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RESEARCH

# Alien Visitation, Extra-Terrestrial Life, and Paranormal Beliefs

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**Abstract**—The present paper investigated the nature and structure of extra-terrestrial beliefs. Respondents completed a booklet containing items measuring belief in extra-terrestrial life, alien visitation, and paranormal belief (Revised Paranormal Belief Scale, R-PBS; and the Australian Sheep Goat Scale, ASGS). Responses were analyzed using principal component analysis (PCA), and a three-factor structure emerged: alien visitation, belief in extra-terrestrial life, and the search for extra-terrestrials. Further analysis revealed that males scored higher than females on belief in extra-terrestrial life and the search for extra-terrestrial life. No difference was observed for alien visitation. Correlational analysis found significant positive associations between each of the extra-terrestrial life factors and alien visitation. In addition to this, the extra-terrestrial life factors and alien visitation were found to correlate with overall paranormal belief (ASGS), and the two factors of the R-PBS (Traditional Paranormal Belief and New Age Philosophy). Alien Visitation was more strongly correlated with the paranormal belief measures than the extra-terrestrial belief factors; these were found to be negatively correlated with the paranormal belief measures when Alien Visitation was controlled for. These findings indicate that only more extreme Alien Visitation beliefs were associated with belief in the paranormal.

*Keywords*: alien visitation—belief in extra-terrestrial life—search for extra-terrestrial life—paranormal belief

## Introduction

The origin, nature, and prevalence of extra-terrestrial beliefs have been relatively under-researched within psychology (Swami, Furnham, Haubner, Stieger, & Voracek, 2009, Swami, Pietschnig, Stieger, & Voracek, 2010b). This is surprising because such beliefs have been recorded throughout human history (Crowe,

1986) and continue to prevail within modern society (Clarke, 1991, Zullino, Verdu, Khazaal, & Borgeat, 2006). Indeed, recent work indicates that a significant proportion of the population believe that extra-terrestrial life exists and that UFOs are evidence of alien life (Biasco & Nunn, 2000, Chequers, Joseph, & Diduca, 1997, Gallup, 1997, Patry & Pelletier, 2001, Swami et al., 2009).

Pertinently, since the 1960s, the development of contemporary alien research has coincided with an observed growth in extra-terrestrial beliefs (Gallup & Newport, 1991, Genta, 2007), which has been accompanied by an increase in reported accounts of UFO and alien-related experiences (cf., French, 2001, French, Santomauro, Hamilton, Fox, & Thalbourne, 2008, Swami et al., 2009). French et al. (2008) estimate that worldwide, the number of people claiming to have conscious memories of alien abduction is likely to run into at least several thousands. Further studies have suggested this figure may be higher, between 2% (Appelle, 1995/1996, Hopkins, Jacobs, & Westrum, 1992) and 5%–6% of the population (Jacobs, 1992). While these figures seem unusually high, even more conservative measures, such as consideration of reported cases, have identified significant numbers of incidents. Notably, Bullard's (1994) survey of 13 investigators yielded 1,700 reports (Appelle, 1995/1996). Collectively, these findings indicate that extra-terrestrial beliefs and experiences represent important phenomena, which merit further study and clarification.

Historically, the study of extra-terrestrial beliefs has been hindered by the fact that such beliefs have been frequently subsumed within measures of general paranormal belief (e.g., the Revised Paranormal Belief Scale [R-PBS], Tobacyk, 1988). Swami et al. (2009) contend that this has occurred because extra-terrestrial beliefs are premised upon notions and theories, which transcend the explanatory power of mainstream science (Gray, 1991). Certainly, the scientific community has yet to accept evidence of extra-terrestrial life as authentic and has failed to agree on a definitive position on the existence of other life forms. It is worth noting that the merits of including extra-terrestrial beliefs within paranormal measures is much debated, and hence not all paranormal scales make reference to extra-terrestrial beliefs (e.g., Australian Sheep Goat Scale, Thalbourne, 1995a, Thalbourne & Delin, 1993).

Where extra-terrestrial beliefs have been incorporated into paranormal belief measures, they have received a partial, limited treatment. For instance, the R-PBS (Tobacyk, 1988) contains a three-item Extraordinary Life Form subscale, which assesses the existence of extra-terrestrial life alongside other extraordinary life forms (i.e. the abominable snowman of Tibet and the Loch Ness Monster). The use of a single item to measure extra-terrestrial beliefs is problematic because there is evidence to suggest that extra-terrestrial beliefs are multidimensional (Dagnall, Munley, Parker, & Drinkwater, 2010a, Dagnall, Parker, Munley, & Drinkwater, 2010, Swami et al., 2009).

This issue is exemplified by the R-PBS item, "There is life on other planets." The item is a general statement, which is difficult to refute because life could take many shapes and forms (e.g., bacteria) (Lawrence, 1995a). Hence, the question of interest should not be whether life exists on other planets but whether life from other planets is visiting the Earth. The latter UFO-related belief(s) are contentious, and there is evidence to suggest that only these radical notions (visitation, abduction, medical examination, etc.) are related to paranormal belief (Dagnall, Parker, Munley, & Drinkwater, 2010, Dagnall, Munley, Parker, & Drinkwater, 2010a).

Limited consideration of extra-terrestrial and alien-related beliefs is not peculiar to the R-PBS, but is typical of several paranormal belief measures: The Belief in the Paranormal Scale (Jones, Russell, & Nickel, 1977) assesses UFO sightings via a single item; the Supernaturalism Scale (Randall & Desrosiers, 1980) assesses belief in extra-terrestrial life and UFOs via three items; the Anomalous/Paranormal Belief Subscale (Kumar, Pekala, & Gallagher, 1994, Kumar & Pekala, 2001) assesses belief in intelligent life on other planets; the Paranormal Short Inventory (Randall, 1997) assesses belief in UFOs via one item; and the Exeter Superstitions Questionnaire (Preece & Baxter, 2000) assesses belief in alien visitation via one item. Examining these measures, it is clear that they fail to provide an adequate measure of extra-terrestrial–related beliefs because they are unable to discriminate between extra-terrestrial life and UFO-related beliefs and contain insufficient items to measure the alien constructs (Dagnall, Munley, Parker, & Drinkwater, 2010a).

The distinction between belief in extra-terrestrial life and UFO-related beliefs has previously been found to be important (Chequers at al., 1997). Notably, Chequers at al. (1997) designed eight items to measure extra-terrestrial life/alien beliefs alongside schizotypy. Following a review of their paper, they subdivided their items into two measures dealing with extra-terrestrial life and UFO related-beliefs. Endorsement rates were lower for items related to UFO-related beliefs (e.g., 1% agreed that they had been taken on board a spaceship and 32% agreed that the government refuses to tell the truth about flying saucers) than items related to belief in extra-terrestrial life (e.g., 85% agreed that there is good evidence that life exists on other planets). These findings suggest that the subscales measure different constructs.

Despite these differences, Chequers et al. (1997) observed some overlap between UFO-related beliefs and extra-terrestrial life; 96% of respondents disagreed that people who say they have been abducted by aliens are mentally ill. Interestingly, Chequers et al. (1997) found that the two subscale measures were differently related to scores on the schizotypal traits questionnaire (Rawlings & MacFarlane, 1994); only UFO-related beliefs were found to positively correlate with level of schizotypy. Chequers et al. (1997) hypothesize that this is because

extra-terrestrial life beliefs are more plausible than UFO-related beliefs. Clearly, their distinction between belief in extra-terrestrial life and UFO-related beliefs is a useful theoretical dichotomy that requires further explanation.

Noting this, Dagnall, Munley, Parker, and Drinkwater (2010a) explored whether alien-related beliefs (life on other planets and alien visitations) were related to extraordinary life forms, as suggested by the R-PBS, and if such beliefs could be considered to represent facets of paranormal belief per se (Diaz-Vilela & Alvarez-Gonzalez, 2004). This was achieved by identifying commonly used measures of paranormal belief (R-PBS, Paranormal Short Inventory, etc.) and related phenomena (e.g., scales assessing belief in extra-terrestrial life and UFO-related beliefs, Chequers et al., 1997; and Poltergeists and Hauntings, Kumar & Pekala, 2001). The latter scales provided only a limited range of related beliefs and consequently the authors generated additional items by exploring reports of alien-related and haunting experiences.

The new and original scale items were combined to produce a 124-item composite measure. This was completed by 1,481 respondents and the data were then analyzed using exploratory factor analysis (principal components analysis), and a nine-factor structure emerged: Hauntings, Other Life, Superstition, Religious Belief, Alien Visitation, Extrasensory Perception (ESP), Psychokinesis (PK), Astrology, and Witchcraft. Consistent with Chequers et al. (1997), other life (extra-terrestrial life) and Alien Visitation (UFO-related beliefs) were identified as separate factors; both were coherent, possessed face validity, and demonstrated excellent internal reliability.

Dagnall, Munley, Parker, and Drinkwater (2010a) in a followup study further explored the relationships among extra-terrestrial life, UFO-related beliefs, and paranormal belief. They found that despite being positively correlated with each other UFO-related beliefs were more highly correlated with paranormal belief, as measured by the R-PBS and ASGS, than belief in extra-terrestrial life; partial correlation, controlling for the overlap between belief in extra-terrestrial life and UFO-related beliefs, found only the more extreme UFO-related beliefs to be associated with paranormal belief. These findings suggest that belief in extra-terrestrial life is multifactorial and that further research is required to identify the structure of such beliefs.

Swami et al. (2009) conducted a study examining the structure of beliefs about extra-terrestrial life. In order to do this they recruited 577 respondents (320 participants from Austria and 257 participants from Britain) and asked them to complete their Extra-terrestrial Beliefs Scale (EBS). The EBS is a 37-item scale measuring belief in evidence of extra-terrestrial life, governmental knowledge of the existence of extra-terrestrial life, scientific search for extra-terrestrial life, and the existence of UFOs. In addition to this, participants provided information on sex, age, ethnicity, religion, marital status, highest educational qualification,

religious belief, and political orientation. Exploratory factor analysis suggested three primary factors: belief that extra-terrestrial life has visited Earth and that governmental agencies have knowledge of this fact (Factor 1), scientific search for extra-terrestrial life (Factor 2), and general beliefs about the existence of extra-terrestrial life (Factor 3). Separate factor analysis for the Austrian and British participants revealed similar factor structures.

Examination of responses to the three factors indicated that respondents made a clear distinction between paranormal-related beliefs (Factor 1) and more science-based beliefs (Factor 3) (Swami et al., 2009). Typically, respondents endorsed the notion that other life exists elsewhere in the universe but were skeptical of the idea that extra-terrestrial life has visited Earth. Thus only Factor 1 was found to be meaningfully related to the categorization of extra-terrestrial beliefs as paranormal. On this basis, Swami et al. (2009) made a distinction between UFO-related beliefs (paranormal-related beliefs) and general belief in the possibility that extra-terrestrial life exists. Interestingly, although participants believed that extra-terrestrial life may exist, they expressed only moderate support for exploration of such life. With regard to demographic variables, Swami et al. (2009) found that: stronger general extra-terrestrial beliefs were associated with higher levels of education; higher religiosity and more right-wing political orientation were associated with decreased belief in extra-terrestrial life; and there were no gender differences across factor scores.

Looking at the previous research makes it evident that further work in the area of extra-terrestrial–related beliefs is required for a number of reasons. First, while the dichotomy between extra-terrestrial life and UFO-related beliefs has been established, the factorial structure of extra-terrestrial beliefs has yet to be fully assessed; Chequers et al. (1997) simply subdivided their items on the basis of content, while Dagnall, Parker, Munley, and Drinkwater (2010), Dagnall, Munley, Parker, and Drinkwater (2010a), and Swami et al. (2009) employed exploratory factor analysis. Hence the present study was designed to extract common factors from the two existing measurement scales.

Dagnall, Parker, Munley, and Drinkwater (2010) and Dagnall, Munley, Parker, & Drinkwater (2010a) identified two factors (life on other planets, Factor 1; and alien visitations, Factor 2), while Swami et al. (2009) outline three factors: belief that extra-terrestrial life has visited Earth and that governmental agencies have knowledge of this fact (Factor 1); scientific search for extra-terrestrial life (Factor 2); and general beliefs about the existence of extra-terrestrial life (Factor 3). In order to do this, the two-item sets from the respective studies were combined to form a composite measure of extra-terrestrial–related beliefs. Second, it was hoped that this approach would lead to an enhanced, psychometrically validated measure of the facets of extra-terrestrial belief, which would be of use within the current area of research

as well as to related areas such as false memory (Clancy, McNally, Schacter, Lenzenweger, & Pitman, 2002, French et al., 2008).

## Methods

### *Materials and Procedure*

Participants were asked to complete: items assessing belief in extra-terrestrial life and alien visitation (Dagnall, Munley, Parker, & Drinkwater, 2010a, Swami et al., 2009), the Revised Paranormal Belief Scale (R-PBS, Tobacyk, 1988, Tobacyk, 2004, Tobacyk & Milford, 1983), and the Australian Sheep–Goat Scale (ASGS, Thalbourne, 1995a, Thalbourne & Delin, 1993). Presentation order across questionnaires was counterbalanced to prevent order effects. The current questionnaire measures have been previously psychometrically validated:

**Belief in extra-terrestrial life and alien visitation** (Dagnall, Parker, Munley, & Drinkwater, 2010, Dagnall, Munley, Parker, & Drinkwater, 2010a, Swami et al., 2009). Belief in extra-terrestrial life and alien visitation was assessed via a 37-composite-item measure; 23 items from Swami et al. (2009) and 14 items from Dagnall, Munley, Parker, & Drinkwater (2010a). The Swami et al. (2009) items represented three factors: alien visitation and coverup (e.g., "The government of this country is covering up the existence of extra-terrestrial life"), 11 questions; scientific search (e.g., "The search for extra-terrestrial life is a serious and important scientific endeavour"), 6 questions; and general beliefs (e.g., "Just because we have no evidence of extra-terrestrial life does not mean that such life does not exist"), 6 questions. The Dagnall, Munley, Parker, & Drinkwater (2010a) items represent two factors: extra-terrestrial life (e.g., "Somewhere in the universe there are other forms of life"), 6 questions; and UFO-related beliefs (e.g., "Aliens are abducting human beings)", 8 questions. In order to facilitate direct comparison with Swami et al. (2009), all questions employed a 7-point Likert-type scale (where 1 was disagree, 4 was neither agree nor disagree, and 7 was agree). Previously, both item sets have been found to be conceptually coherent and possess good to excellent internal reliability (Cronbach's alpha, α). Swami et al. (2009): alien visitation and coverup, $\alpha = .90$; scientific search, $\alpha = .82$; and general beliefs, $\alpha = .75$. Dagnall, Munley, Parker, & Drinkwater (2010a): belief in extra-terrestrial-life, $\alpha = .91$; and UFO-related beliefs, $\alpha = .95$.

**Revised Paranormal Belief Scale (R-PBS)** (Tobacyk, 1988, Tobacyk, 2004, Tobacyk & Milford, 1983). The R-PBS is an amended form of the Paranormal Belief Scale developed by Tobacyk and Milford (1983) and is the most frequently used self-report measure of paranormal belief (Irwin, 2004). It contains 26 items assessing seven facets of paranormal belief: traditional religious belief, psi, witchcraft, superstition, spiritualism, extraordinary life forms, and precognition. The R-PBS can be totalled to produce overall scores,

or subscores can be calculated for each of the facets. However, recent attempts to refine/purify the scale to eliminate differential item functioning (arising from age and gender bias) and subsequent factor analysis has identified an alternative two-factor solution (Lange, Irwin, & Houran, 2000). This is composed of factors assessing New Age Philosophy (NAP) and Traditional Paranormal Belief (TPB): NAP measures belief in psi, reincarnation, altered states, and astrology (11 items), while TPB assesses belief in concepts such as the devil, witchcraft, and heaven and hell (5 items) (Irwin, 2004). R-PBS items are presented as statements (e.g., "I believe in God"), and respondents record answers on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores on the scale/sub-scale indicate higher paranormal belief.

The current paper, in line with Irwin (2004) and recent convention will employ the two-factor solution suggested by Lange, Irwin, & Houran (2000). This is achieved by recoding the scores; 1–7 is converted to 0–6, and the rasch scaling procedure is used (Andrich, 1988). Rasch scaling produces scores ranging from 6.85 to 47.72 on NAP and 11.16 to 43.24 on TPB. While the factorial structure of the R-PBS has frequently been debated (Lawrence, 1995a, 1995b, Lawrence, Roe, & Williams, 1997, Tobacyk, 1995a, 1995b, Tobacyk & Thomas, 1997), the scale overall has been found to be a conceptually and psychometrically satisfactory measure (Tobacyk, 2004). Particularly, the R-PBS has been found to possess adequate validity (Tobacyk, 1995a, 1995b, 2004) and good test–retest reliability (Tobayck, 2004).

**Australian Sheep–Goat Scale** (Thalbourne, 1995b, Thalbourne & Delin, 1993). The ASGS measures belief in, and alleged experience of, three core concepts of parapsychology (life after death, psychokinesis, and extrasensory perception). These concepts, while independent, have been found to be highly correlated. Hence, the ASGS is generally considered to measure belief in psychic ability (Thalbourne, 1995a, 1995b, Thalbourne & Delin, 1993, Thalbourne, Dunbar, & Delin, 1995, Wiseman & Watt, 2006). The ASGS is composed of 18 items, and the response options are False (scored as zero), "?" (Don't know: scored as 1 point), and True (scored as 2 points). The scale has a range from 0 to 36, higher scores indicating higher levels of belief and experience. Recent attempts to rasch scale the ASGS (Lange & Thalbourne, 2002) suggest that scoring should be limited to 16 rather than 18 items. Across a range of studies the ASGS has demonstrated good reliability and validity (Thalbourne, 1995a, Thalbourne & Delin, 1993).

### *Respondents*

527 respondents completed the questionnaire. Ages ranged 16–75 years, with a mean of 25.27, a standard deviation of 10.96, and a median of 20 (lower quartile 19 and upper quartile 27); 73% female and 27% male. Respondents

were recruited through a range of sources: via undergraduate and postgraduate psychology and healthcare courses, through contacts at local colleges, via emails to staff and students across the University, and to external contacts. An opportunistic snowball-sampling technique was employed. Participation was voluntary and respondents could terminate participation at any point. All surveys were completed under anonymous and confidential conditions.

### *Procedure*

All participants were informed that the questionnaire measure was concerned with the measurement of belief. They were told that their responses would be anonymous and that they should ensure that all items were completed. Participants were instructed that there was no time limit and that they should work through the questions at their own pace.

## Results

### *Exploration of the Empirical Structure of the Questionnaire*

In line with Swami et al. (2009) participants' questionnaire responses were subjected to principal components analysis (PCA) with orthogonal (varimax) rotation. Prior to conducting PCA, the correctness of the data for factor analysis was assessed. The data was found to be suitable for PCA: The Kaiser–Mayer–Oklin value (.956) exceeded the recommended value of .6 (Kaiser, 1970, 1974); Bartlett's Test of Sphericity (Bartlett, 1954) was significant ($\chi^2$ = 12797.746, df = 561, $p < .001$), and the correlation matrix contained many coefficients of .3 or above. An item-loading cut-off value of .45 was selected; Comrey and Lee (1992) suggest that item loadings above this value provide a good measure of a factor.

The initial PCA resulted in a solution comprising six factors with eigenvalues of greater than 1, accounting for 64% of the total variance. Parallel analysis was conducted using the MonteCarlo PCA (Watkins, 2000). This indicated that Factors 4, 5, and 6 should not be retained in the final analysis. Reliability analysis, in the form of Cronbach's alpha (α), revealed that Factor 1 (α = .95) and Factor 2 (α = .92) possessed excellent internal reliability and Factor 3 (α = .80) good internal reliability.

Following the initial PCA and the subsequent reliability analysis, a second PCA was undertaken. This included the three factors which produced an acceptable internal reliability coefficient ($\alpha \geq .7$) and used a reduced set of 25 items (see Table 1).[1]

**TABLE 1**
**Scale Items with Mean Scores and Standard Deviations (SD) for UK Participants**

| | | GENDER | | | | COMBINED TOTAL | |
|---|---|---|---|---|---|---|---|
| | | WOMEN | | MEN | | | |
| Item | | Mean | SD | Mean | SD | Mean | SD |
| 1 | Given the size and age of the universe, it is very likely that extra-terrestrial life must exist. | 4.80 | 1.64 | 5.50 | 1.60 | 4.99 | 1.66 |
| 6 | If Earth-like planets exist in the universe, then it is likely that Earth-like organisms will have evolved on those planets. | 4.82 | 1.41 | 4.94 | 1.71 | 4.85 | 1.50 |
| 8 | Intelligent extra-terrestrial life has visited Earth. | 3.16 | 1.58 | 3.26 | 1.73 | 3.19 | 1.62 |
| 11 | The search for extra-terrestrial life is a serious and important endeavour. | 4.41 | 1.55 | 4.81 | 1.75 | 4.52 | 1.61 |
| 15 | Just because we have no evidence of extraterrestrial life does not mean that such life does not exist. | 5.51 | 1.55 | 5.70 | 1.58 | 5.56 | 1.56 |
| 18 | Governments should direct more funding to the scientific search for extra-terrestrial life. | 2.98 | 1.66 | 3.36 | 1.69 | 3.08 | 1.67 |
| 21R | The search for extra-terrestrial life is a waste of time and money. | 4.18 | 1.77 | 4.61 | 1.83 | 4.30 | 1.79 |
| 23R | Earth is the only planet in the universe that harbours life. | 4.84 | 1.62 | 5.36 | 1.63 | 4.98 | 1.64 |
| 26R | The search for extra-terrestrial life is a pseudoscience (not proper science). | 4.38 | 1.58 | 4.52 | 1.80 | 4.42 | 1.64 |
| 28 | Extra-terrestrial creatures visited Earth in the distant past or at the dawn of civilization. | 3.38 | 1.39 | 3.21 | 1.66 | 3.33 | 1.47 |
| 38 | Somewhere in the universe there are other forms of life. | 4.88 | 1.55 | 5.30 | 1.68 | 4.99 | 1.60 |
| 39 | People have been taken on board alien spaceships. | 2.65 | 1.50 | 2.72 | 1.64 | 2.67 | 1.54 |
| 40R | The Earth is the only planet in the universe that supports life. | 4.78 | 1.67 | 5.21 | 1.67 | 4.90 | 1.68 |
| 41 | Aliens are abducting human beings. | 2.35 | 1.42 | 2.36 | 1.48 | 2.35 | 1.44 |
| 42R | The only intelligent life exists on earth. | 4.46 | 1.67 | 4.80 | 1.73 | 4.55 | 1.69 |
| 43 | Aliens have implanted objects into people. | 2.28 | 1.38 | 2.31 | 1.41 | 2.29 | 1.39 |
| 44 | There is life on other planets. | 4.79 | 1.49 | 5.31 | 1.58 | 4.93 | 1.53 |
| 45 | Alien spaceships regularly visit Earth. | 2.57 | 1.52 | 2.57 | 1.56 | 2.57 | 1.53 |
| 46R | There is no such thing as extra-terrestrial life. | 4.68 | 1.74 | 5.22 | 1.75 | 4.83 | 1.76 |
| 47 | Alien spaceships have crash-landed on Earth. | 2.64 | 1.53 | 2.86 | 1.71 | 2.70 | 1.58 |
| 48 | Intelligent life exists beyond our universe. | 4.49 | 1.57 | 4.87 | 1.66 | 4.59 | 1.60 |
| 49 | Alien intelligence is responsible for some UFO sightings. | 3.20 | 1.59 | 3.14 | 1.68 | 3.18 | 1.62 |
| 50 | Extra-terrestrials have visited Earth throughout history. | 3.25 | 1.69 | 3.22 | 1.75 | 3.24 | 1.71 |
| 51 | Unidentified Flying Objects suggest that some kind of extra-terrestrial life form has approached the surface of the Earth. | 3.28 | 1.63 | 3.18 | 1.67 | 3.25 | 1.64 |

**TABLE 2**
**Principal Component Loadings for Scale Items**

| Factor | Item/Number | Communalities | Component | | |
|---|---|---|---|---|---|
| | | | 1 | 2 | 3 |
| **Alien Visitation (Factor 1)** | | | | | |
| 45 | Alien spaceships regularly visit Earth. | .76 | **.85** | .09 | .15 |
| 39 | People have been taken on board alien spaceships. | .75 | **.85** | .11 | .10 |
| 41 | Aliens are abducting human beings. | .70 | **.83** | .03 | .10 |
| 47 | Alien spaceships have crash-landed on earth.. | .74 | **.83** | .27 | .19 |
| 50 | Extra-terrestrials have visited Earth throughout history. | .79 | **.83** | .19 | .12 |
| 43 | Aliens have injected objects into people. | .68 | **.81** | .01 | .10 |
| 49 | Alien intelligence is responsible for some UFO sightings. | .73 | **.79** | .24 | .18 |
| 51 | Unidentified Flying Objects suggest that some kind of extra-terrestrial life form has approached the surface of the Earth. | .71 | **.79** | .25 | .17 |
| 8 | Intelligent extra-terrestrial life has visited Earth. | .64 | **.74** | .27 | .12 |
| 28 | Extra-terrestrial creatures visited Earth in the distant past or at the dawn of human civilization. | .58 | **.71** | .20 | .20 |
| **Existence of Extra-Terrestrial (Factor 2)** | | | | | |
| 40R | The Earth is the only planet in the universe that supports life. | .71 | .05 | **.83** | .14 |
| 38 | Somewhere in the universe there are other forms of life. | .71 | .14 | **.80** | .19 |
| 23R | Earth is the only planet in the universe that harbours life. | .64 | .07 | **.77** | .23 |
| 1 | Given the size and age of the universe, it is very likely that extra-terrestrial life must exist. | .63 | .16 | **.76** | .14 |
| 44 | There is life on other planets. | .62 | .08 | **.76** | .18 |
| 48 | Intelligent life exists beyond our universe. | .65 | .27 | **.75** | .06 |
| 46R | There is no such thing as extra-terrestrial life. | .64 | .14 | **.73** | .31 |
| 42R | The only intelligent life exists on Earth. | .57 | .18 | **.72** | .12 |
| 15 | Just because we have no evidence of extra-terrestrial life does not mean that such life does not exist. | .43 | .12 | **.61** | .22 |
| 6 | If Earth-like planets exist in the universe, then it is likely that Earth-like organisms will have evolved on those planets. | .40 | .22 | **.74** | .01 |
| **Search for Extra-Terrestrial Life (Factor 3)** | | | | | |
| 21R | The search for extra-terrestrial life is a waste of time and money. | .70 | .08 | .33 | **.73** |
| 26R | The search for extra-terrestrial life is a pseudoscience (not proper science). | .67 | .29 | .25 | **.72** |
| 18 | Governments should direct more funding to the scientific search for extra-terrestrial life. | .64 | .45 | .15 | **.67** |
| 11 | The search for extraterrestrial life is a serious and important scientific endeavor. | .57 | .24 | .37 | **.61** |

**Bolded** numbers represent values loaded on to particular factors.

The second PCA, also using varimax rotation, provided a solution comprising three factors with eigenvalues greater than 1, accounting for 64% of the total variance. Inspection of the pattern matrix revealed that all emergent factors demonstrated good levels of internal consistency, and were conceptually distinct. One of the 25 items was omitted because it failed to meet the loading cut-off value of .45:

**Factor 1 (Alien Visitation)**, eigenvalue of 10.59, accounted for 42.38% of the variance. This factor demonstrated excellent internal reliability (α = .95) and comprised ten items.

**Factor 2 (Belief in the Existence of Extra-Terrestrial Life)**, eigenvalue of 4.00, accounted for 15.99% of the variance. This factor demonstrated excellent internal reliability (α = .92) and comprised ten items.

**Factor 3 (Search for Extra-Terrestrial Life)**, eigenvalue of 1.30, accounted for 5.20% of the variance. This factor demonstrated good internal reliability (α =.80) and comprised four items (see Table 2).

### *Gender Differences*

In order to allow comparisons between the three factor scores, the mean was calculated for each factor. In order to test for gender differences on factor scores, a multivariate analysis of covariance was conducted (MANCOVA). A significant main effect was found for gender, $F(3, 523) = 5.53$, $p = .001$, Wilk's Lambda =.97, partial eta-squared = .031.[2] Analysis of each alien/extra-terrestrial belief factor revealed that: males ($M = 5.22$, $SD = 1.18$) scored higher than females ($M = 4.80$, $SD = 1.24$) on Belief in the Existence of Extra-Terrestrial Life, $F(1, 525) = 12.08$, $p = .001$, partial eta-squared = .022; and males ($M = 4.33$, $SD = 1.39$) scored higher than females ($M = 3.99$, $SD = 1.30$) on Search for Extra-Terrestrial Life, $F(1, 525) = 6.89$, $p = .009$, partial eta-squared = .013. No difference was found between males and females on Alien Visitation, $F(1, 525) = .005$, $p > .05$, partial eta-squared = .00 (see Table 3).

**TABLE 3**
**Means, Standard Deviations, & Reliability Statistics for Factor Scores**

| | | GENDER | | | | | | COMBINED TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | WOMEN | | | MEN | | | | | |
| | Factor | *M* | *SD* | *α* | *M* | *SD* | *α* | *M* | *SD* | *α* |
| 1 | Alien Visitation | 2.87 | 1.27 | .95 | 2.88 | 1.38 | .96 | 2.88 | 1.30 | .95 |
| 2 | Existence of Extra-Terrestrial Life | 4.80 | 1.24 | .93 | 5.22 | 1.18 | .90 | 4.92 | 1.24 | .92 |
| 3 | Search for Extra-Terrestrial Life | 3.99 | 1.30 | .80 | 4.33 | 1.39 | .79 | 4.08 | 1.33 | .80 |

### *Relationship between Extra-Terrestrial and Paranormal Beliefs*

Prior to conducting correlation analysis, the reliability of the paranormal measures was assessed. This revealed that the Revised Paranormal Belief Scale (R-PBS) (Tobacyk, 1988, Tobacyk, 2004, Tobacyk & Milford, 1983) and the Australian Sheep-Goat Scale (ASGS) (Thalbourne, 1995a, Thalbourne & Delin, 1993**)** possessed good interval reliability. In addition to this, the two-factor solution for the R-PBS (Lange, Irwin, & Houran, 2000), which comprised factors assessing New Age Philosophy (NAP) and Traditional Paranormal Belief (TPB), demonstrated good internal reliability (see Table 4).

**TABLE 4**
**Means, Standard Deviations, and Reliability Statistics for Paranormal Belief Measures**

| Paranormal Belief Measures | *M* | *SD* | *α* |
|---|---|---|---|
| R-PBS | 57.01 | 27.75 | .88 |
| TPB | 22.16 | 4.70 | .89 |
| NAP | 22.84 | 5.07 | .79 |
| ASGS | 9.60 | 7.05 | .93 |

A series of Pearson's Product-Moment correlations were conducted between the three alien/extra-terrestrial belief factors and the measures of paranormal belief (NAP, TPB, and ASGS). Significant positive correlations were found between the alien/extra-terrestrial belief factors. Positive correlations were also found between: NAP and the alien/extra-terrestrial belief factors; TPB and Alien Visitation and Search for Extra-Terrestrial Life; and ASGS and the alien/extra-terrestrial belief factors (see Table 5).

**TABLE 5**
**Correlations: Alien Visitation, Extra-Terrestrial, and Paranormal Belief**

| | | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| **1** | Alien Visitation | | | | | | |
| **2** | Belief in ET | .41** | | | | | |
| **3** | Search for ET | .54** | .58** | | | | |
| **4** | NAP | .56** | .15** | .25** | | | |
| **5** | TPB | .48** | .07 | .15** | .68** | | |
| **6** | ASGS | .49** | .24** | .25** | .65** | .53** | |

* $p < .05$; ** $p < .01$ (all probabilities one-tailed).

Looking at the pattern of correlations, it is clear that there is a stronger relationship between Alien Visitation and the measures of paranormal belief than there is between the two extra-terrestrial-belief–related factors (Belief in the Existence of Extra-Terrestrial Life and the Search for Extra-Terrestrial Life) (see Table 6).

**TABLE 6**
**Differences in Correlation Magnitude between Belief in Alien/Extra-Terrestrial Life Factors and Measures of Paranormal Belief**

| | Alien/Extra-Terrestrial Belief Factors | | Z | Sig |
|---|---|---|---|---|
| | **Alien Visitation** | **Belief in ET** | | |
| NAP | .56 | .15 | 9.72 | $\leq$.001 |
| TPB | .48 | .07 | 9.48 | $\leq$.001 |
| ASGS | .49 | .24 | 6.03 | $\leq$.001 |
| | **Alien Visitation** | **Search for ET** | | |
| NAP | .56 | .25 | 8.57 | $\leq$.001 |
| TPB | .48 | .15 | 8.55 | $\leq$.001 |
| ASGS | .49 | .25 | 6.32 | $\leq$.001 |
| | **Belief in ET** | **Search for ET** | | |
| NAP | .15 | .25 | 2.33 | $\leq$.001 |
| TPB | .07 | .15 | 2.11 | $\leq$.001 |
| ASGS | .24 | .25 | 0.47 | $\leq$.05 |

A series of first-order partial correlations was conducted to determine the degree to which the significant positive correlations between the alien/extra-terrestrial belief factors and paranormal belief were explained by belief in Alien Visitation. Controlling for Alien Visitation beliefs revealed weak negative correlations between Belief in the Existence of Extra-Terrestrial Life, Search for Extra-Terrestrial Life, and the two factors of the R-PBS (NAP and TPB) (see Table 7). Contrastingly, controlling for Belief in the Existence of Extra-Terrestrial Life revealed positive correlations between Alien Visitation, Search for ET, and the two factors of the R-PBS (NAP and TPB) (see Table 8). Finally, controlling for Search for ET produced positive correlations between Alien Visitation and the two factors of the R-PBS (NAP and TPB), and no correlation was found between Belief in ET and the R-PBS (see Table 9). These findings indicate that the relationship between the alien/extra-terrestrial belief factors and paranormal belief is best explained by belief in Alien Visitation.

**TABLE 7**
**Partial Correlations: Belief in the Existence of ET, Search for ET, and Paranormal Belief Controlling for Alien Visitation**

| | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | Belief in ET | | | | |
| 2 | Search for ET | .47** | | | |
| 3 | NAP | –.10* | –.08* | | |
| 4 | TPB | –.16** | –.15** | .56** | |

* $p < .05$; **; $p < 0.1$ (all probabilities one-tailed).

**TABLE 8**
**Partial Correlations: Alien Visitation, Search for ET, and Paranormal Belief Controlling for Belief in the Existence of ET**

| | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | Alien Visitation | | | | |
| 2 | Search for ET | .40** | | | |
| 3 | NAP | .55** | .19** | | |
| 4 | TPB | .50** | .14** | .68** | |

* $p < .05$; ** $p < 0.1$ (all probabilities one-tailed).

**TABLE 9**
**Partial Correlations: Alien Visitation, Belief in the Existence of ET, and Paranormal Belief Controlling for Search for ET**

| | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | Alien Visitation | | | | |
| 2 | Belief in ET | .15** | | | |
| 3 | NAP | .52** | .02 | | |
| 4 | TPB | .48** | –.03 | .67** | |

* $p < .05$; ** $p < 0.1$ (all probabilities one-tailed).

## Discussion

The nature and structure of alien/extra-terrestrial beliefs has been relatively under-researched within psychology (Swami et al., 2009, Swami, Pietschnig, Stieger, & Voracek, 2010b). Hence, the current paper was designed to extend research by examining and reconciling theoretical differences between important recent work (cf., Dagnall, Parker, Munley, & Drinkwater, 2010, Dagnall, Munley, Parker, & Drinkwater, 2010a, and Swami et al., 2009). Particularly, debate has arisen around the nature and number of alien/extra-terrestrial belief factors: Dagnall, Parker, Munley, and Drinkwater (2010) and Dagnall, Munley, Parker, and Drinkwater (2010a) forwarded two factors (Factor 1, belief in extra-terrestrial life; and Factor 2, UFO-related beliefs), while Swami et al. (2009) outlined three factors (Factor 1, belief that extra-terrestrial life has visited Earth and that governmental agencies have knowledge of this fact; Factor 2; scientific search for extra-terrestrial life; and Factor 3, general beliefs about the existence of extra-terrestrial life). Although these studies successfully proposed alien/extra-terrestrial factors and produced valid and reliable measures, the lack of agreement over the number and nature of factors suggests that there is currently no theoretical consensus, and that greater conceptual clarity is required. In this context the current study's intention was to disambiguate these differences and in so doing further elucidate understanding of alien/extra-terrestrial beliefs.

To achieve this, items from the Dagnall, Parker, Munley, & Drinkwater (2010) and Dagnall, Munley, Parker, & Drinkwater (2010a) and Swami et al. (2009) papers were combined to produce a composite measure of alien/extra-terrestrial belief(s). Using Principal Components Analysis (PCA), this measure was found to be reducible to three related, but conceptually different factors: Factor 1, Alien Visitation (e.g., "Alien spaceships regularly visit Earth"); Factor 2, Belief in the Existence of Extra-Terrestrial Life (e.g., "Somewhere in the universe there are other forms of life"); and Factor 3, the Search for Extra-Terrestrial Life (e.g., "Governments should direct more funding to the scientific search for extra-terrestrial life"). The existence of three factors supports the notion that alien/extra-terrestrial life beliefs are multifactorial (Chequers et al., 1997, Dagnall, Parker, Munley, & Drinkwater, 2010, Dagnall, Munley, Parker, & Drinkwater, 2010a, Swami et al., 2009) and implies that simple measures, such as those contained within general measures of paranormal belief (e.g., R-PBS) are insufficient and unable to account for the complex nature of alien/extra-terrestrial beliefs.

Importantly, support is provided for the dichotomy between alien visitation/UFO-related beliefs and extra-terrestrial belief (Dagnall, Parker, Munley, & Drinkwater, 2010, Dagnall, Munley, Parker, & Drinkwater, 2010a, Swami et al., 2009, Chequers et al., 1997). Differences, however, were observed between

the factors identified in the present study and those proposed by Dagnall, Parker, Munley, & Drinkwater (2010), Dagnall, Munley, Parker, & Drinkwater (2010a), and Swami et al. (2009). Particularly, the Dagnall, Parker, Munley, & Drinkwater (2010) measure was extended by the identification of an additional factor (Search for Extra-Terrestrial Life), while the government component of the Swami et al.'s measure (2009) (Factor 1) was found to be redundant.

Within the present study, males scored higher than females on Belief in the Existence of Extra-Terrestrial Life (Factor 2) and Search for Extra-Terrestrial Life (Factor 3), and no difference was found for Alien Visitation. While these findings contradict Swami et al. (2009, 2010b), who found no sex difference, they are consistent with previous studies, which found men more likely to believe in extra-terrestrial life (Goode, 2000, Patry & Pelletier, 2001, Rice, 2003). Although gender differences were observed, the accompanying effect sizes were small (Cohen, 1988), and this may explain the previously reported inconsistent findings.

The present paper was also designed to examine the relationship between alien/extra-terrestrial belief and paranormal belief. Previous work reports that participants endorse the existence of life elsewhere in the universe but are skeptical that such life has visited Earth (Dagnall, Parker, Munley, & Drinkwater, 2010, Dagnall, Munley, Parker, & Drinkwater, 2010a, Swami et al., 2009). Noting this distinction, Swami et al. (2009) proposed a dichotomy between paranormal-related alien/extra-terrestrial beliefs (Factor 1, belief that extra terrestrial life has visited Earth and that government agencies have knowledge of this fact) and more science-based beliefs (Factor 3, general beliefs about the existence of extra terrestrial life). Dagnall, Munley, Parker, & Drinkwater (2010a) found only the more radical UFO-related beliefs to be positively associated with paranormal belief; alien visitation was found to correlate more strongly with paranormal belief than the extra-terrestrial belief factors. Partial correlations controlling for alien visitation revealed no association between the extra-terrestrial belief factors and paranormal belief. These findings suggest that belief in alien visitation can be viewed alongside facets of paranormal belief, while belief in extra-terrestrial life cannot. Perhaps one interpretation of this is that both sets of belief are dependent upon impaired/faulty reasoning and critical evaluation (e.g., Blackmore, 1997, Bressan, 2002, Dagnall, Parker, & Munley, 2007, Rogers, Fisk, & Wiltshire, 2010). However, in spite of this, it is clear that belief in alien visitation or an alien presence is not always considered to be unfounded and without evidential base (e.g., Carlotto, 1995, 1997, 2002, DiPietro, Molenaar, & Brandenburg, 1988, Friedman, 2008, Greer, 2006, Leir, 2005, Maccabee, 2000, Sitchin, 1976, 2004, 2010).

Indeed, many researchers hold particular ideas concerning extraterrestrials predicated upon reasoned argument and the evaluation of evidence.

Consequently, what remains for further study is how the nature of alien visitation beliefs might differ between groups of individuals depending upon how those beliefs are derived. In some instances at least, beliefs in alien visitation or an alien presence is the result of analytical processes that form the basis of empirical and critical evaluation. Thus, the relationship between paranormal beliefs and alien visitation beliefs may not be found when the latter beliefs are based upon reasoned argument. This requires further study.

In this context one variable of particular interest is reality testing (Irwin, 2003). Reality testing has been defined as the inclination to test critically the logical plausibility of beliefs. The importance of reality testing is derived from the notion that pathological beliefs and delusions arise in part from the failure to subject hypothetical explanations of sensory experience to critical testing (Irwin, 2004, Langdon & Coltheart, 2000); problems arise because experiences require interpretation (casual attributions) and are subject to bias (Kahneman & Tversky, 1972, Weiner, 1986). Thus, pathological belief generation is characterized by the failure to test the plausibility of generated explanations/hypotheses.

Reality testing deficits have been used to explain the development and maintenance of paranormal beliefs (Dagnall, Drinkwater, Parker, & Munley, 2010, Irwin, 2004, 2003, Zusne & Jones, 1982). The acceptance and maintenance of paranormal explanations over conventional alternatives arises from the intuitive–experiential interpretation of stimuli and an absence of analytical–rational processing (reality testing) (Irwin, 2009). Irwin and Young (2002) argue that people with an intuitive–experiential processing style will be predisposed toward accepting paranormal explanations because they find them appealing and therefore do not subject them to reality testing. This notion could be extended to include alien visitation/UFO-related beliefs.

Recent research has found that scores on cognitive–perceptual measures (schizotypy and transliminality) affect level of paranormal belief (Dagnall, Munley, Parker, & Drinkwater, 2010b). Particularly, participants scoring above the median have demonstrated higher levels of endorsement across a range of paranormal belief subscales (Hauntings, Aliens, Superstition, Other Life, Religion, PK, ESP, Astrology, and Witchcraft) than those below the median. In line with Swami et al. (2010b), this suggests that the individual-differences approach may be usefully employed to clarify the underlying processes that give rise to extra-terrestrial and alien-related beliefs.

Indeed, extra-terrestrial and alien-related beliefs have been found to be predicted by different variables. Swami et al. (2010b) reported that extra-terrestrial beliefs were predicted by paranormal beliefs, the unusual factor of schizotypy, openness to experience, and education. While Swami, Chamorro-Premuzic, and Shafi (2010a) noted that Agreeableness, Neuroticism, and

Extraversion were positively correlated with beliefs in alien visitation and government coverups, when additional variables were controlled for (e.g., conformity and sensation-seeking) only Conscientiousness significantly predicted such beliefs. Extending this work, it would be interesting to see which individual cognitive–perceptual factors (reality testing, schizoptypy, dissociation, etc.) best predict belief in extra-terrestrial and alien-related beliefs (Swami et al., 2010b), and whether, as is the case with paranormal beliefs, this relationship may be largely explained by reality-testing deficits (Dagnall, Drinkwater, Parker, & Munley, 2010, Irwin, 2004, 2009). Again, more work is required in this area.

In conclusion, this paper provides further support for the dichotomy between extra-terrestrial–related beliefs and alien visitation/UFO-related beliefs. The former are likely to be considered more conventional by members of the mainstream scientific community, especially those involved or affiliated with SETI (e.g., Shostak, 2009, Vakoch, 2011). The latter views could be construed as somewhat less conventional by these same researchers. However, it is perhaps more likely that the endorsement of belief in alien visitation and its relationship to paranormal belief is not fixed but variable, depending upon how such beliefs are derived and the manner in which such beliefs are woven into the individual's scientific worldview.

## Notes

[1] Within Table 1 and Table 2, reversed (item numbers with an R) denotes items that are reversed-scored.

[2] A partial eta-squared between .01 and .06 reflects a small effect size, within the .06–.13 range a medium effect size, and .14 or higher a large effect (Cohen, 1988).

## References

Andrich, D. (1988). *Rasch Models for Measurement*. Sage University Paper Series on Quantitative Applications in the Social Sciences, series no. 07-068. Beverly Hills, CA: Sage Publications.

Appelle (1995/96). The abduction experience: A critical evaluation of theory and evidence. *Journal of UFO Studies, 6,* 29–78.

Bartlett, M. S. (1954). A note on the multiplying factors for various chi-square approximations. *Journal of the Royal Statistical Society, 16* (Series B), 296–298.

Biasco, F., & Nunn, K. (2000). College students' attitudes toward UFOs. *College Student Journal, 34,* 96–99.

Blackmore, S. J. (1997). Probability misjudgement and belief in the paranormal: A newspaper survey. *British Journal of Psychology, 88,* 683–689.

Bressan, P. (2002). The connection between random sequences, everyday coincidences, and belief in the paranormal. *Applied Cognitive Psychology, 16,* 17–34.

Bullard, T. E. (1994). The influence of investigators on UFO abduction reports: Results of a survey. In Andrea Pritchard, David E. Pritchard, John E. Mack, Pam Kasey, & Claudia Yapp (Eds.), *Alien Discussions: Proceedings of the Abduction Study Conference Held at M.I.T.,* pp. 571–619, Cambridge, MA: North Cambridge Press.

Carlotto, M. J. (1995). Digital video analysis of anomalous space objects. *Journal of Scientific Exploration, 9,* 45–63.

Carlotto, M. J. (1997). Evidence in support of the hypothesis that certain objects on Mars are artificial in origin. *Journal of Scientific Exploration, 11,* 123–145.

Carlotto, M. J. (2002). *The Cydonia Controversy: The History, Science, and Implications of the Discovery of Artificial Structures on Mars*. Authorhouse.

Chequers, J., Joseph, S., & Diduca, D. (1997). Belief in extra-terrestrial life, UFO-related beliefs, and schizotypal personality. *Personality and Individual Differences, 23,* 519–521.

Clancy, S. A., McNally, R. J., Schacter, D. L., Lenzenweger, M. F., & Pitman, R. K. (2002). Memory distortion in people reporting abduction by aliens. *Journal of Abnormal Psychology, 111,* 455–461.

Clarke, D. (1991). Belief in the paranormal: A New Zealand survey. *Journal of the Society for Psychical Research, 57,* 412–425.

Cohen, J. (1988). *Statistical Power Analysis for the Social Sciences*. Hillsdale, NJ: Lawrence Erlbaum.

Comrey, A. L., & Lee, H. B. (1992). *A First Course in Factor Analysis* (second edition). Hillsdale, NJ: Lawrence Erlbaum.

Crowe, M. J. (1986). *The Extra-Terrestrial Life Debate, 1750–1900.* Cambridge, England: Cambridge University Press.

Dagnall, N., Drinkwater, K., Parker, A., & Munley, G. (2010). Reality testing, belief in the paranormal, and urban legends. *European Journal of Parapsychology, 25*.

Dagnall, N., Munley, G., Parker, A., & Drinkwater, K. (2010a). The relationship between belief in extra-terrestrial life, UFOs-related beliefs and paranormal belief. *Society for Psychical Research, 74,* 1–14.

Dagnall, N., Munley, G., Parker, A., & Drinkwater K. (2010b). Paranormal belief, schizotypy and transliminality. *Journal of Parapsychology, 74,* 117–143.

Dagnall, N., Parker, A., & Munley, G. (2007). Paranormal belief and reasoning. *Personality and Individual Differences, 43,* 1406–1415.

Dagnall, N., Parker, A., Munley, G., & Drinkwater, K. (2010). Common paranormal belief dimensions. *Journal of Scientific Exploration, 24,* 431–447.

Diaz-Vilela, L., & Alvarez-Gonzalez, C. (2004). Differences in paranormal beliefs across fields of study from a Spanish adaptation of Tobacyk's RPBS. *Journal of Parapsychology, 68,* 405–421.

DiPietro, V., Molenaar, G., & Brandenburg, J. (1988). *Unusual Martian Surface Features* (fourth edition). Willmar, MN: Molenaar Inc. Press.

French, C. C. (2001). Alien Abductions. In R. Roberts & D. Groome (Eds.), *Parapsychology: The Science of Unusual Experience*, London: Arnold, pp. 102–116.

French, C. C., Santomauro, J., Hamilton, V., Fox, R., & Thalbourne, M. A. (2008). Psychological aspects of the alien contact experience. *Cortex, 44,* 1387–1395.

Friedman, S. (2008). *Flying Saucers and Science: A Scientist Investigates the Mysteries of UFOs*. Franklin Lakes, NJ: New Page Books.

Gallup, G. H. (Ed.) (1997). *The Gallup Poll: Public Opinion 1996*. Wilmington, DE: Scholarly Resources.

Gallup, G. H., & Newport, F. (1991). Belief in paranormal phenomena among adult Americans. *Skeptical Enquirer, 15,* 137–146.

Genta, G. (2007). *Lonely Minds in the Universe: The Search for Extraterrestrial Intelligence.* Berlin: Springer.

Goode, E. (2000). *Paranormal Beliefs: A Sociological Introduction*. Prospect Heights, IL: Waveland Publishing.

Gray, W. D. (1991). *Thinking Critically about New Age Ideas*. Belmont, CA: Wadsworth.

Greer, S. M. (2006). *Hidden Truth: Forbidden Knowledge*. Crossing Point.

Hopkins, B., Jacobs, D. M., & Westrum, R. (1992). *Unusual Personal Experiences: An Analysis of the Data from Three National Surveys Conducted by the Roper Organization*. Las Vegas: Bigelow Holding Corp.

Irwin, H. J. (2003). Reality testing and the formation of paranormal beliefs. *European Journal of Parapsychology, 18,* 15–28.

Irwin, H. J. (2004). Reality testing and the formation of paranormal beliefs: A constructive replication. *Journal of the Society for Psychical Research, 68,* 143–152.

Irwin, H. J. (2009). *The Psychology of Paranormal Belief: A Researcher's Handbook*. Hatfield, England: University of Hertfordshire Press.

Irwin, H. J., & Young, J. M. (2002). Intuitive versus reflective processes in the formation of paranormal beliefs. *European Journal of Parapsychology, 17,* 45–53.

Jacobs, D. M. (1992). *Secret Life: First-Hand Accounts of UFO Abductions*. New York: Simon & Schuster.

Jones, W. H., Russell, D. W., & Nickel, T. W. (1977). Belief in the Paranormal Scale: An objective instrument to measure beliefs in magical phenomena and causes. *JSAS Catalogue of Selected Documents in Psychology, 7,* 100 (Ms. No. 1577).

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology, 3,* 430–454.

Kaiser, H. (1970). A second generation Little Jiffy. *Psychometrika, 35,* 401–415.

Kaiser, H. (1974). An index of factorial simplicity. *Psychometrika, 39,* 31–36.

Kumar, V. K., & Pekala, R. J. (2001). Relation of hypnosis-specific attitudes and behaviours to paranormal beliefs and experiences: A technical review. In J. Houran & R. Lange (Eds.), *Hauntings and Poltergeists: Multidisciplinary Perspectives*, Jefferson: NC: McFarland.

Kumar, V. K., Pekala, R. J., & Gallagher, C. (1994). *The Anomalous Experiences Inventory*. Unpublished psychological test. West Chester, PA: West Chester University.

Langdon, R., & Coltheart, M. (2000). The cognitive neuropsychology of delusions. *Mind & Language, 15,* 183–216.

Lange, R., Irwin, H. J., & Houran, J. (2000). Top-down purification of Tobacyk's Revised Paranormal Belief Scale. *Personality and Individual Differences, 29*, 131–156.

Lange, R., & Thalbourne, M. A. (2002). Rasch scaling paranormal belief and experience: The structure and semantics of Thalbourne's Australian Sheep–Goat Scale. *Psychological Reports, 91,* 1065–1073.

Lawrence, T. R. (1995a). How many factors of paranormal belief are there?: A critique of the PBS. *Journal of Parapsychology, 59,* 3–25.

Lawrence, T. R. (1995b). Moving on from the PBS: A final reply to Tobacyk. *Journal of Parapsychology, 59,* 131–140.

Lawrence, T., Roe, C., & Williams, C. (1997). Confirming the factor structure of the Paranormal Beliefs Scale: Big orthogonal seven or oblique five? *The Journal of Parapsychology, 61,* 13–27.

Leir, R. K. (2005). *The Aliens and the Scalpel*. Book Tree.

Maccabee, B. R. (2000). *UFO FBI Connection: The Secret History of the Government's Cover-Up*. St. Paul, MN: Llewellyn Publications.

Patry, A., & Pelletier, L. (2001). Extra-terrestrial beliefs and experiences: An application of the theory of reasoned action. *The Journal of Social Psychology, 141,* 199–201.

Preece, P. F. W., & Baxter, J. H. (2000). Scepticism and gullibility: The superstitious and pseudo-scientific beliefs of secondary school students. *International Journal of Science Education, 22*, 1147–1156.

Randall, T. M. (1997). Paranormal Short Inventory. *Perceptual and Motor Skills, 84,* 1265–1266.

Randall, T. M., & Desrosiers, M. (1980). Measurement of supernatural belief: Sex differences and locus of control. *Journal of Personality Assessment, 44,* 493–498.

Rawlings, D., & MacFarlane, E. (1994). A multidimensional schizotypal traits questionnaire for young adolescents. *Personality and Individual Differences, 17,* 489–496.

Rice, T. (2003). Believe it or not: Religious and other paranormal beliefs in the United States. *Journal for the Scientific Study of Religion, 42,* 95–106.

Rogers, P., Fisk, J. E., & Wiltshire, D. (2010). Paranormal belief and the conjunctive fallacy: Controlling the temporal relatedness and potential surprise differentials in component events. *Applied Cognitive Psychology.* http://wileyonlinelibrary.com

Shostak, S. (2009). *Confessions of an Alien Hunter: A Scientist's Search for Extraterrestrial Intelligence.* National Geographic Society.

Sitchin, Z. (1976). *The 12th Planet*. New York: Harper.

Sitchin, Z. (2004). *The Earth Chronicles Expeditions*. Bear & Company.

Sitchin, Z. (2010). *There Were Giants Upon the Earth: Gods, Demigods, and Human Ancestry: The Evidence of Alien DNA (Earth Chronicles)*. Bear & Company.

Swami, V., Chamorro-Premuzic, T., & Shafi, M. (2010a). Psychology in outerspace: Personality, individual difference, and demographic predictors of beliefs about extraterrestrial life. *European Psychologist 15*(3), 220–228. doi:10.1027/1016-9040/a000023

Swami, V., Furnham, A., Haubner, T., Stieger, S., & Voracek, M. (2009). The truth is out there: The structure of beliefs about extra-terrestrial life among Austrian and British respondents. *The Journal of Social Psychology, 149,* 29–43.

Swami, V., Pietschnig. J., Stieger, S., & Voracek, M. (2010b). *Alien Psychology: Associations between Extraterrestrial Beliefs and Paranormal Ideation, Superstitious Beliefs, Schizotypy, and the Big Five Personality Factors. Applied Cognitive Psychology, 25*(4), 647–653. http://wileyonlinelibrary.com

Thalbourne, M. A. (1995a). Further studies of the measurement and correlates of belief in the paranormal. *Journal of the American Society for Psychical Research, 89,* 233–247.

Thalbourne, M. A. (1995b). Psychological characteristics of believers in the paranormal: A replicative study. *Journal of the American Society for Psychical Research, 89,* 153–164.

Thalbourne, M. A., & Delin, P. S. (1993). A new instrument for measuring the sheep–goat variable: Its psychometric properties and factor structure. *Journal of the Society for Psychical Research, 59,* 172–186.

Thalbourne, M. A., Dunbar, K. A., & Delin, P. S. (1995). An investigation into correlates of belief in the paranormal. *Journal of the American Society for Psychical Research, 89,* 215–231.

Tobacyk, J. J. (1988). *A Revised Paranormal Belief Scale*. Unpublished manuscript. Ruston, LA: Louisiana Tech University.

Tobacyk, J. (1995a). What is the correct dimensionality of paranormal beliefs?: A reply to Lawrence's critique of the Paranormal Belief Scale. *Journal of Parapsychology, 59,* 27–46.

Tobacyk, J. (1995b). Final thoughts on issues in the measurement of paranormal beliefs. *Journal of Parapsychology, 59,* 141–145.

Tobacyk, J. (2004). A revised paranormal belief scale. *International Journal of Transpersonal Studies, 23,* 94–98.

Tobacyk, J., & Milford, G. (1983). Belief in paranormal phenomena: Assessment instrument development and implications for personality functioning. *Journal of Personality and Social Psychology, 44,* 1029–1037.

Tobacyk, J., & Thomas, A. (1997). How the big orthogonal seven is really the oblique seven. *Journal of Parapsychology, 61,* 337–334.

Vakoch, D. A. (2011). *Communication with Extraterrestrial Intelligence*. New York: SUNY Press.

Watkins, M. W. (2000). *Monte Carlo PCA for Parallel Analysis [computer software]*. State College, PA: Ed & Psych Associates.

Weiner, B. (1986). *An Attributional Theory of Motivation and Emotion*. New York: Springer-Verlag.

Wiseman, R. & Watt, C. (2006). Belief in psychic ability and the misattribution hypothesis: A qualitative review. *British Journal of Psychology, 97,* 323–338.

Zullino, D. F., Verdu, B., Khazaal, Y., & Borgeat, F. (2006). Delusional ideas of alien control induced by the visit to an attraction park. *German Journal of Psychiatry, 9,* 57–59.

Zusne, L., & Jones, W. H. (1982). *Anomalistic Psychology: A Study of Extraordinary Phenomena of Behavior and Experience.* Hillsdale, NJ: Lawrence Erlbaum Associates.