranormal scales tend to look at different types of phenomena such as superstition (Nixon, 1925) and Extra Sensory Perception (ESP) (Thalbourne & Delin, 1993; Thalbourne & Haraldsson, 1980). Moreover, the scales differ with regard to looking at belief (Jones, Russell, & Nickel, 1977; Tobacyk & Milford, 1983; Tobacyk, 2004) or experience (Irwin, Schofield, & Baker, 2014; Kumar, Pekala, & Gallagher, 1994). The most commonly used scale in this area is the Paranormal Belief Scale (Tobacyk & Milford, 1983), and the later revised Paranormal Belief Scale (Tobacyk, 2004).

The rPBS is the mainstay of the paranormal researcher but it has been critiqued for its number of factors. The authors posit seven factors (Tobacyk & Milford, 1983; Tobacyk, 2004), while other researchers have identified five (Lawrence, 1995; Lawrence & Cicco, 1997; Lawrence, Roe, & Kani, 1997) or two (Lange, Irwin, & Houran, 2000; Irwin & Marks, 2013). Items included in the scale have also been criticized; for example, the item “witches do exist” might not indicate a belief in witchcraft, merely the acknowledgment that there are people who call themselves witches (Irwin, 2009). These problems, coupled with the lack of a concrete definition of paranormal belief, substantially weaken the scale’s validity (Lawrence, 1995), with confusion surrounding what is being measured and how dimensions are classified. Furthermore, the inclusion of traditional religious belief as a subscale means that the rPBS does not provide an accurate score of global paranormal belief; high scores on the measure do not differentiate between high religious or high paranormal believers and Metaphysical Chauvinism proposes that individuals can hold these as contrasting beliefs (Aarnio & Lindeman, 2007; Rice, 2003; Schofield et al., 2016), although it has been argued that the rPBS should not be used as a unitary measure but that the sub-scales should be examined separately (Lawrence, 1995). Therefore, a new scale is required with an adequate number of valid items that can be used both uni- and multi-dimensionally in a way consistent with theory and empirical research, and which can measure “supernatural belief” in a way that encompasses the above concepts of paranormal, religious, and spiritual beliefs.

Study 1 – Item Generation and Exploratory Factor Analysis

This study aimed to create a new scale that incorporates religious, spiritual, and paranormal beliefs under the umbrella term of supernatural belief. The new scale is informed by theory and previous empirical research while being mindful of the issues regarding the previous scales. An item pool was created by taking items from previous scales of religious, spiritual, and paranormal beliefs. The pool was then reduced and the factors were assessed to evaluate the relation between religious, spiritual, and paranormal belief within the larger context of supernatural belief.

Method

Participants

Sample sizes for Exploratory Factor Analysis vary but Worthington and Whittaker (2006) suggest at least 300 participants. Therefore, the sample size used in this study ($n = 382$) was deemed to be

adequate for the 71 items in the proposed scale. The participants were recruited from the University of Derby, including on-campus and online students, by the first author, who gave general details about the study. Also, using opportunity sampling, recruitment was carried out via social media (Twitter and Facebook). The British Psychological Society was also contacted for recruitment. The participants' ages ranged from 18 to 79 years-of-age ($M = 34.85$, $SD = 12.81$). The gender of the participants was: male = 104 (27%), female = 276 (72%), and two (.5%) preferred not to say. Of the participants, 287 (75%) were higher education students, eight (2%) attended college or other post-secondary education, 211 (55%) were enrolled in undergraduate degrees, and 68 (18%) in postgraduate study. Of those that were not currently students, the level of education attainment was: seven (2%) a primary or secondary education; 16 (4%) college or other post-secondary education; 32 (8%) undergraduate degrees; and 40 (10%) post-graduate study. The University of Derby students were offered academic credit as an incentive for taking part in the study. A total of 450 participants started to fill out the survey with 382 completing all the questions, a completion rate of 85%.

Materials

Item Pool Generation for the Belief in the Supernatural Scale

There were three stages in the process of selecting items for the item pool: stage one was the initial search for scales to draw items from; stage two was an evaluation of the scales from the initial search; stage three was the evaluation and possible modification of the items taken from the scales.

Stage One – The Search for Scales

The scales used needed to be associated with belief. However, if the items could be modified to fit that category or another term had been used interchangeably with belief (faith, for example), then inclusion in the final list of scales was deemed acceptable. Further criteria at the initial stage were that the scales needed to have cross-cultural and face validity. The initial search was conducted using Hill and Hood Jr.'s (1999) book that contains over 100 measures of religiosity for religious and spiritual belief scales. For paranormal belief scales, Irwin's (2009) book was consulted as 14 scales are featured in the appendix. The religious, spiritual, and paranormal scales were checked and chosen based on the above criteria. The scales measured different variants of religious, spiritual, and paranormal belief, or all of those concepts (for example in the case of the rPBS, Tobacyk, 2004) but they are split this way for ease of searching. Using the books as initial sources also helped establish key search terms. The terms "religious belief scale," "spiritual belief scale," and "paranormal belief scale" were initially used. The following search engines were used: Elsevier Science Direct, Psycinfo, and Google Scholar. Although several scales were identified from these searches, it became clear that this method of searching was unwieldy and would not provide a comprehensive list of scales. Within Psycinfo it is possible to generate a list of the scales used by studies identified after a particular search. We established that using the search term "beliefs" rather than "belief" generated a more comprehensive list of studies. Using this method it was possible to see the most commonly used scales in studies that looked at the religious, spiritual, and paranormal. The scales found by this method were integrated with the previous lists, duplicates were noted and removed. The advantage of this method was that it allowed the scales to be rated on their popularity.

Stage Two – Reducing the Scales

Once a full list of scales was established, the next stage involved assessing them individually. Although stage one did involve a certain amount of assessment, stage two involved looking more in depth at the items within the scale and what the scales had been used for previously. The scales needed to measure belief, have cross-cultural validity, and be available. Also, it is worth noting that some of the scales had been developed as clinical tools (particularly some of the spiritual belief scales) and were therefore inappropriate. Despite this, some of the scales had elements of one or more of the previous exclusion criteria but either some of the items could be used or some of the items could be used with modifications. The studies were checked to see if further scales could be identified. This left 49 scales. Stage three involved evaluating these scales and selecting items from them.

Stage Three – Reducing the Items

The initial pools of items were taken from the scales selected in stage two. The pool of items numbered 639 initially. The first pass looked at duplicates, and a second examination checked face validity. The next step examined cross-cultural validity. Finally, the items were examined to see if people who were non-believers could answer them. If the items could be altered to address any of the above issues this was done. This process resulted in a final item pool of 204. This pool was then sent to three expert reviewers leaving 71 items. A seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) including a midpoint of 4 (uncertain) was selected, paralleling the rPBS.

Procedure

Participants were provided a link to the study via email if they were recruited face to face, or the link was included in Twitter and Facebook along with brief details of the study. The 71 items in the survey were hosted online on Qualtrics. On the survey's landing page, the participants were briefed and asked questions regarding consent and a series of demographic questions. The final page of the survey debriefed the participant. Ethical approval for this study was received from the University's Psychology Research Ethics Committee.

Analysis

An Exploratory Factor Analysis was run on the 71 items generated to evaluate item redundancy and initial factor groupings. Analyses are two-tailed unless mentioned otherwise.

Results

Data Normality

There was adequate sampling adequacy for the analysis and the correlations in the matrix were significantly different from zero and therefore factorable. The Maximum Likelihood technique was selected, and an oblique rotation method (Direct Oblimin) selected. It revealed an eight factor solution

based on the criterion of Eigenvalues > 1 and a three factor solution based on a scree plot. Before further interpretation was attempted, some items were removed.

Item Reduction

Cronbach's alpha showed very good internal consistency, $\alpha = .98$. The communalities on three items were low with an $r < .4$, which indicated that they should be considered for removal (Velicer & Fava, 1998). One item was below $.2$ ($r = .164$), "The existence of an afterlife can never be scientifically demonstrated, for it is impossible to..." and it did not load onto any of the eight factors so it was deleted. The initial correlation matrix was examined for multi-collinearity and correlations greater than $.8$ were marked. Twenty-nine items met that criteria and were examined to establish which could be deleted based on repetition (Rockwell, 1975). For example, the items "The soul continues to exist though the body may die" and "Everyone has an immortal soul" had a correlation of $.816$; the former item was deleted due to the latter being a better measurement of the concept. In total 20 items were deleted.

Main Analysis

The Factor Analysis was re-run on the remaining 51 items. Again, the sampling adequacy was good and the correlations in the matrix were significantly different from zero and therefore factorable. We chose a Factor Analysis using the Maximum Likelihood technique with Direct Oblimin oblique rotation method. Cronbach's alpha showed very good internal consistency, $\alpha = .97$, with no items requiring further scrutiny; communalities were all $> .2$. However, the pattern matrix after rotation suggested that further items should be removed. Six items had loadings of $< .4$ and were removed, for example "I believe that mind can control matter" had a loading of $.36$. The item "I think about how my life is part of a larger spiritual force" cross-loaded onto factors one and two and was also deleted. This led to seven further items being deleted.

The final Factor Analysis was run again on 44 items, the sampling adequacy was good and the correlations in the matrix were significantly different from zero and therefore factorable. Again, Factor Analysis using the Maximum Likelihood technique with Direct Oblimin oblique rotation method was chosen. Cronbach's alpha showed good internal consistency ($\alpha = .97$) with no items requiring further scrutiny and communalities were all $> .2$. The "Everyone has an immortal soul" item loading dropped to $.39$ and we retained it because it was just below the $.4$ threshold and has strong theoretical importance.

Kaiser's criterion for Eigenvalues presented a five-factor solution, while the scree plot (see figure 1) suggested a three-factor solution. Three, four, and five factor solutions were run but items mostly loaded onto the first two factors indicating that the models were under factored. Based on the Eigenvalues and previous research, for example, the rPBS is suggested to have as many as seven factors, the five-factor solution was favored and forced. See Table 1 for the factor loading after rotation. The five factors are interpreted as follows: factor one – "mental and psychic phenomena (MPP)"; factor two – "religious belief (RB)"; factor three – "psychokinesis (PK)"; factor four – "supernatural entities (SE)"; and factor five – "common paranormal perceptions (CPP)."

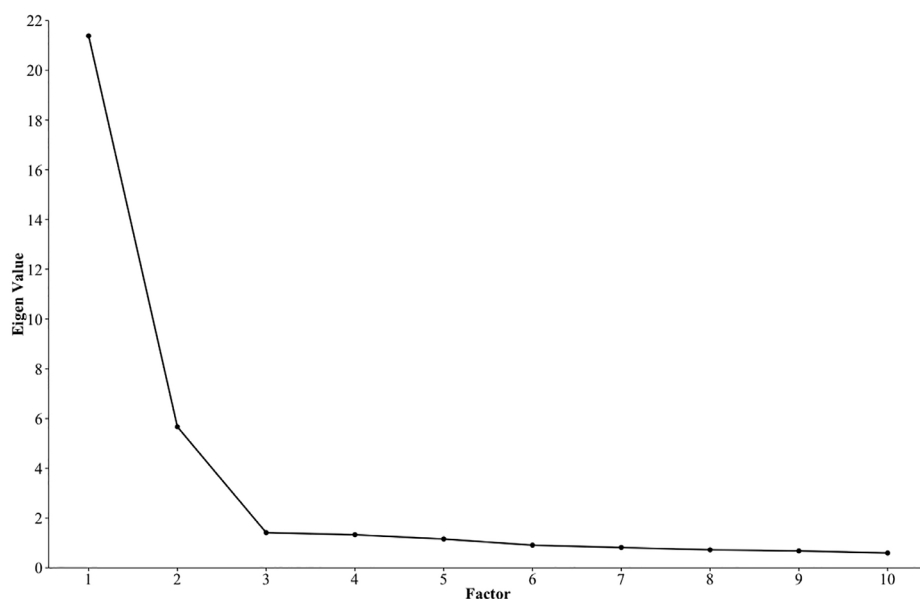


Figure 1. Scree Plot Showing Eigenvalues and Factor Numbers.

Following item reduction and exploratory factor analysis on the initial 71 items, a 44 item five-factor solution was selected. Factor one was named “Mental and Psychic Phenomena” (MPP), due to items related to such constructs as ESP or mental telepathy, although other phenomena were present in this group, such as auras and reincarnation. Factor two was labeled “Religious Belief” (RB) with the items focusing mainly on religious belief and different aspects of God. The third factor was named “Psychokinesis” (PK), with items related to concepts such as levitation or the movement of objects using the mind. The fourth factor was named “Supernatural Entities” (SE), with items relating to beings such as demons, angels, or a supreme being. The fifth factor was named “Common Paranormal Perceptions” (CPP), with items related to haunting or poltergeists, for example. Study two was then conducted to confirm the proposed structure, and examine test-retest reliability and validity.

Table 1

Factor Loadings after Direct Oblimin Oblique Rotation

	Factor				
	MPP	RB	PK	SE	CPP
I believe that it is possible to send a mental message to another person, or in some way influence them at a distance, by means other than the normal channels of communication.	.79				
There is a great deal we have yet to understand about the mind, so it is likely that many phenomena (such as Extra Sensory Perception (ESP) will one day be proven to exist.	.72				
There is such a thing as telepathy (communication directly from mind to mind).	.72				
I am convinced that thought transference actually does work.	.70				
Extra Sensory Perception (ESP) is an unusual gift that many persons have and should not be confused with the elaborate trick of entertainers.	.67				
Every person has an aura (a mysterious energy field, usually invisible, surrounding the body).	.65				

There is both a spiritual as well as a natural side to reality.	.58	
I believe that a person's deeds are stored in his or her "karma."	.56	
There are some objects or places that have a special spiritual meaning, for instance being surrounded by a certain type of energy.	.52	
Some people have an unexplained ability to predict the future.	.52	
Reincarnation does occur.	.49	
I believe psychic phenomena are real and should be studied scientifically.	.48	
Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations etc.	.45	
During altered states, such as sleep or trances, the spirit can leave the body.	.43	
There is a spiritual realm besides the physical one.	.43	
Everyone has an immortal soul.	.39	
Religion gives meaning to my life.	.96	
My religious belief is an important part of who I am as a person.	.83	
Religious belief is better than logic for solving life's important problems.	.81	
In my life, I experience the presence of the divine.	.78	
I believe in God.	.66	
My spiritual belief affects absolutely every aspect of my life.	.63	
God has given humanity a complete, unfailing guide to happiness and salvation, which must be totally followed.	.58	
There are individuals who are messengers of God.	.57	
God has given some people the power to heal the sick.	.54	
Every human being is a member of the cosmos and God is the cosmic mind.	.51	
Some individuals are able to levitate (lift) objects through mental forces.		-.88
There is such a thing as levitation (raising the body through mental power).		-.71
Psychokinesis, the movement of objects through psychic powers, does exist.		-.70
Some men and women can find missing persons by swinging a pendulum over a map.		-.45
There exist evil, personal spiritual beings, whom we might call demons.		-.68
There is a devil.		-.64
Black magic really exists.		-.49
There exist good personal spiritual beings, whom we might call angels.		-.49
I firmly believe that ghosts or spirits do exist.		-.46
I believe that there is a divine plan and purpose for every living being and thing.		-.45
A Supreme Being exists.		-.45
In spite of what many people think, card reading, for example tarot cards, can tell a lot about a person and their future.		-.64
Some psychics can accurately predict the future.		-.57

Astrology is a way to accurately predict the future.	-56
Some buildings are haunted.	-51
There are such things as poltergeists (spirits which signal their presence by moving objects or making noises).	-46
As a general rule, a fortune teller's predictions which come true are the result of coincidence.	.45
It is often possible to make valid personality judgements about people by knowing their astrological sign.	-40

Study 2 – Confirmatory Factor Analysis and Construct Validity

The aim of study two was to conduct a Confirmatory Factor Analysis on the BitSS developed in study one using a fresh sample of participants. The test-retest reliability of this scale was assessed by doing a three-month follow-up study of participants. Also, comparisons were made for convergent validity to the three scales used by Schofield et al. (2016): the rPBS, the rRLI, and the ISS. A cluster analysis was conducted on the new scale to see if similar groups of believers could support Metaphysical Chauvinism (Beck & Miller, 2001).

Methods

Participants

Participants ($N = 318$) were recruited from the University of Derby (both on campus and online) and social media (Facebook and Twitter) using an opportunity sampling method by the first author, who gave general details surrounding the study. The age range was from 18 to 72 ($M = 31.19$, $SD = 15.17$). The gender of the participants was: 75 (24%) males, 241 (76%) females, and two (1%) preferred not to say; 255 (80%) identified as students, of which 219 (69%) were undergraduates, 34 (11%) were post-graduates, and two (1%) were in college or post-secondary school education. The initial sample was 422 people but only 318 (81%) answered all the items.

Materials

Belief in the Supernatural Scale

The Belief in the Supernatural Scale (BitSS) was developed in study one (see appendix). The item response format is a seven point Likert scale from 1 (strongly disagree) to 7 (strongly agree), so the possible scores range from 44 to 308. Item 39 is reverse scored. Three scales were used to test the validity of the new scale and were selected due to their use by Schofield et al. (2016).

Revised Religious Life Inventory

The Revised Religious Life Inventory (rRLI) (Hills, Francis, & Robbins, 2005) has 24 items and three subscales. The subscales measure: Intrinsic religious belief (nine items), extrinsic religious belief (seven items), and quest (eight items). The item response format is a seven point Likert scale; the range of

scores is from 24 to 168. Items include: “As I grow and change, I expect my religion also to grow and change” and “If not prevented by unavoidable circumstances, I attend church.”

Intrinsic Spirituality Scale

The Intrinsic Spirituality Scale (ISS) (Hodge, 2003) has six items and no subscales; the item response format uses an 11-point scale, tailored to the item. Items two, four, and six are reversed. Items include: “In terms of the questions I have about life, my spirituality answers,” item response format range: “no questions” to “all questions” and “When I am faced with an important decision, my spirituality”; item response format range: “plays absolutely no role” to “is always the overriding consideration.”

Revised Paranormal Belief Scale

The Revised Paranormal Belief Scale (rPBS) (Tobacyk, 2004) is a 26-item scale with seven subscales: precognition, spiritualism, witchcraft, psi, traditional religious belief (4 items each), superstition, and extraordinary life forms (3 items each). The item response format is a seven point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Items include: “Black cats can bring bad luck” and “Some people have an unexplained ability to predict the future.” Subscale scores were averaged. Cronbach’s α Coefficients were $>.92$ for the main scales and $>.77$ for the seven subscales.

Procedure

After participants had been recruited, they were emailed details of the study and a link to the online survey that was hosted at www.qualtrics.com, or the link and details were provided on the social media post. The four questionnaires (BitSS, ISS, RRLI, and rPBS) were presented in a different order for each participant for counterbalancing. The final page of the survey was brief explaining the study and restating the right to withdraw. Participants were asked if they wanted to participate in a three-month follow up study. Those that agreed were sent a re-test after three months.

Analysis

A Confirmatory Factor Analysis was performed on the data from the BitSS Scale. Further tests of validity were carried out using correlations and one cluster analysis and reliability was tested using a test re-test Pearson correlation.

Results

Confirmatory Factor Analysis

A Confirmatory Factor Analysis was conducted on the proposed “Belief in the Supernatural” scale. The data was normal and factorable. The sample size was greater than 200 and therefore deemed more than adequate (Worthington & Whittaker, 2006). We chose the Maximum Likelihood method as the estimator and the first variable in each subscale was set as 1 for data scaling purposes. There were no negative error variances and none of the Squared Multiple Correlations (SMCS) ex-

ceeded 1. Factor loadings were examined and deemed as being adequate, the lowest value being item 39 ($r^2 = .271$).

Table 2
Fit Indices for the BitSS Scale.

Factors	X^2	Df	p	RMSEA	SRMR	CFI	TLI	NFI
Five	3359.03	892	<.001	0.09 90 % (0.A090-0.097)	0.08	0.83	0.82	0.78
One	5665.09	902	<.001	0.13	0.12	0.66	0.65	0.62
Cut off Values (Hu & Bentler, 1999)	N/A	N/A	>.05	≤ 0.06	≤ 0.08	≥ 0.95	≥ 0.95	≥ 0.95

X^2 -Chi Square, Df –Degrees of Freedom, RMSEA - Root Mean Square Error of Approximation, SRMR - Standardized Root Mean Square Residual, CFI - Confirmatory Fit Index, TLI - Tucker-Lewis Index, and NFI - Normed Fit Index.

A number of measures of fit were examined (see table 2) taken from various fit indices including: Overall (Chi-square), absolute (SRMR, RMSEA), and incremental fit (NFI, CFI, TLI). All of the indices were beyond the recommended thresholds. Kline (2011) states that these thresholds are “marginal” and the value of the X^2 indices is suspect (Gerbing & Anderson, 1985), so the indices indicate the possibility of the data not fitting the model perfectly. Localized areas of strain were examined to evaluate if any items were weak. Standardized residuals were examined to further identify localized areas of strain. The correlations of the standardized residuals were investigated for values $> .2$ (Kline, 2011) and 18 did. Thirteen items correlated with one other item (13, 19, 26, 6, 9, 35, 16, 3, 7, 20, 29, 34, 41), three correlated with two items (36, 1, 2), one correlated with three items (43) and one correlated with seven others (31). An examination of the z correlation table showed that these values were significant; the typical cut off value for this is > 1.96 for significance of .05 or > 2.58 for a significance of .01 (Harlow, 2014). The correlations between the scales demonstrate excellent convergent validity, see Table 3.

Table 3
Correlations Between Scales

	BSI	IS	RRL
Intrinsic Spirituality	0.67*		
Revised Religious Life	0.56*	0.66*	
Revised Paranormal Belief	0.91*	0.52*	0.40*

Note. BSI = Belief in the Supernatural; IS = Intrinsic Spirituality; RRL = Revised Religious Life. * $p < .01$

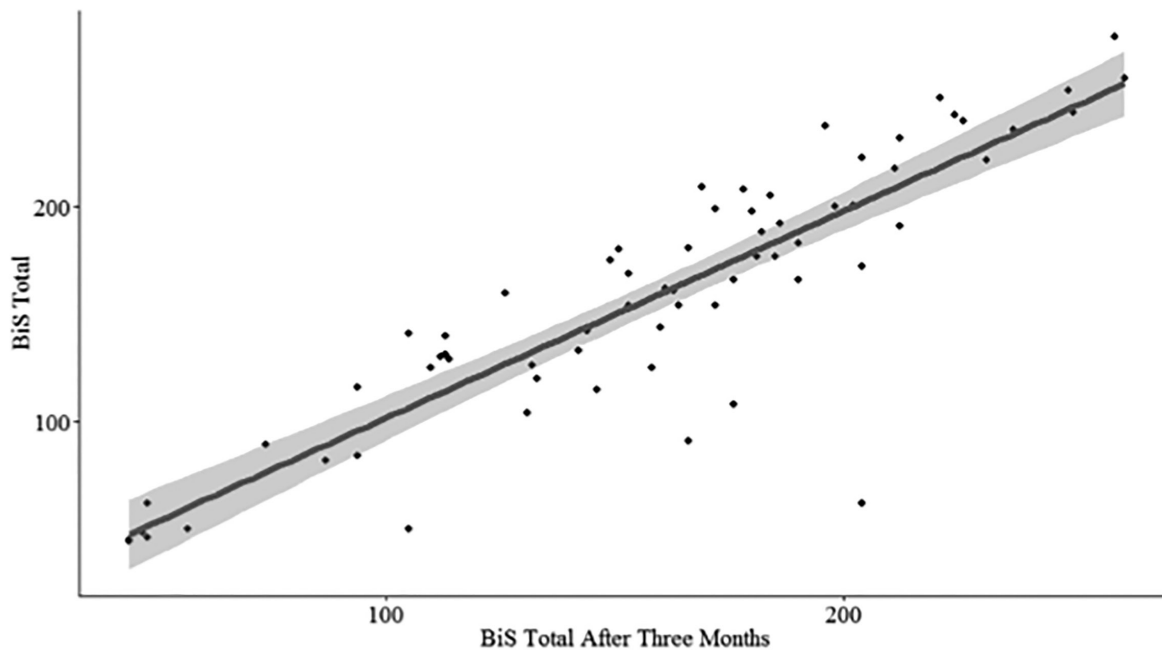


Figure 2. BitSS Totals at the Study Date and Three Months After.

Cluster Analysis

A Hierarchical Cluster Analysis was performed on the five subscales of the BitSS; descriptive statistics are displayed in Table 4. Z-scores were used to normalize the data of the three scales. To optimize minimum variances between the clusters, Ward's method was selected (Ward, 1963).

Table 4
Mean (and Standard Deviation) Z-scores for the Four Clusters

	Mean (SD) Z-scores				ANOVA	
	Cluster 1 (<i>n</i> = 61, 19.18%)	Cluster 2 (<i>n</i> = 127, 39.94%)	Cluster 3 (<i>n</i> = 105, 33.02%)	Cluster 4 (<i>n</i> = 25, 7.86%)	<i>f</i> (3,314)	<i>p</i>
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)		
Mental and Psychic Phenomena	.24 (.37)	.88 (.49)	-1.16 (.53)	-.17 (.53)	343.65	<.001
Religious Belief	-.43 (.51)	.64 (.87)	-.85 (.28)	1.42 (.58)	155.52	<.001
Psychokinesis	-.17 (.54)	.99 (.70)	-.94 (.19)	-.66 (.41)	277.47	<.001
Supernatural Entities	-.15 (.54)	.85 (.61)	-1.08 (.40)	.60 (.72)	248.93	<.001
Common Paranormal Perceptions	.18 (.50)	.90 (.63)	-1.02 (.42)	-.75 (.47)	269.17	<.001

The scree plot (Figure 3) indicates at least three clusters, but for comparative purposes a four-cluster solution was used. Levene's Test was significant (<.05) for all five subscales, violating the assumption of equality; Box's Test was also significant, but the probability values were accepted again due to the large

sample size (Tabachnick, Fidell, & Osterlind, 2007). The four Cluster solution was internally validated using a one-way MANOVA ($IV_1 = 4 \times \text{clusters}$; $DV_{1(MPP)}$, $DV_{2(RB)}$, $DV_{3(PK)}$, $DV_{4(SE)}$ and $DV_{5(CPP)}$). This showed a significant difference between the scales and that the model accounted for an average of 70% of the variance ($F_{(15)} = 90.23, p < .001, \text{Wilks } \Lambda = 0.07$). A one-way ANOVA and *post hoc* Tukey HSD examined the squared Euclidian differences between each cluster with regard to the subscales of the BitSS. (see table 5). The majority was significant, apart from: PK difference between cluster 3 and 4 ($=.08$) and the CPP differences between clusters 3 and 4 ($=.11$). For a graph of the z-scores of the scale within the clusters see Figure 4.

In summary, a CFA was used to further test the five-factor model of supernatural belief proposed by the EFA in study one. The fit indices showed that the data were not a perfect match to the model. Model re-specification was examined and the changes produced small differences in the fit indices and further changes to the model were therefore rejected. The model also correlated with three other measures of spirituality, religiosity, and paranormal belief. The BitSS scale had a strong correlation with the scale measuring paranormal belief, and moderate ones with the other two scales. The “Religious Belief” subscale of the rPBS had a strong correlation with the religiosity scale; the remaining subscales on the BitSS had a strong correlation with the paranormal belief measure totals and respective subscales. The spirituality scale showed a moderate correlation with all subscales apart from “Psychokinesis” and “Common Paranormal Perceptions.” The cluster analyses showed that the classification into “believers,” “paranormal believers,” “sceptics,” and “religious believers” groups posited by Schofield et al. (2016) was supported and this supported the five factor model of the BitSS scale. Finally, the BitSS scale showed good test-retest reliability at a three-month follow-up.

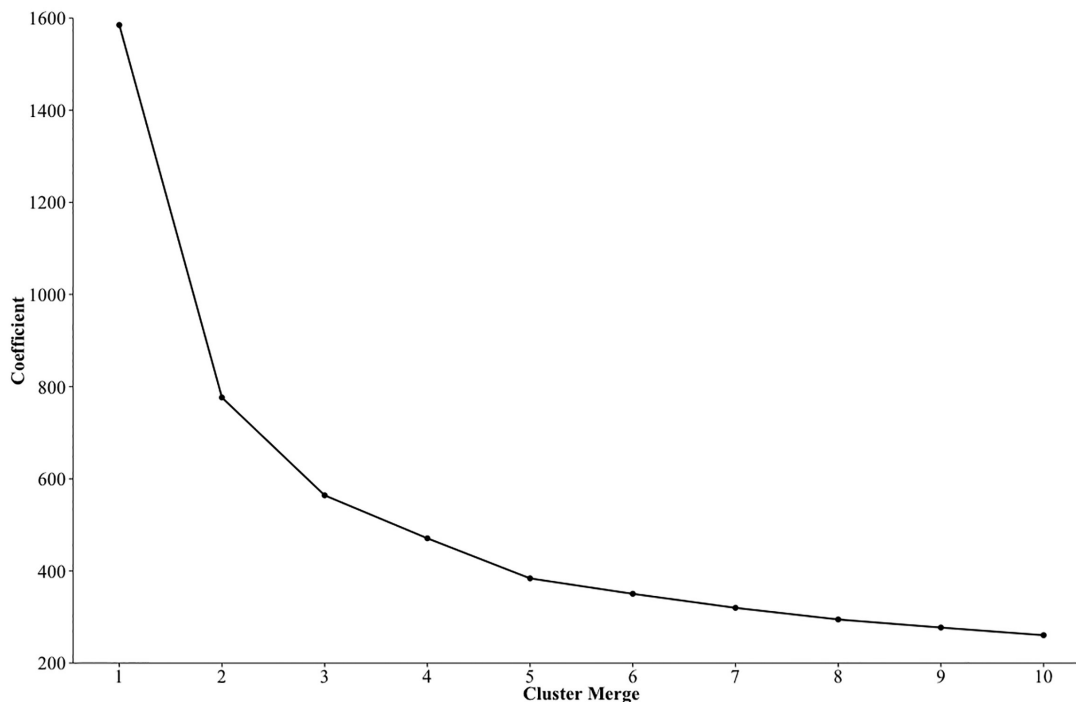


Figure 3. The Last 10 Merged Squared Agglomeration Distances and the Cluster Merges of the Five Sub-scales of the BitSS.

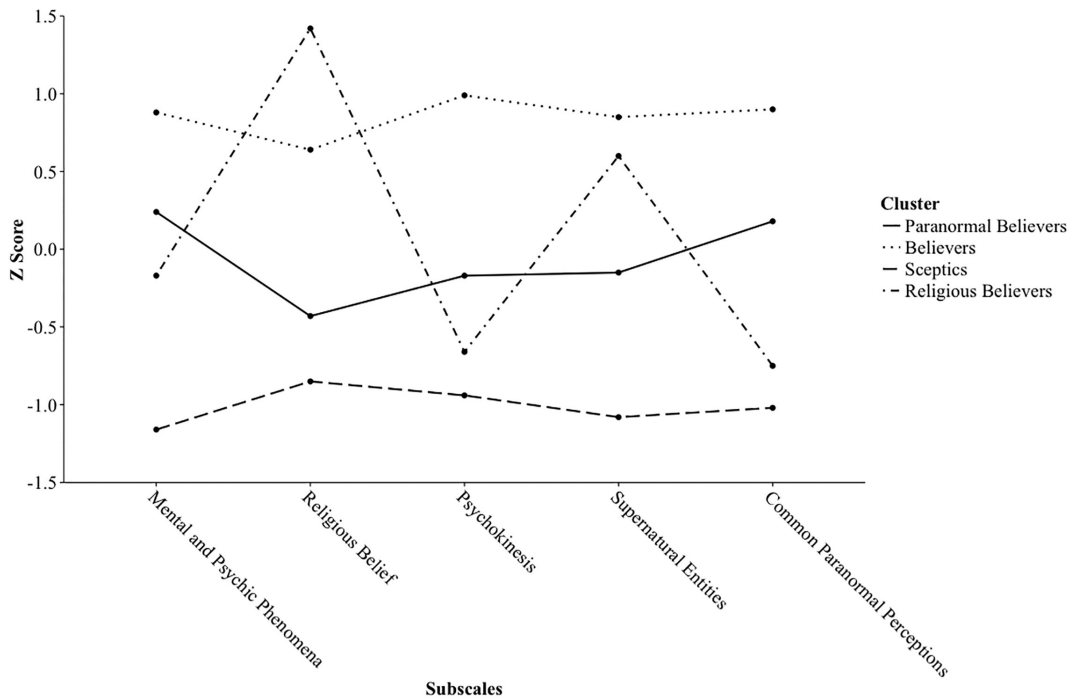


Figure 4. Mean Z-Scores for the Subscales of the BitSS and their Respective Cluster Membership.

Discussion and Conclusions

Study one created an initial item pool and reduced it to a 44-item scale and proposed a five-factor solution using EFA. The factors were: “Mental and Psychic Phenomena,” “Religious Belief,” “Psychokinesis,” “Supernatural Entities,” and “Common Paranormal Perceptions.” Study two tested the factors proposed in study one using CFA and found that although the model was not a perfect fit to the data it was adequate, and showed excellent convergent validity and test-retest reliability.

The BitSS scale demonstrated good convergent validity, it correlated strongly with the rPBS, and moderately with the rRLI and the ISS. The “Religious Belief” subscale correlated strongly with the rRLI; the remaining subscales on the BitSS correlated strongly with the paranormal belief measure. The ISS showed a moderate correlation for all subscales apart from “Psychokinesis” and “Common Paranormal Perceptions.” The BitSS scale showed good test-retest reliability at a three-month follow up showing a strong correlation. In addition, a cluster analysis on the BitSS showed that the groups posited by Schofield et al. (2016) and others (Aarnio & Lindeman, 2007; Irwin, 1997; Rice, 2003) were supported, and this in turn supported the five-factor model of the BitSS scale.

The scale and its five factors are comparable to previous measures, with a five-factor solution also being posited by some researchers for the rPBS (Lawrence, 1995; Lawrence & Cicco, 1997; Lawrence, Roe, & Kani, 1997). However, it differs from previous scales in a number of ways. First, the BitSS “Mental and Psychic Phenomena” factor has a larger number of items than the rPBS and of a broader scope; interestingly, the items primarily overlap with the rPBS “spiritualism” subscale (e.g., mental mediumship). This BitSS factor also appears more in line with the “New Age” subscale of Lange et al.’s (2000) purification of the rPBS and Irwin and Marks’s (2013) Survey of Scientifically Unaccepted Beliefs. However, the BitSS offers more than two subscales and subsequently a clearer interpretation of paranormal belief than the one provided by the “New Age” factor in the aforementioned scales. In addition, this factor contains items pertaining to precognition similar to Tobacyk’s (2004, 1988) “Precognition” subscale of the rPBS. The BitSS “Religious Belief” factor comprises mostly items that refer to religion, God, or the divine. This accords with the “Traditional Religious Belief” subscale of the rPBS, but is a more robust measure of religious belief than the rPBS’s factor because it contains more items. In addition, at least three of its items could be argued as being more spiritual in nature (for example, “my spiritual belief affects absolutely every aspect of my life,” “every human being is a member of the cosmos and God is the cosmic mind”), reflecting the difficulty in distinguishing spiritual beliefs from religious and paranormal ones. The BitSS “Psychokinesis” factor has items that are clearly linked to psychokinesis and is similar to the “psi” subscale of the rPBS (Tobacyk, 2004) and to items of the ASGS (Thalbourne, 1995), such as “I believe I am psychic.” The BitSS “Supernatural Entities” factor items relate to both religious and paranormal constructs mainly concerned with separate sentient beings (angels). This is in line with the Supernatural Belief Scale (Jong, Bluemke, & Halberstadt, 2013), which has items such as: “There exist good personal spiritual beings, whom we might call angels.” The BitSS “Common Paranormal Perceptions” factor items encompass precognition and haunting and the haunting element is similar to Otis and Alcock’s (1982) Extraordinary Beliefs Inventory.

The EFA and CFA analyses of the BitSS also indicate that the underlying link between religious and paranormal belief is spiritual belief, making it difficult to distinguish it as a separate belief system. For example, the “Mental and Psychic Phenomena,” “Religious Belief,” and “Supernatural Entities” factors all included items related to spirituality. The majority of the items related to spirituality were found in the “Mental and Psychic Phenomena” factor, making it the most spiritual of the factors. The “Supernatural Entities” factor has two items that refer to spiritual beings, relating to angels and demons, potentially covering both religious (the reference to angels) and paranormal/religious (the reference to demons) concepts. Therefore, religiosity and paranormality are separate rather than overlapping concepts, but both concern the spiritual concepts that underlie them. This offers considerable support for defining religious and paranormal belief separately, while highlighting the difficulties in defining spirituality without reference to either the religious or the paranormal.

One potential criticism of the new scale could be that measuring supernatural belief is too broad. The attempt to measure the three concepts of religious, spiritual, and paranormal belief could be the reason for the overlap seen between the resulting five factors, and the lack of a subscale that measures spirituality alone is a potential problem. However, arguably the overlap of spirituality with other concepts might make the measurement of spirituality as a discrete concept an impossible task. Also, the sample is WEIRD (Western, Educated, Industrialized, Rich, and Democratic) (Henrich, Heine, & Noren-

zayan, 2010) so the cross-cultural validity of some of the items has not been established. Finally, it remains to be seen if the scale can measure belief in unbelievers adequately. Although the CFA showed that the data did not fit the model perfectly, there are reasons for this. Chi-square is affected by sample size (Brown, 2015); the sample in this study being greater than 200 is arguably large and perhaps inflated this measure of model fit. Model complexity also plays a role: the 44-item, five factor model tested is highly complex and so it is less likely that some of the fit indices will fall within the accepted boundaries (Hu & Bentler, 1999). Moreover, the fit indices are often described as thresholds, but according to Hu and Bentler (1999) they should be used as “rules of thumb” rather than “cut offs” and so the values should be accepted when they are close to fit. The sample size, model complexity, and the assertion that the indices are just rules of thumb suggest that although the model is not a perfect fit, it is acceptable. More importantly the findings are in line with previous theory (Beck & Miller, 2001) and research (Schofield et al., 2016). The scale also shows good validity, correlating strongly with the rPBS, and moderately with the rRLI. Moreover, compared to the three other scales used in the cluster analysis, the BitSS subscales provide a good amount of detail about their respective factor contents and are clearly supported by previous research and theory. Rather than using a number of separate scales to build a picture of how people believe using Cluster Analysis, the BitSS and its subscales offer a clear picture of the beliefs that make up the four clusters.

The new scale successfully captures the nature of supernatural belief and, being based on previous scales that have measured religiosity, spirituality, and paranormality, provides a wide range of items that assess these three concepts. The clear delineation of religious and paranormal belief emerging from these factor analyses supports the Metaphysical Chauvinism theory (Beck & Miller, 2001) and concurs with previous research that distinguishes religious and paranormal believers (Schofield, Baker, Staples, & Sheffield., 2016). This further strengthens the proposition that religious belief should not be defined as a paranormal belief. Also, the rPBS does not refer to either ghosts or poltergeists specifically, despite this being a staple of paranormal/supernatural belief, which makes the new subscale more comprehensive. The five factors of the new scale encompass the aspects of the supernatural well and are easy to interpret. The new scale provides insight into how the three concepts of religious, spiritual, and paranormal belief might fit together. Although religious and paranormal beliefs show a clear divide, spiritual belief is spread among the factors. The notion that spirituality is the underlying concept of religious and paranormal beliefs could be tested in future studies. The BitSS has more items covering fewer factors than the rPBS and has a clearer factor structure. The BitSS provides a new measure of supernatural belief to assess the personality and cognitive correlates of these types of belief.

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Appendix

Belief in the Supernatural Scale

Instructions

Each statement on this survey is something you may or may not agree with. Please respond to the statements as honestly as you can. For example, if you strongly agree with the statement please check that box. Please remember, your answer should reflect your own belief. You can choose from the following responses: Strongly Disagree; Moderately Disagree; Slightly Disagree; Uncertain; Slightly Agree; Moderately Agree; Strongly Agree.

1 My spiritual belief affects absolutely every aspect of my life.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

2 I firmly believe that ghosts or spirits do exist.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

3 Black magic really exists.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

4 Some people have an unexplained ability to predict the future.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

5 God has given humanity a complete, unfailing guide to happiness and salvation, which must be totally followed.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

6 There are individuals who are messengers of God.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

7 A Supreme Being exists.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

8 I believe that it is possible to send a mental message to another person, or in some way influence them at a distance, by means other than the normal channels of communication.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

9 Every human being is a member of the cosmos and God is the cosmic mind.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

10 I am convinced that thought transference actually does work.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

11 There is such a thing as levitation (raising the body through mental power).

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

12 Every person has an aura (a mysterious energy field, usually invisible, surrounding the body).

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

13 There is both a spiritual as well as a natural side to reality.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

14 There exist evil, personal spiritual beings, whom we might call demons.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

15 Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations etc.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

16 Some men and women can find missing persons by swinging a pendulum over a map.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

17 Extra Sensory Perception (ESP) is an unusual gift that many persons have and should not be confused with the elaborate trick of entertainers.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

18 During altered states, such as sleep or trances, the spirit can leave the body.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

19 Reincarnation does occur.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

20 It is often possible to make valid personality judgments about people by knowing their astrological sign.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

21 I believe that there is a divine plan and purpose for every living being and thing.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

22 There is a great deal we have yet to understand about the mind, so it is likely that many phenomena (such as Extra Sensory Perception (ESP) will one day be proven to exist.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

23 There is such a thing as telepathy (communication directly from mind to mind).

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

24 Psychokinesis, the movement of objects through psychic powers, does exist.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

25 In spite of what many people think, card reading, for example tarot cards, can tell a lot about a person and their future.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

26 I believe that a person's deeds are stored in his or her "karma".

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

27 Religion gives meaning to my life.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

28 Some psychics can accurately predict the future.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

29 Some buildings are haunted.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

30 I believe psychic phenomena are real and should be studied scientifically.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

31 Everyone has an immortal soul.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

32 My religious belief is an important part of who I am as a person.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

33 Religious belief is better than logic for solving life's important problems.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

34 Astrology is a way to accurately predict the future.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

35 I believe in God.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

36 There is a spiritual realm besides the physical one.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

37 There are some objects or places that have a special spiritual meaning, for instance being surrounded by a certain type of energy.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

38 There is a devil.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

39 As a general rule, a fortune teller's predictions which come true are the result of coincidence.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

40 There exist good personal spiritual beings, whom we might call angels.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

41 There are such things as poltergeists (spirits which signal their presence by moving objects or making noises).

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

42 Some individuals are able to levitate (lift) objects through mental forces.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

43 In my life, I experience the presence of the divine.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

44 God has given some people the power to heal the sick.

Strongly Disagree Moderately Disagree Slightly Disagree Uncertain Slightly Agree Moderately Agree Strongly Agree

Scoring

Item 39 is reverse-scored.

Subscales:

Mental and Psychic Phenomena: q4, q8, q10, q12, q13, q15, q17, q18, q19, q22, q23, q26, q30, q31, q36, q37.

Religious Belief: q1, q5, q6, q9, q27, q32, q33, q35, q43, q44.

Psychokinesis: q11, q16, q24, q42.

Supernatural Entities: q2, q3, q7, q14, q21, q38, q40.

Common Paranormal Perceptions: q20, q25, q28, q29, q34, q39, q41.

Subscale scores should be averaged.

La Création et la Validation de l'Échelle de Croyance au Supernaturel (Belief in the Supernatural Scale)

Cette étude avait pour but de créer et valider une nouvelle échelle, l'Échelle de Croyance au Supernaturel. La première étude a utilisé une analyse exploratoire de facteurs (EFA) pour réduire un ensemble initial de 71 items à 44 items, et pour identifier une structure factorielle, sur 382 participants. Une structure en cinq facteurs a été proposée : "phénomènes mentaux et psychiques", "croyances religieuses", "psychocinèse", "entités supernaturelles", et "perceptions paranormales communes". L'échelle proposée fut alors analysée dans une deuxième étude utilisant une analyse confirmatoire de facteur (CFA) avec 318 nouveaux participants. La nouvelle échelle a fourni un large nombre d'items et indique

que, bien qu'il y ait une séparation claire entre croyances religieuses et paranormales, les croyances spirituelles sont distribuées sur les facteurs, indiquant que la spiritualité pourrait être le concept qui vient lier la religiosité et le paranormal. L'Echelle de croyance au surnaturel fournit un outil utile qui peut être employé seul ou en association avec d'autres mesures dans les recherches sur la croyance surnaturelle.

Die Entwicklung und die Validierung der Skala des Glaubens an das Übernatürliche (Belief in the Supernatural Scale)

Diese Studie wurde in Absicht unternommen, eine neue Skala zur Erfassung des „Glaubens an das Übernatürliche“ zu entwickeln und zu validieren. In Studie eins wurde eine Exploratorische Faktorenanalyse (EFA) verwendet, um einen anfangs 71 Items umfassenden Pool auf 44 zu reduzieren und eine Faktorenstruktur mit 382 Teilnehmern zu gewinnen. Es ergab sich eine Fünf-Faktoren-Struktur, die sich aus „mental und psychischen Phänomenen“, „religiösem Glauben“, „Psychokinese“, „übernatürlichen Wesenheiten“ und „allgemeinen paranormalen Wahrnehmungen“ zusammensetzte. Die vorgeschlagene Skala wurde in Studie zwei mittels einer „Konfirmatorischen Faktorenanalyse“ (KFA) mit 318 neuen Teilnehmern analysiert. Die neue Skala ergab ein breites Spektrum von Items und weist darauf hin, dass – obwohl sich religiöse und paranormale Einstellungen klar voneinander unterscheiden –, spiritueller Glaube sich unter diesen Faktoren verteilt und darauf hinweist, dass Spiritualität das Konzept sein könnte, das Religiosität und Paranormalität miteinander verknüpft. Die Skala „Glaube an das Übernatürliche“ (Belief in the Supernatural Scale, BitSS) stellt ein wertvolles Instrument dar, das entweder allein oder zusammen mit früheren Fragebögen zur Untersuchung des Glaubens an Übernatürliches verwendet werden kann.

Creación y Validación de la Escala sobre Creencias Sobrenaturales (Belief in the Supernatural Scale)

Este estudio tuvo como objetivo crear y validar una nueva escala, la “Belief in the Supernatural Scale” (BitSS). El estudio uno, con 328 participantes, usó un análisis factorial exploratorio (EFA) para reducir un grupo inicial de 71 a 44 reactivos e identificar una estructura factorial. Se propuso una estructura de cinco factores: “fenómenos mentales y psíquicos,” “creencias religiosas,” “psicokinesis,” “entidades sobrenaturales,” y “percepciones paranormales comunes”. Analizamos la escala propuesta en el estudio dos utilizando un Análisis Factorial Confirmatorio (CFA) con 318 participantes nuevos. La nueva escala proporciona una amplia gama de reactivos y muestra que, si bien las creencias religiosas y paranormales muestran una división clara, la creencia espiritual se extiende entre esos factores, lo que indica que la espiritualidad podría ser el concepto que vincula la religiosidad y la paranormalidad. La BitSS proporciona una herramienta valiosa que puede usarse sola o junto con medidas previas para investigar creencias sobrenaturales.