

RESEARCH ARTICLE

A Question of Belief: An Analysis of Item Content in Paranormal Belief Questionnaires

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Abstract—This study examined the degree to which paranormal believers, who profess ‘strong’ belief in the popular expression of a topic known as the *primary item* (e.g., *Psychics possess a mysterious ability to know things about a person’s past and future*), disagree with related items and/or the putative ‘cause’ of the topic, known as *secondary items* (e.g., *Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations, etc.*). It was theorized that scoring differences between primary and secondary items might indicate certain kinds of paranormal believer, which might then allow us to conduct deeper analyses of paranormal belief (PB) and its putative relationships with deficits and dysfunctions. A complete set of items drawn from ten established PB scales was administered to a sample of 343 respondents. Using Factor Analysis, we developed the Paranormal Belief Informedness Scale (PBIS), consisting of 10 primary items, and 10 secondary items, scores of which were used to identify three major PB types: ‘primary believers’ (who believe in *all* 10 primary items, and thus exhibit ‘strong’ PB), ‘primary non-believers’ (who believe in none of the 10 primary items), and ‘mixed believers’ (who believe in only some primary items). We found significant response-rate differences between primary and secondary items across believer types, and across psi categories (i.e. extra-sensory perception, psychokinesis, and life after death). For the full sample, it was shown that there is a significant

relationship between PB and reality testing deficits as measured on the reality testing subscale of the *Inventory of Personality Organisation* (IPO-RT) (Lenzenweger et al. 2001). However, this relationship tended not to be significant across believer types. Also, there was no evidence in the full sample, or in any believer type, that PB was correlated with depression as measured on the Beck Depression Inventory (BDI-II). We suggest that paranormal believers have differences that may be reflected in their responses to predictor variables, and/or how informed their paranormal belief is.

Keywords: depression—*informed belief*—*paranormal belief*—*quasi-belief*
—*primary belief*—*reality testing*

Introduction

The literature suggests that people who believe in, and/or claim, paranormal experiences, as measured on a range of paranormal belief (PB) scales, can be seen as potentially ‘deficient’ or ‘dysfunctional’ (see Irwin 2009 for a thorough review). These conditions can be characterized under two clinically oriented hypotheses: (i) the cognitive deficits hypothesis—believers have uncritical, naïve, or irrational thought processes based on deficits in intelligence and/or reasoning skills, and (ii) the psychodynamic functions hypothesis, whereby believers are psychologically disadvantaged or maladapted (Irwin 2009, Irwin & Watt 2007). While some concessions have been made that the findings for cognitive deficits in paranormal believers are “mixed,” “ambiguous,” or “unequivocal” (Irwin & Watt 2007:229–231), or even “not encouraging” (Irwin 2009:90), *and* it has been proposed that PB might logically stem from “the data of parapsychological research” (Irwin & Watt 2007:232), there is, however, “general support” (Irwin & Watt 2007:234) that believers tend to be psychologically or socially deviant (dysfunctional). We would argue that the pathologization of paranormal believers, although warranted in some cases, has somehow become overextended to *all* paranormal believers, and much of the past research in anomalistic psychology is a primary influence in this assumption. On the psychodynamic aspects of PB, Jinks (2012a) has identified some specific sources of this assumption:

... it is the associating of paranormal belief formation and maintenance with schizotypal ideation (Brugger et al. 1993, Brugger & Graves 1997, Hergovich, Schott, & Arendasy 2008, Irwin & Green 1998, Pizzagalli et al. 2000, Pizzagalli, Lehmann, & Brugger 2001, Thalbourne, Dunbar, & Delin 1995, Windholz & Diamant 1974), delusion, psychosis, and schizophrenia (e.g., Cella, Vellante, & Preti 2012, Houran & Lange 2004, Thalbourne 1994) that most successfully creates an impression that paranormal believers are psychologically dysfunctional. (Jinks 2012a:128)

We do not entirely dispute the insights drawn from some correlates and functions of PB (see Irwin & Watt 2007, Kumar & Pekala 2001, Lange & Houran 1997, 1998), and it is clear that many psi-researchers place great emphasis and importance on PB scales for scientific reasons—for example, due to the often-supported psi and sheep–goat hypotheses,¹ sheep are usually regarded as probable high-scorers on tests of psychic ability whereas goats are not (see Lawrence 1993, Palmer 1971, 1977). PB scores are therefore good predictors of a range of psychological and parapsychological responses. However, a number of PB scales have been criticized (see Irwin’s 2009 review), and only in the last few decades have psychometric procedures reached the level of sophistication where PB has shifted from a unitary construct to a multi-factorial construct. It is now taken for granted that PB can refer *not only* to beliefs in (a) psychic abilities such as extra-sensory perception and psychokinesis, *but also* beliefs in (b) supernatural, occult, and crypto-morphic phenomena. These advances are noteworthy, but they do not resolve a critical problem—namely, that participants in PB studies merely tend to accept at face value most belief-scale items as either ‘correct’ or ‘incorrect’ (Walton 2010). Such acceptance fails to address the possibility that some believers per se might ‘believe’ in concepts they do not actually understand, even though those beliefs do not correspond to *informed beliefs*, or the type of beliefs PB researchers believe they are measuring. Rather, these ‘believers’ may hold *quasi-beliefs*—semi-propositional representations of the world superficially believed to be true prior to any truth evaluation (Recanati 1997).² Individuals may often hold quasi-beliefs indefinitely, never migrating them to the status of an informed belief, casually expressing agreement with a given proposition in such a way that their answer is indistinguishable from another individual who is better informed (see Jinks 2012a for details).³ We note the fact that a person’s level of paranormal belief is underpinned by how informed their belief is as much as how informed their non-belief, or disbelief, is. However, for the purposes of this study (and for operational reasons), we are mainly interested in informed belief; not informed non-belief (i.e. informed skepticism).

Without a clearer understanding of the nature and diversity of PB (i.e. the qualitative, not just quantitative, degrees to which these beliefs are held and maintained), the proposition that PB indicates deficits and/or dysfunctions may likely be unwarranted, or at the very least may not apply to some *subsets* of paranormal believers.

Primary and Secondary Paranormal Belief Items

A viable means of investigating quasi-belief, and other forms of belief, is to develop question sets with two classes of item. Items in the first class would

replicate most of the familiar propositions found in common paranormal belief questionnaires referring to anomalous processes, occurrences, locations, entities, or personalities. Such items could be labelled *primary items*. Items in the second class would variously (a) represent the standard anomalous explanations for the primary items; (b) offer an alternative example of the primary item; or (c) re-word the primary item to exclude specific reference to any anomalous process, occurrence, location, entity, or associated personality. Such items could be labeled *secondary items*.

Jinks (2012a) developed a set of primary and secondary items about a number of paranormal and related beliefs, and then administered them to more than 400 participants. He confirmed, for example, that those who held 'strong' beliefs in *primary* items (e.g., "Some places are haunted by the ghosts of dead people") actually displayed erratic patterns of approval toward related *secondary* items (e.g., "When people die, part of them still remains on earth in another form") (Jinks 2012a:141). Those participants who responded affirmatively to a given primary item, *and* their related secondary item(s) because they possess greater knowledge of the topic (i.e. they are better informed) were referred to as 'informed believers,' and those who responded affirmatively to the primary item only were referred to as 'quasi-believers.' Jinks concluded that the latter group might hold only superficial understanding of what they claim to believe. It may even be the case that the associations between disorders/dysfunctions and paranormal belief might be more a function of a propensity to hold quasi-beliefs, rather than the fact that these beliefs refer to extraordinary content.

Houran and Lange (2012) argued that Jinks' method had merit and could be applied to PB "scales that have been validated" (p. 161), a recommendation supported by Jinks (2012b). We argue that none of the established PB scales, as currently used, differentiate between informed believers and quasi-believers, though opportunity may be there in the pools of approved items to discern the hypothesized difference. From that perspective, it is possible that in any sample of believers, there are quasi-believers who have not fully considered the implications of their beliefs, and informed believers who have (which is not to ignore the fact that there are non-believers who can be classed as informed skeptics but, as mentioned, the present study is focused on belief, not non-belief or disbelief). If 'quasi-believer' and 'informed believer' are two legitimate types, as well as other possible types on a continuum of paranormal belief, scoring differences on primary items and related secondary items should help us to identify these types. Critically, these types may even display different psychological and behavioral traits than those that generally characterize the typical paranormal believer. In this paper, we will attempt to demonstrate such differences in

three areas: (i) the primary-item/secondary-item scoring dichotomy, (ii) reality testing, and (iii) depression.

Reality Testing

Reality testing comprises “a set of perceptual, cognitive, and sensorimotor acts that enables one to determine one’s relationship with the external physical and social environments” (Reber 1995:640). Irwin points out that hypotheses may be scrutinized “in the light of prior personal experience, general knowledge, and the input of authoritative others and similar sociocultural sources” (Irwin 2003:15), and he explains that the evaluative process of logical testing and probing translates as *reality testing*. For the purposes of this paper, we classify reality testing deficits as cognitive deficits.

While the concept of reality testing has been arguably associated with paranormal belief for some decades (Alcock 1981, Zusne & Jones 1982), empirical testing of the relationship is “meagre” or ‘artifactual’ (Irwin, 2004:144). Irwin (2003) used three subscales from the *Bell Object Relations and Reality Testing Inventory* (BORRTI) (Bell 1995) to test against various subscales of PB as measured on Tobacyk’s Revised Paranormal Belief Scale (R-PBS), which include New Age Philosophy (NAP), Traditional Paranormal Beliefs (TPB), Extraordinary Life Forms, Precognition, Psi, Spiritualism, Superstition, and Witchcraft. The measures of reality testing from the BORRTI were ‘Reality Distortion’ (RD), ‘Uncertainty of Perception’ (UP), and ‘Hallucinations and Delusions’ (HD). Significant effects (Spearman’s r_s) ranged from weak to moderate (.15 to .58), in a sample drawn from a “general community of Australian adults” (Irwin 2003:17)—only the correlations between Precognition and RD, and TRB and UP, were not significant. After transformation of NAP, TPB, and UP data, regression analyses showed that (a) NAP was predicted by RD, UP, and HD, and (b) TPB was predicted by RD and HD.

Using the Reality Testing subscale of the *Inventory of Personality Organisation* (IPO-RT) (Lenzenweger et al. 2001), Irwin (2004) found reality testing deficits (IPO-RT) correlated positively (Spearman’s r_s) with the same measures of R-PBS, although TPB was replaced by Traditional Religious Beliefs (TRB). Effects ranged from weak to moderate (.32 to .63), in a sample drawn once again from a “general community of Australian adults” (Irwin 2004:147). Irwin concluded that some people, “when faced with an anomalous experience, jump to a paranormal interpretation without due critical testing of the logical plausibility of this belief” (Irwin 2004:149). Irwin could not demonstrate ‘clinical’ levels of reality testing deficits in his sample because the IPO-RT measures these deficits in terms of

an “informational processing style” rather than as “psychotic phenomena” (Irwin 2004:145).

Dagnall et al. (2010) found significant correlations (Pearson’s r) of moderate strength between reality testing deficits (IPO-RT) and the two PB measures (NAP and TPB). They concluded that reality testing deficits were “fundamentally involved in the formation and maintenance of some paranormal beliefs” (Dagnall et al. 2010:25). Drinkwater, Dagnall, and Parker (2012) replicated these two results, and a significant correlation between Australian Sheep–Goat Scale (ASGS) (Thalbourne 1995) and IPO-RT was also found.

Irwin and Marks (2013) have also found a significant correlation of IPO-RT with their new subscale, New Age Belief (NAB), but not for their other subscale, Traditional Religious Belief (TRB), both of which make up their Survey of Scientifically Unaccepted Beliefs (a.k.a. Survey of Popular Beliefs). Recently, Irwin, Dagnall, and Drinkwater (2015) performed two bootstrapping regressions (since they had significantly-skewed data) and found that the IPO-RT (their criterion variable) was again a predictor of NAB and, on this occasion, the TRB.

These findings indicate a consistent effect, but they may prove only how conventional approaches fail to draw out other dimensions of paranormal belief.

Depression

Depression (including the depression dimension of bipolar disorder) may be related to paranormal belief (Irwin 2009, Thalbourne & Houran 2004). Depression is a low-mood state indicated by aversion to activity, with possible negative effects on a person’s thoughts, behavior, feelings, and well-being (DSM-IV-TR 2000). Given that depression is also described as a state of sadness, anxiety, emptiness, hopelessness, helplessness, worthlessness, guilt, irritability, shame, and restlessness, we class depression as a psychodynamic dysfunction. Depression per se and the depression dimension of bipolar disorder (i.e. manic-depression) are essentially the same. If a given paranormal belief measure correlates positively with a measure of manic-depression, it can be assumed that paranormal belief scores predict both mania and depression and not likely one or the other. For example, Thalbourne and Delin (1994) found that both Depressive Experience (measured on the Depression subscale of the Manic-Depression Scale, MDS) and Manic Experience (measured on the Mania subscale of the MDS) were both “significantly and positively related to belief in, and alleged experience of, the paranormal” (cited in Thalbourne & Houran 2004:140).

Focusing on depression only, a combination of findings exist with regard to the relationship between PB and *trait* depression (an ongoing, stable element of an individual, rather than a temporary state—see Spielberger et al. 2003). While some studies have found a positive relationship (Thalbourne & Delin 1994, Thalbourne & French 1995), others have found no association between the two (Zebb & Moore 2003). Tobacyk found a correlation between scores on the R-PBS and “depressive attributional style” (p. 864), the latter measured on the Attributional Style Questionnaire (Peterson et al. 1982). Though mixed findings exist, they do generally suggest that trait depression may enhance susceptibility to PB.

The relationship between *state* depression and PB is also implied where ‘helplessness’ (a cognitive aspect of depression, see Abramson, Seligman, & Teasdale 1978) correlated with scores on the R-PBS (Dudley 1999). However, Irwin (2009) suggests that depression is not necessarily indicated if a given situation was merely perceived to be uncontrollable.

From his own (sometimes co-authored) studies from 1994 to 2004, Thalbourne (2005) reports 10 out of 19 positive and significant Depression/PB correlations, but his review is confined to the same few researchers, and the effects are generally small. Overall, findings by other researchers are mixed (see Irwin 2009:94 for details). More recently, in a study by Billows and Storm (2015a), depression measured on the Beck Depression Inventory (BDI-II) did not correlate significantly with either the ASGS (Thalbourne 1995) or the Basic Limiting Principles Questionnaire (Thalbourne 2010).

Rationale for the Study

It is clear that further research is needed in the above areas of deficits and dysfunction, but we stress that it is crucial that any such research also involves critical approaches to PB that question current definitions and understandings. Measures of PB may be shown to be psychometrically sound, but we must also ask if those measures detect an internally consistent subset of propositions regarding an anomalous topic, its putative causes, and/or alternative examples of the topic. And, if not, we might ask how the presence of these apparent quasi-beliefs impacts on current conceptions of paranormal belief.

The over-arching aim of the present study is to develop and administer a question-set of PB items drawn from established PB measures to determine whether participants who self-report strong belief in primary items maintain this level of belief when responding to secondary items. To do this, we aim to construct a paranormal belief instrument (the so-called Paranormal Belief Informedness Scale) by which we shall endeavour to identify subsets of believers who may or may not exhibit varying levels of reality-testing

deficits and depression. It is therefore crucial that we first demonstrate the existence of, and differences between, primary and secondary items, and subsequently show that response differences between the two types of items help identify various believer types whose responses to particular measures of deficits and dysfunction are not necessarily consistent.

Methods

Participants

The original study was divided into two parts. For Part 1, the initial sample ($N = 387$) comprised: (i) first-year psychology students from the School of Psychology, University of Adelaide (Adelaide, South Australia), who received credit for laboratory participation ($n = 71$); (ii) students and staff from various disciplines from the University of Adelaide, including non-credited School of Psychology students ($n = 36$); and (iii) online respondents who were informed of the study by word of mouth or via various websites, including the Australian Institute of Parapsychological Research, Inc. (AIPR), a number of Facebook pages, and APD Performance Pty Ltd, a market research service ($n = 280$). All of the student-participants in (i) above, and most of the participants in (ii) above, completed the questionnaires in Lance Storm's (L.S.) laboratory. No remuneration was offered for participation. The research was approved by the School of Psychology Ethics Sub-Committee.

Of 387 participants, 59% were females ($n = 227$), and 41% were male ($n = 160$). Age ranged from 18 to 81 years ($M = 42$ years, $SD = 18$ years, $n = 386$ —one participant did not give age). Age distributed normally.

For Part 2, which was a qualitative study, we sought to screen and interview ten gamblers from various gambling establishments in the Manchester area, UK. Five gambling categories would be covered: horses, bingo, slots, cards, sports-betting. For comparative purposes, interviewees were either 'high-scoring' and 'low-scoring' on the so-called Paranormal Belief Informed Scale (PBIS; details about the PBIS are given in the Results section; a full report of Part 2 of this two-part study is planned as a separate article).

Measures

The study was administered via computer monitor and started with an information page (providing a plain language description of the aim and nature of the study and contact details for the principal experimenter and for counseling services in case of adverse reactions to the study). The information

page was followed by a consent form and a demographics inventory on one page each, followed by a test instrument labeled “Paranormal Belief Questionnaire” (PBQ). The latter included 244 anomalous and paranormal belief items drawn from ten established belief questionnaires. Six of these ten scales are regarded as “historically significant” (Irwin 2009:177). Primarily, the three major parapsychological categories, extra-sensory perception (ESP, including telepathy, clairvoyance, and precognition), psychokinesis (PK), and life after death (LAD), were covered, as were other paranormal and anomalous categories such as supernatural and religious beings, witchcraft and occult practices, superstition, spiritualism, and extraordinary life forms (i.e. ‘crypto-morphs’). The PBQ comprises all these categories as captured in the ten scales, which are here described:

1. **Anomalous Experiences Inventory (AEI)** (Gallagher, Kumar, & Pekala 1994). The full-scale AEI contains 70 true/false items that form five subscales concerning anomalous/paranormal experiences, beliefs, abilities, fear of the paranormal/anomalous, and use of drugs and alcohol. Example item #9: “I have lived before.” The subscales have shown good convergent validity when correlated with selected personality measures. Specifically for the present study, the AEI acronym refers only to the *Anomalous/Paranormal Belief Subscale*, consisting of 12 true/false items. The subscale theoretical mean score is 6 (min. = 0; max. = 12).

2. **Australian Sheep–Goat Scale (ASGS)** (Thalbourne 1995, 2010). The ASGS is an 18-item self-report measure of belief in and alleged experience of the paranormal (ESP, psychokinesis, and life after death). Items are each scored 0 (false), 1 (uncertain), and 2 (true), along a visual analogue scale (e.g., “I am completely convinced that: ESP does *not* exist ESP exists”). Theoretical (raw) mean score = 18 (min. = 0; max. = 36). The ASGS data are ‘top-down purified’ using Rasch-scaling techniques (Rasch 1980),⁴ thus yielding a measure that has *interval-level* properties (Lange & Thalbourne 2002). This procedure alters the scoring range and mean. Higher total scores indicate stronger beliefs in the facets of paranormal phenomena mentioned. For a total score on the Rasch-scaled ASGS (RASGS), only 16 of the 18 item-Rasch-scores are summed (the scores on the two afterlife items are not included). The RASGS has been standardized with a mean of 25 ($SD = 5$). RASGS scores range from 8.13 to 43.39. In a good-sized sample ($N = 131$, Storm & Thalbourne 2005), the ASGS gave a high reliability coefficient, Cronbach’s $\alpha = 0.91$ (Billows & Storm 2015a, report Cronbach’s $\alpha = 0.95$).

3. **Basic Limiting Principles Questionnaire (BLPQ)** (Thalbourne 2010). The BLPQ is a 26-item self-report measure of belief in and alleged experience of the paranormal. It is an attempted improvement by Thalbourne (2010) on the ASGS, professing superior wording, alternate positive and negative wording to avoid acquiescence response bias, and additional items (four on mind–body dualism, three on paranormal healing, and two on clairvoyance; see Thalbourne 2010). Example item #2: “I believe I have had personal experience of ESP.” Each item includes a five-point Likert scale ranging from 1 = *Strongly Disagree*, to 5 = *Strongly Agree*. Theoretical (raw) mean score = 78 (min. = 26; max. = 130). Higher scores indicate stronger belief in the paranormal. Thus far, this measure has been used only once in a thesis by Billows (Billows 2014, see Billows & Storm 2015a, 2015b). Billows and Storm (2015a) report Cronbach’s $\alpha = 0.96$. The BLPQ has since been Rasch-scaled (RBLPQ) (Lange 2016) to remove age and gender bias, resulting in a 23-item version. The RBLPQ has been standardized with a mean of 50 ($SD = 15$), scores range from 6.35 to 106.25.

4. **Belief in the Paranormal Scale (BPS)** (Jones, Russell, & Nickel 1977). The BPS is a 25-item scale measuring psychic, supernatural, and occult phenomena, as well as “divination and prophecy, legendary creatures and civilizations, and other scientifically unattested phenomena” (Irwin 2009:41). Example item #4: “I firmly believe that ghosts or spirits do exist.” Five items are negatively worded to discourage acquiescence. Responses are recorded on a five-point Likert scale, ranging from 1 = *Strongly Disagree*, to 5 = *Strongly Agree*. Scores range from 25 to 125. As far as the scale’s reliability (test–retest) and validity (predictive, concurrent, and construct) are concerned, Irwin reports that the scale has “psychometric adequacy” (Irwin 2007:42).

5. **Extraordinary Beliefs Inventory (EBI)** (Otis & Alcock 1982). The EBI is a 30-item scale measuring extraordinary beliefs such as “luck, spirits, religion, psychic phenomena, creatures, and fortune-telling” (Otis & Alcock 1982:81). Example item #19: “There is such a thing as *extrasensory perception* (ESP).” Responses are recorded on a seven-point Likert scale, ranging from 1 = *Strongly Disagree* to 7 = *Strongly Agree*. Scores range from 30 to 210. Jones and Alcock reported that the consistency of responses was high, with alpha values ranging from .68 (creatures) to .92 (religion).

6. **Jinks’ Belief Questionnaire (JBQ)** (Jinks 2012a). The JBQ is an 89-item paranormal and anomalous belief scale containing 14 primary items and 30 secondary items about ESP, PK, LAD, the Bermuda triangle,

extraterrestrials, mysterious hominids, lake monsters, ghosts, astrology, and the prophecies of Nostradamus, as well as: (a) a limited range of complementary and alternative medical categories (CAM), including feng shui, homeopathy, iridology, and acupuncture for the purpose of hypothesis testing; (b) four control items to determine the extent of participant cooperation, and (c) 41 cover items (decoys) to disguise the explicit association between primary items and similar but non-specific secondary items. The four control items included three patently false propositions: (i) “UFOs have landed in broad daylight near the Sydney Opera House”; (ii) “Some newborn babies can speak as well as adults”; (iii) “Some gifted people don’t need to eat or drink but can live on sunlight alone”; and one statement assuming agreement (“Some people have bad nightmares”). The order of presentation was randomized, with no question from the same category adjacent to another. Participants were required to answer items using a six-point Likert scale (Leung 2011) for the likelihood of the item’s content being true, with responses ranging from 1 = *Definitely Not*, to 5 = *Definitely*. Each topic consisted of between two and six items, with one primary item and the remainder being secondary items. The secondary items, referring to potential anomalous *explanations* for the concepts, events, entities, or personalities referred to in the primary item, were derived from the relevant literature sources (e.g., Berlitz 1974 for a sympathetic, paranormal explanation of disappearances in the “Bermuda Triangle,” or Barnes 2012 for an account of the shared ancestry of humans with mystery hominids).

7. Magical Ideation Scale (MIS) (Eckblad & Chapman 1983). The MIS, which consists of 30 true/false items, is a measure of paranormal aspects of magical ideation (i.e. “belief in forms of causation that by conventional standards are invalid”—Eckblad & Chapman 1983:215). The MIS has been used to predict symptoms of schizotypy and schizophrenia proneness. Example item #30. “I have sometimes felt that strangers were reading my mind.” Twenty-three items score 1 point for a ‘True’ response; seven items score 1 point for a ‘False’ response. Internal consistency reliability values are good: .82 (males); .85 (females).

8. Survey of Scientifically Unaccepted Beliefs (SSUB) (Irwin & Marks 2013)—also labeled the *Survey of Popular Beliefs* (SPB) for general use. The SSUB is a 20-item self-report survey that measures the “intensity of scientifically unaccepted beliefs” (Irwin & Marks 2013:150). There are two sub-scales in the SSUB: *New Age Beliefs* (NAB), 15 items, example item #9: “Fortune tellers can accurately sense the future using a crystal

ball”; and *Traditional Religious Beliefs* (TRB), 5 items, example item #1: “The Devil (Satan) is a real entity.” Responses range on a five-point Likert scale from 1 = *Strongly Disagree*, to 5 = *Strongly Agree*. Irwin and Marks explain that scores on each scale are “computed as the sum of responses to the items in the respective scale and then converted to scores with interval-level measurement” (Irwin & Marks 2013:150) based on Rasch-scaling techniques. The Rasch measures for both scales have been standardized with a mean of 25 ($SD = 5$). NAB scores range from 13.37 to 36.53; TRB scores range from 15.62 to 34.12. Cronbach’s α range across studies from .89 to .93 (Irwin 2015, Irwin, Dagnall, & Drinkwater 2015).

9. **Paranormal Short Inventory (PSI)** (Randall 1997). The PSI is a 13-item measure of paranormal belief. Example item #4: “Contrary to scientific opinion, there is some validity to fortune telling.” Seven items are reverse-scored (example item #2: “For the most part, people who claim to be psychics are in reality very good actors”). Responses are measured on a six-point Likert scale ranging from 1 = *Strongly Disagree*, to 6 = *Agree Strongly*. The full-scale theoretical mean score is 45.5 (min. = 13; max. = 78).

10. **Paranormal Belief Scale-Revised (RPBS)** (Tobacyk 2004). The RPBS (for convenience, PBS-R) is a 26-item scale that measures degree of belief in each of seven dimensions: Extraordinary Life Forms, Precognition, Psi, Spiritualism, Superstition, Traditional Religious Belief, and Witchcraft. Example item #21: “Some psychics can accurately predict the future.” Tobacyk (2004) notes improvements from the original 25-item PBS (see Tobacyk & Milford 1983), including the adoption of a seven-point Likert scale, and item changes for three subscales (Extraordinary Life Forms, Precognition, and Witchcraft). The PBS-R boasts “greater reliability and validity, less restriction of range, and greater cross-cultural validity” (Tobacyk 2004:94). The full-scale theoretical mean score is 104 (min. = 26; max. = 182). Four-week test–retest reliabilities for the PBS-R subscales range from .60 to .95.

Also administered were⁵:

(a) the **Reality Testing subscale of the Inventory of Personality Organization (IPO-RT)** (Lenzenweger et al. 2001)—a 20-item unidimensional, self-report measure, which assesses aspects of reality testing. Responses are recorded on a five-point Likert scale (1 = *Never True*, to 5 = *Always True*). Total scores can range from 20 to 100, with high scores

indicating reality testing deficits—example item #3: “When I’m nervous or confused, it seems like things in the outside world don’t make sense either.” Internal consistencies ranging from .85 to .87, and test–retest reliability correlated highly at $r = .80$ (Lenzenweger et al. 2001:579).

(b) **Beck Depression Inventory II (BDI-II)** (Beck, Steer, & Brown 1996)—a 21-item self-report measure of depression, designed to align with characteristics of depression as dictated by the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*. The items focus on symptoms of depression such as hopelessness, irritability, and changes in sleep and appetite. The BDI-II contains 21 questions, each answer being scored on a scale value of 0 to 3. Higher total scores indicate more severe depressive symptoms. Standardized cutoffs: 0 to 13 = “minimal depression”; 14 to 19 = “mild depression”; 20 to 28 = “moderate depression”; and 29 to 63 = “severe depression” (Beck, Steer, & Garbin 1988). The BDI displays high internal consistency ($\alpha = 0.91$), and one-week test–retest reliability, $r = .93$ (Beck, Steer, & Brown 1996). Recent analysis of the instrument showed similar results with internal consistency of around $\alpha = .91$ and test–retest ranging from $r = .73$ to .96 (Wang & Gorenstein 2013).

(c) **Conformity Scale (CS)** (Mehrabian & Steffl 1995)—an 11-item scale with each item scored on a nine-point scale (four items are reverse-scored), ranging from -4 (‘*very strong disagreement*’) to $+4$ (‘*very strong agreement*’). Mehrabian (2005) defines conformity as “a characteristic willingness to identify with others and emulate them, to give in to others so as to avoid negative interactions, and generally to be a follower rather than a leader in terms of ideas, values, and behaviors” (p. 2)—example item #1: “I often rely on, and act upon, the advice of others.” The CS was administered as a safeguard since some participants may be either conformist (or nonconformist) in their responses, and therefore indiscriminately agree (or disagree) to any or all items.

Procedure

Information and questionnaire material was presented on a computer monitor. Each stage of the experiment was time-stamped (i.e. after completion of each scale). All participants read the Information page and then confirmed their acknowledgment on the Consent page—clicking onto the next screen automatically registered consent of the participant, who then provided some demographic details. Participants then completed the PBQ, IPO-RT, the BDI-II, and the CS. For the PBQ, participants were required to respond to items using the original Likert, visual analogue, multiple-

choice, and dichotomous (i.e. True/False) options unique to each of the ten PB instruments. The design was not counterbalanced. In studies where there are manipulations of the independent variables, and the researcher wishes to eliminate order effects and demand characteristics, counterbalancing can be helpful (for examples, see Reis & Judd 2000). However, since the PBQ consists of ten paranormal belief scales, all of which measure the same construct, and since there were no treatments, order effects are likely to be small. The IPO-RT and the BDI-II are administered after the PBQ. The studies reviewed above also show that paranormal belief scales were administered before the reality testing scale (Irwin 2003, 2004), or the depression scales (Thalbourne & Delin 1994, Thalbourne & Houran 2004).

Prior to analysis of the PBQ data, we independently determined the primary and secondary items within standard scales using our criteria above (see first paragraph in the section *Primary and Secondary Paranormal Belief Items*; see also the section *Preliminary Item Assessment* below). Jinks' *control* items were used to screen out unsuitable participants. These items are not specifically associated with any of the paranormal categories. We then:

- (i) ran an exploratory factor analysis, the highest factor loadings of which were used to construct a Paranormal Belief Informedness Scale (PBIS) comprising 10 primary items, and 10 secondary items;
- (ii) identified subsets of believers in the sample: (a) 'primary believers' who responded at any level of agreement to *all* 10 primary belief items of the PBIS (note that 'agree' was qualified as 'slightly,' 'somewhat,' 'moderately,' or 'strongly' depending on the Likert scale); (b) 'primary non-believers' who responded at any level of disagreement to *all* 10 primary belief items of the PBIS; (c) 'mixed believers'; a heterogeneous group who responded at any level of agreement with *some* of the 10 primary items in the PBIS; and (d) two smaller groups (i.e. quasi-believers and informed believers) derived from the primary believer group;⁶
- (iii) compared response rates on primary and secondary items; and
- (iv) differentiated mean-scoring and correlational differences between various belief types on reality testing deficits and depression.

For details regarding (i), see the section *Factor Analysis and Creation of the PBIS*. Regarding (ii), (iii), and (iv), see the section *Planned Analyses*.

Hypotheses

Hypothesis 1 (H1): Mean scores for primary belief items (by belief categories ESP, PK, and LAD, and paranormal belief generally) are higher than mean scores for secondary belief items for the three believer groups (primary non-believers, mixed-believers, and primary believers).

Hypothesis 2 (H2): Mean scores for secondary belief items (by belief categories ESP, PK, and LAD, and paranormal belief generally) are higher for informed believers than quasi-believers.

Hypothesis 3 (H3): There are rank-order relationships between paranormal belief and reality testing deficits and depression, both between and within believer groups.

Results

Preliminary Item Assessment

Prior to participant testing, there were two independent assessments of items from nine of the ten PB scales (the JBQ was not included in this assessment as that scale had been created with those subdivisions already established—see Jinks 2012a). Item assessment was by the first and third authors (L.S. and A.L.J.), requiring subdivision of all items into two types (namely, primary and secondary). For the most part, there was mutual agreement on item assessment, although the wording of some items was ambiguous (these items were never used in the Factor Analysis). Table 1 shows counts of primary and secondary items for all nine scales. Eckblad and Chapman's (1983) MIS was a particular challenge for L.S. and A.L.J., who concluded that 18 of the 30 items (60%), although arguably secondary, were ambiguous. The difficulty with the MIS may have stemmed from the fact that magical ideation tends to refer to specific ideas or situations and not to generalized notions.

Data from a total of 387 respondents (cases) were collected. All data were checked for scores of 5 (*very probably*) or 6 (*definitely*) to *at least one* of the three patently false control items, and scores of 1 (*definitely not*) to the “*nightmare*” item. These participants may have been non-cooperative or acquiescent (Krosnick 1999). In total, 35 cases were removed due to extreme scores on these items as just indicated. Another nine cases were removed for completing the entire online task in less than 10 minutes (prior testing of the time taken to read through the entire survey as fast as reasonably possible, not including time to ponder answers, and without actually using the mouse to select answers, took about 20 minutes; the median time taken

TABLE 1
Primary and Secondary Items for the Nine Paranormal Belief Scales

PB Scale	Primary Items	Secondary Items	Ambiguous Items	Totals
1. AEI	4	8	n/a	12
2. ASGS	10	7	1	18
3. BLPQ	16	10	n/a	26
4. BPS	18	6	1	25
5. EBI	24	6	n/a	30
6. MIS	7	5	18	30
7. PBS-R	17	9	n/a	26
8. PSI	9	4	n/a	13
9a. SPB-NAB	9	6	n/a	15
9b. SPB-TRB	4	1	n/a	5
Total Items	118	62	20	200

AEI = Anomalous Experiences Inventory; ASGS = Australian Sheep–Goat Scale; BLPQ = Basic Limiting Principles Questionnaire; BPS = Belief in the Paranormal Scale; EBI = Extraordinary Beliefs Inventory; MIS = Magical Ideation Scale; PBS-R = Paranormal Belief Scale–Revised; PSI = Paranormal Short Inventory; SPB-NAB = Survey of Popular Beliefs (New Age Belief); SPB-TRB = Survey of Popular Beliefs (Traditional Religious Belief); n/a = not applicable

to complete the survey was 55 minutes, which is close to the advertised time of 50 minutes based on legitimate pre-testing). Ultimately, the data of 44 respondents (11%) were excluded from the analysis on account of these two screenings.

Levels of conformity as measured on the Conformity Scale (CS) (Mehrabian & Stefl, 1995) were then assessed with the aim of excluding low- or high-scoring participants from further analysis. CS scores are shown in Table 2. To test the distributions for normality, the skewness and kurtosis values were divided by their respective *SE* values (if the statistics

fall between ± 1.96 they are not significant, and are regarded as normal; see George & Mallery 2010). Test results showed that the data curve was significantly left-skewed ($p = .027$), suggesting that some number of low-scoring non-conformists accounted for the curve's deviation from normality. Although the Shapiro-Wilk test result was significant ($p < .001$), the lowest scores came from only two cases, each of whom had non-significantly low scores of -22 ($z = 1.28, p = .100$), and, given that the theoretical lowest score is considerably lower at -44 , we did not deem these two cases significantly nonconformist. This assumption was supported by inspection of a box-and-whiskers graph which showed no outliers.

Descriptive statistics of all paranormal belief scales using data from the final reduced database ($N = 343$) are given in Table 2, including Cronbach's α values for each scale. Even though all efforts were made to produce an acceptable database for analyses, all PB scales were significantly skewed and/or kurtotic. The same was the case for the IPO-RT and BDI-II scales. It was decided that all hypotheses would be tested using nonparametric statistical tests where possible since the measures are ordinal or interval (e.g., Likert scales), and the relationships are monotonic (inspections of the distributions showed this to be so). In Hypothesis 1, we conducted Repeated Measures ANOVA, but we made appropriate tests on group variance beforehand.

A series of non-hypothesized Spearman's r_s correlations on PB scale scores (ten scales) for comparative purposes are given in Table 3. It can be seen that all scales (and subscales) correlate significantly, which is generally to be expected. The strengths of the correlations (moderate to high) are fairly consistent across scales. Weaker rank correlation coefficients are found to be consistent across belief scales for the three subscales, Superstition (from the PBS-R), Traditional Religious Belief (PBS-TRB), and Traditional Religious Belief (SPB-TRB), although the two TRB subscales correlate very highly, as is to be expected, $r_s(341) = .91$.

We then produced a correlation matrix of the 114 items to assess the strength of relationships since a matrix that is factorable should include sizeable correlations (we required all correlations to be over .30). Overall, the matrix was a positive manifold, but seven items were removed for having values $< .30$. This final count of 107 items was submitted for factor analysis (FA).

Factor Analysis and Creation of the PBIS

The final database was ready for the next stage of assessment. Given $N = 343$, our sample size was considered acceptable for FA. Cattell (1978:508, see also Arrindell & van der Ende 1985:166) recommends an absolute

TABLE 2
**Descriptive Statistics (*N* = 343): Twelve Paranormal Belief Scales,
 Conformity, Depression, and Reality Testing Deficits**

Variable	<i>M</i>	<i>SD</i>	Min.	Max.	Cronbach's α
1. AEI	6.56	3.60	0.00	12.00	.87
2. ASGS (R)	23.50	8.32	8.13	43.39	.95
3. BLPQ (R)	52.17	11.94	6.35	88.70	.96
4. BPS	70.70	22.59	25.00	116.00	.96
5. EBI	107.38	40.95	30.00	191.00	.97
6. JBQ	117.86	41.30	44.00	245.00	.98
7. MIS	7.85	5.78	0.00	24.00	.87
8. PBIS	27.92	7.36	20.00	40.00	.96
9. PBS-R (Full Scale)	92.90	32.94	29.00	157.00	.95
PBS-R Subscales					
Extraor. Life Forms	3.64	1.23	1.00	7.00	.60
Precognition	3.51	1.68	1.00	7.00	.90
Psi	3.72	1.63	1.00	7.00	.87
Spiritualism	3.96	1.89	1.00	7.00	.92
Superstition	2.09	1.37	1.00	7.00	.91
Trad. Religious Belief	4.01	1.82	1.00	7.00	.85
Witchcraft	3.74	1.80	1.00	7.00	.91
10. PSI	40.45	13.68	14.00	72.00	.89
11. SPB-NAB	24.12	3.37	13.37	31.94	.93
12. SPB-TRB	24.28	4.42	15.62	34.12	.87
13. Conformity	7.21	11.53	-22.00	36.00	.71
14. Depression (BDI II)	11.36	11.30	0.00	59.00	.95
15. Reality Testing (IPO-RT)	45.22	15.12	20.00	90.00	.92

AEI = Anomalous Experiences Inventory; ASGS (R) = Rasch-scaled Australian Sheep-Goat Scale; BLPQ (R) = Rasch-scaled Basic Limiting Principles Questionnaire; BPS = Belief in the Paranormal Scale; EBI = Extraordinary Beliefs Inventory; JBQ = Jinks' Belief Questionnaire; MIS = Magical Ideation Scale; PBIS = Paranormal Belief Informedness Scale; PBS-R = Paranormal Belief Scale-Revised; PSI = Paranormal Short Inventory; SPB-NAB = Survey of Popular Beliefs (New Age Belief); SPB-TRB = Survey of Popular Beliefs (Traditional Religious Belief).

TABLE 3
Correlation Matrix (Spearman's r_s): Twelve Paranormal Belief Scales (df = 341)

Scale	1.	2.	3.	4.	5.	6.	7.	8.	9a.	9b.	9c.	9d.	9e.	9f.	9g.	9h.	10.	11.
1. AEI	—																	
2. ASGS (R)	.77																	
3. BLPQ (R)	.80	.92																
4. BPS	.81	.83	.88															
5. EBI	.76	.78	.83	.92														
6. JBQ	.78	.77	.81	.88	.87													
7. MIS	.69	.69	.72	.70	.69	.73												
8. PBIS	.83	.83	.85	.90	.85	.81	.67											
9. a. PBS-R Full	.76	.78	.83	.92	.95	.87	.70	.83										
b. Extraord. Life Form	.47	.47	.49	.64	.64	.71	.47	.52	.68									
c. Precognition	.71	.75	.79	.83	.82	.81	.64	.82	.85	.51								
d. Psi	.74	.81	.83	.86	.82	.79	.63	.84	.85	.57	.74							
e. Spiritualism	.83	.82	.86	.90	.85	.82	.65	.87	.87	.53	.81	.80						
f. Superstition	.14 ^a	.21	.24	.28	.40	.39	.35	.14 ^b	.45	.38	.37	.23	.21					
g. Trad. Religious Belief	.36	.33	.35	.41	.61	.38	.33	.35	.60	.28	.37	.34	.39	.27				
h. Witchcraft	.61	.63	.66	.79	.78	.69	.55	.69	.84	.54	.64	.70	.67	.33	.50			
10. PSI	.74	.79	.84	.88	.84	.83	.69	.83	.83	.53	.86	.78	.81	.31	.33	.67		
11. SPB-NAB	.77	.80	.84	.88	.86	.84	.69	.83	.86	.55	.85	.78	.85	.32	.37	.69	.89	
12. SPB-TRB	.27	.26	.28	.32	.53	.29	.25	.26	.48	.18 ^c	.27	.26	.27	.22	.22	.91	.42	.26

AEI = Anomalous Experiences Inventory; ASGS (R) = Rasch-scaled Australian Sheep-Goat Scale; BLPQ (R) = Rasch-scaled Basic Limiting Principles Questionnaire; BPS = Belief in the Paranormal Scale; EBI = Extraordinary Beliefs Inventory; JBQ = Jinks' Belief Questionnaire; MIS = Magical Ideation Scale; PBIS = Paranormal Belief Informedness Scale; PBS-R Full = Paranormal Belief Scale—Revised (Full Scale); PSI = Paranormal Short Inventory; SPB-NAB = Survey of Popular Beliefs (New Age Belief); SPB-TRB = Survey of Popular Beliefs (Traditional Religious Belief). All p values significant at $p < .001$ except:
^a $p = .011$; ^b $p = .012$; ^c $p = .001$.

minimum sample size of no less than 250, but others advise larger samples—see Comrey & Lee 1992, who consider 300 to be ‘good’). Also, we could have opted for a subject-to-variable (STV) ratio as low as 2:1, as suggested by Kline (1979:40), provided there is a minimum of 100 participants, and the lower limit of variables-to-factors ratio is 3 to 6, which was not an issue since we ran our FA for a single PB factor. However, we followed the rule that the STV ratio should be at least 3:1 (for pilot and theoretical studies), giving us an upper limit of 114 items that we could confidently enter into the FA.

Prior to this consideration (as we could not foresee how many participants we would get, or would be left with after screening), we had already decided in advance to create a Paranormal Belief Informedness Scale (PBIS) comprising only items that speak to conventional PB phenomena (namely, ESP, PK, and LAD items). Although there were nine PB scales with a total of 200 items (JBQ data was not entered into the FA, as we plan to analyze that data in a followup study), we reduced this number to 107 items that describe only these three conventional PB phenomena (65 primary belief items, and 42 secondary belief items).

Factor Analysis (principal axis factoring) was conducted, given that we are interested only in common variance, or, put another way, we only wished to analyze covariation among items, without intrusion of the specific variance associated with particular items. Only one factor was extracted, as we were preparing a single PB scale and not interested in factors per se as the items are all from previously published and validated scales with no purpose served in factor-wise reassessment of the items. Furthermore, for the purposes of hypothesis testing, we are only interested in primary/secondary differences. As a failsafe measure, we conducted another Factor Analysis, and a Principal Components Analysis, both allowing for multiple factors as discerned from Eigenvalues over 1.00. As it happened, in both cases, only one factor proved viable, with other factors producing loadings that were considerably smaller.

The Kaiser–Meyer–Olkin Measure of Sampling Adequacy was 0.98, which Kaiser (1974) characterizes as “marvelous.” Moreover, Bartlett’s test of sphericity gave a value that was large and significant: 42253.40, $df = 5671$, $p < .001$, so it appears unlikely that the correlation matrix is an identity matrix. Once again, the data were appropriate for factor analysis. The Factor Matrix is described next.

Our single factor has an Extraction Sum of 57.62, with 53.85% of the variance explained. As there are too many items to list, factor loadings ranged from .412 to .904, and communalities ranged from .170 to .802. Factor loadings (starting from the highest and working downward) were

used to select the items for a 20-item PBIS scale comprising 10 primary belief items and 10 secondary belief items. These 20 items are listed in the Appendix. It can be seen that they come from five scales: BLPQ (2 items), EBI (8 items), PBS-R (3 items), BPS (4 items), and PSI (3 items).

The next step in PBIS scale development was to standardize the scoring of the 20 items for hypothesis testing in the next section. In fact, due to further testing requirements, this standardization was necessary for all items since the PB measures use scoring methods ranging from true/false scales, to five-, six-, and seven-point Likert scales. Since responses for all scales are essentially binary (i.e. agreement vs. disagreement), we recoded all responses (disagreement = 1; agreement = 2), thus yielding dichotomous items. The PBIS theoretical mean score would be 30.00, but actual mean score was 27.92 ($SD = 7.36$; see Table 2 for other statistics). The distribution was significantly skewed and kurtotic, but there were no outliers.

Planned Analyses

H1: Mean scores for primary belief items (by belief categories ESP, PK, and LAD, and paranormal belief generally) are higher than mean scores for secondary belief items for the three believer groups (primary non-believers, mixed-believers, and primary believers). Testing this hypothesis involved assessing whether there was a scoring differential between mean scores on primary items and secondary items for each paranormal category: ESP, PK, and LAD, and for paranormal belief generally. Testing would also necessarily involve discerning differences between types of believer (i.e. we expect scoring to increase across the groups primary non-believers, mixed believers, and primary believers, in that order). We applied only one strict criterion for selection as a primary believer; respondents had to *agree* with *all* 10 primary items in the PBIS.⁷ This criterion is necessary because if disagreement with even one primary item is allowed, other belief types could not be labeled as distinct types due to category overlap and statistical test results would be ambiguous. Primary non-believers were respondents who *disagreed* with *all* 10 primary items in the PBIS. The remainder were a heterogeneous (mixed) group of believers (they *agreed* or *disagreed* with any number of the 10 primary items in the PBIS). Scores on secondary items were included to make up the full PBIS score. There were 115 primary non-believers, 180 mixed believers, and 48 primary believers. Table 4 lists the PBIS mean scores for the three believer types.

A series of four Repeated Measures ANOVA tests were conducted to determine scoring differences: items (primary vs. secondary) \times group (three primary believer types), where 'items' is our within-subjects variable, and

TABLE 4
**Descriptive Statistics: Paranormal Belief Informedness Scale (PBIS),
 Reality Testing Deficits (IPO-RT), and Depression (BDI-II) for Believer Types**

	<i>M</i>	<i>SD</i>
PBIS		
1. Primary Non-Believers (<i>n</i> = 115)	20.40	0.83
2. Mixed Believers (<i>n</i> = 180)	29.65	5.31
3. Primary Believers (<i>n</i> = 48)	39.35	1.18
• Quasi-Believers (<i>n</i> = 17)	38.18	1.33
• Informed Believers (<i>n</i> = 31)	40.00	0.00
IPO-RT		
1. Primary Non-Believers (<i>n</i> = 115)	37.03	12.58
2. Mixed Believers (<i>n</i> = 180)	47.69	14.47
3. Primary Believers (<i>n</i> = 48)	55.56	13.61
• Quasi-Believers (<i>n</i> = 17)	54.59	14.48
• Informed Believers (<i>n</i> = 31)	56.10	13.32
BDI-II		
1. Primary Non-Believers (<i>n</i> = 115)	11.77	13.00
2. Mixed Believers (<i>n</i> = 180)	11.22	10.56
3. Primary Believers (<i>n</i> = 48)	10.92	9.69
• Quasi-Believers (<i>n</i> = 17)	11.94	9.38
• Informed Believers (<i>n</i> = 31)	10.35	9.96

‘group’ is our between-subjects factor. It is emphasized that the primary and secondary item scores are separate variables and therefore the relatedness of their means cannot be tested other than by Repeated Measures ANOVA and, albeit routine, it is mandatory (and certainly not a perfunctory exercise) to test group differences, again justifying Repeated Measures ANOVA.

For the ANOVA to be valid, and ensure full variance in the item measures across types, we used the 87 remaining (or so-called ‘excluded’) non-PBIS items from the established scales after their original scores had been standardized via conversion to binary scores (i.e. agree/disagree). These 87 were also divided into primary and secondary for the comparisons to be run in the ANOVA tests. We were aware that some scales contained ambiguous items that might contaminate the results due to category overlap, so we excluded these items from the analyses. There were six primary items that could be about ESP or PK, and one that could be about ESP, or PK, or LAD, and one that could be about PK or LAD; there were three secondary items that could be about ESP, or PK, or LAD; and one secondary item that could describe either ESP or LAD. A total of 12 items were removed leaving 75 items: 47 primary items (ESP: 24 items; PK: 8 items; and LAD: 15 items); and 28 secondary items (ESP: 17 items; PK: 3 items; and LAD: 8 items). We are skeptical about the test validity on PK items with so few primary and secondary items (especially as there are only three secondary PK items—we comment further on this problem in the Discussion).

Levene’s tests showed that the three belief groups failed to meet the assumption of homogeneity of variance, but pre-testing on the data using Welch’s F test and Brown-Forsythe test indicated that the groups are nevertheless significantly different in spite of the violation (Tomarken & Serlin 1986).

Repeated measures ANOVA on ESP items. Table 5 lists mean scores on the 75-item scale by believer type and psi category. Results were significant, and in the directions expected: Items, $F(1, 340) = 5.90$, $p = .02$, partial $\eta^2 = .017$; Believer type, $F(2, 340) = 293.91$, $p < .001$, partial $\eta^2 = .63$ (primary/secondary item scoring was significantly different, and all groups were significantly different from each other). There was also a significant interaction effect, Item \times Type, $F(2, 340) = 3.20$, $p = .042$, partial $\eta^2 = .02$. The interaction effect means the primary/secondary item scoring gap was not constant across levels of belief, but widened disproportionately. In other words, the scoring gap was determined in part by group membership and not by the primary–secondary difference alone. Figure 1 illustrates these effects.

Repeated measures ANOVA on PK items. Results were significant, but only two effects (group and interaction) were in the directions expected—the primary/secondary item difference was not in the direction hypothesized: Items, $F(1, 340) = 103.05$, $p < .001$, partial $\eta^2 = .23$; Believer type, $F(2, 340) = 199.88$, $p < .001$, partial $\eta^2 = .54$ (all groups were significantly different from each other). There was also a significant interaction effect, Item \times Type, $F(2, 340) = 4.68$, $p = .010$, partial $\eta^2 = .03$. Figure 2 illustrates these

TABLE 5
Descriptive Statistics: Mean Item Score for Psi Categories
(ESP, PK, and LAD) by Believer Type (75 Items)

Item Type	Believer *	Mean	SD
Primary ESP Items	1	1.08	0.08
	2	1.41	0.23
	3	1.82	0.13
	Total	1.36	0.30
Secondary ESP Items	1	1.09	0.10
	2	1.39	0.25
	3	1.79	0.15
	Total	1.31	0.30
Primary PK Items	1	1.03	0.08
	2	1.21	0.22
	3	1.59	0.25
	Total	1.20	0.26
Secondary PK Items	1	1.12	0.21
	2	1.41	0.32
	3	1.85	0.21
	Total	1.38	0.36
Primary LAD Items	1	1.15	0.19
	2	1.54	0.31
	3	1.90	0.12
	Total	1.46	0.36
Secondary LAD Items	1	1.11	0.12
	2	1.42	0.26
	3	1.81	0.19
	Total	1.37	0.31
All Primary Psi Items	1	3.25	0.24
	2	4.16	0.61
	3	5.31	0.40
	Total	4.02	0.82
All Secondary Psi Items	1	3.32	0.29
	2	4.21	0.66
	3	5.44	0.41
	Total	4.08	0.86

* 1 = primary non-believers ($n = 115$); 2 = mixed-believers ($n = 180$); 3 = primary believers ($n = 48$)

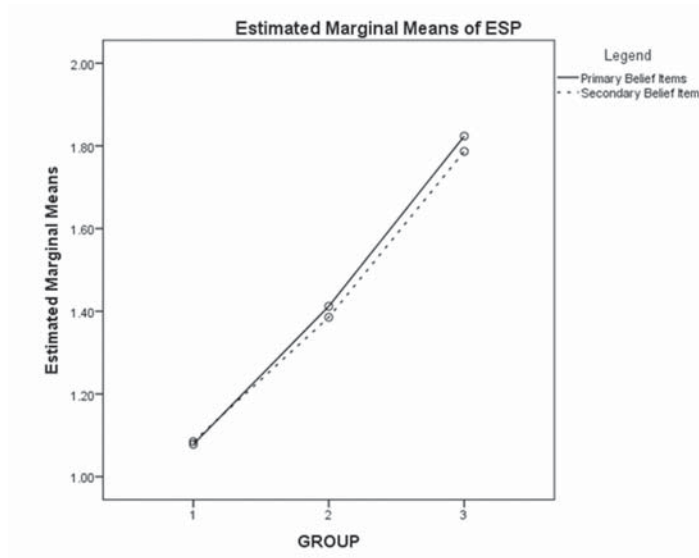


Figure 1. Belief in ESP: Three significant effects: (i) item (primary vs. secondary); (ii) group (1 = primary non-believers; 2 = mixed believers; 3 = primary believers); and (iii) interaction. All effects are in the directions hypothesized.

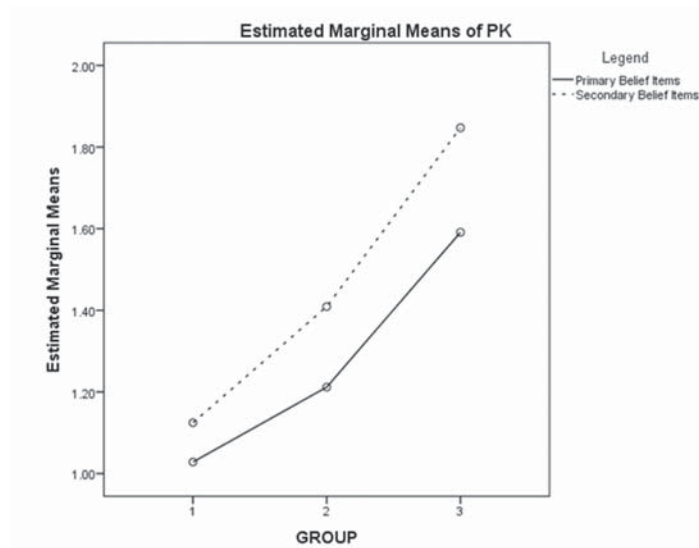


Figure 2. Belief in PK: Three significant effects: (i) item (primary vs. secondary); (ii) believer group (1 = primary non-believers; 2 = mixed believers; 3 = primary believers), and (iii) interaction.

effects. We will discuss the unexpected 'Items' result in the Discussion section.

Repeated measures ANOVA on LAD items. Results were significant, and in the directions expected: Items, $F(1, 340) = 27.08, p < .001$, partial $\eta^2 = .07$; Believer type, $F(2, 340) = 245.93, p < .001$, partial $\eta^2 = .59$ (all groups were significantly different from each other). There was also a significant interaction effect, Item \times Group, $F(2, 340) = 3.30, p = .038$, partial $\eta^2 = .02$. Figure 3 illustrates these effects.

Repeated measures ANOVA on paranormal belief (all psi items). Two results were significant, but only one effect (group) was in the direction expected: Believer type, $F(2, 340) = 336.68, p < .001$, partial $\eta^2 = .66$ (all groups were significantly different from each other). The primary/secondary item difference was not in the direction hypothesized: Items, $F(1, 340) = 14.62, p < .001$, partial $\eta^2 = .04$. There was no significant interaction effect, Item \times Type, $F(2, 340) = 0.98, p = .378$, partial $\eta^2 = .01$. Figure 4 illustrates these effects. Hypothesis 1 was partially supported. We will discuss the unexpected 'Items' result in the Discussion section.

H2: Mean scores for secondary belief items (by belief categories ESP, PK, and LAD, and paranormal belief generally) are higher for informed believers than quasi-believers. A major aim of the present study was to differentiate informed believers from quasi-believers on secondary item scoring as Jinks (2012a) had done. Informed believers respond affirmatively to *all* primary and *all* secondary items in the PBIS, whereas quasi-believers respond affirmatively to *all* primary items only in the PBIS, but they respond negatively to *all* secondary items in the PBIS. We found 31 informed believers among the 48 primary believers. Thirty-one informed believers in a sample of 343 participants is about 9%. There were 17 quasi-believers. Data from the 75-items scale were analyzed using Mann-Whitney U tests.

For ESP, secondary item scoring was significantly higher for informed believers ($Mdn = 1.82$) than for quasi-believers ($Mdn = 1.76$), $U = 157.50, p = .011$ (one-tailed), $r = .33$.

For PK, secondary item scoring was significantly higher for informed believers ($Mdn = 2.00$) than for quasi-believers ($Mdn = 1.67$), $U = 194.00, p = .041$ (one-tailed), $r = .43$.

For LAD, secondary item scoring was significantly higher for informed believers ($Mdn = 1.88$) than for quasi-believers ($Mdn = 1.75$), $U = 141.00, p = .004$ (two-tailed), $r = .39$.

For psi generally, secondary item scoring was significantly higher for informed believers ($Mdn = 5.64$) than for quasi-believers ($Mdn = 5.27$), $U = 125.50, p = .002$ (one-tailed), $r = .43$. The four-part hypothesis was supported.



Figure 3. Belief in Life After Death: Three significant effects: (i) item (primary vs. secondary); (ii) believer group (1 = primary non-believers; 2 = mixed believers; 3 = primary believers); and (iii) interaction. All effects are in the directions hypothesized.

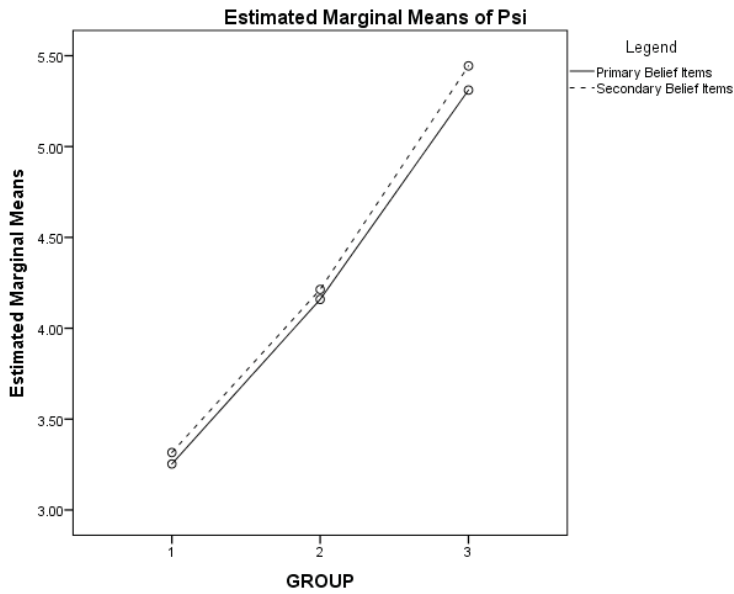


Figure 4. Paranormal Belief: Two significant effects: (i) item (primary vs. secondary); and (ii) group (1 = primary non-believers; 2 = mixed believers; 3 = primary believers).

To illustrate the kind of thinking that underpins quasi-belief, we take three examples from the PBIS (one from each psi category ESP, PK, and LAD) to show the response inconsistencies of quasi-believers. In the ESP category, informed believers endorsed the primary item ebi10 (“Psychics possess a mysterious ability to know things about a person’s past and future”) and the secondary item ebi23 (“Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations, etc.”), whereas quasi-believers endorsed only the primary item. The difference between the two types of believer may lie in the failure of quasi-believers to extend their belief about psychics’ knowing “things about a person’s . . . future” to ‘predictions’ about specific personal events (“election results, political assassinations”), and/or impersonal events (“natural disasters”).

In the PK category, informed believers endorsed the primary item ebi1 (“There is a real phenomenon known as *psychokinesis* (the ability to move objects by the power of the mind)”), and the secondary item pbs16 (“A person’s thoughts can influence the movement of a physical object”), whereas quasi-believers endorsed only the primary item. The difference between the two types of believer may lie in the failure of quasi-believers to equate “the power of the mind” with “the influence” of a “person’s thoughts,” both of which (mind power and thoughts) are generally seen as the underlying mechanism of psychokinesis.

For LAD, informed believers endorsed the primary item bps8 (“Through psychic individuals it is possible to communicate with the dead”) and the secondary item ebi12 (“There is such a thing as astral projection (where the body remains behind while the spirit travels)”), whereas quasi-believers endorsed only the primary item. The difference between the two types of believer would seem to lie in the assumption that quasi-believers tend not equate “the dead” with the “spirit.” Inspection of the PBIS (Appendix A) shows that similar assumptions about quasi-believers can be drawn from other item dichotomies.

H3: There are rank-order relationships between paranormal belief and reality testing deficits and depression, both between and within believer groups.

Reality testing deficits. Table 4 above lists IPO-RT mean scores by believer types. It can be seen that reality testing (RT) deficits generally increase across believer groups as PB increases. A Jonckheere-Terpstra test for ordered alternatives showed that there was a statistically significant trend of higher median RT scores with higher levels of PB (from primary non-believer, mixed believer, to primary believer), $T_{JT} = 24,822.50$, $z = 7.72$, $p < .001$ (two-tailed). A significant Kendall’s tau-b

shows a weak-to-moderate effect (RT tended to increase with PB group), $r_{\tau}(341) = .33, p < .001$ (two-tailed).

Even though this significant trend lends support to the literature (see Introduction), these findings do not tell the whole story about the relationships between PB and RT deficits within groups. We ran Spearman's r_s tests for the groups, including one new group—a sub-group of the primary non-believers which we call informed skeptics ($n = 87$) because they respond negatively to *all* primary and *all* secondary items in the PBIS. This sub-group can be justifiably classed as 'informed' following our definition of consistent responding to primary and secondary items.

We need to point out that we cannot validly use PBIS scores in these tests because primary believers effectively have the highest PBIS scores on all 10 primary items (i.e. only the 'agreement' levels are included since agreement defines that type). Similarly, primary non-believers effectively have the lowest PBIS scores because their scores on all 10 primary items are the lowest (i.e. 'disagreement' defines that type). Therefore, variance on the 10 primary items would be reduced for primary believers and primary non-believers, though not for the full sample or mixed-believers. It would therefore be the case that significant correlations, with the PBIS as one variable, would probably be artifacts caused by the reduced variance in the PBIS. We therefore ran our tests on the same 75-item dataset (i.e. the excluded-items dataset) that was used in the series of tests on Hypotheses 1 and 2, and not only did we form one generalized paranormal belief set, we also preserved believer category, item category, and psi category, to see if the RT correlates would vary across these categories. We thus ran nine category tests for the full sample, and nine category tests for each of the six groups derived thereof.

Table 6 lists the correlations. As can be seen, all nine of nine correlations are significant for the full sample, across psi (ESP, PK, and LAD) and item (Primary, Secondary) categories, but the trend tends to dissolve across believer groups (i.e. as paranormal belief increases). Primary non-believers showed eight significant correlations out of nine; informed skeptics showed seven significant correlations out of nine; mixed-believers showed four significant correlations out of nine (note that mixed believers is the biggest group; $n = 180$); and finally primary believers, and the subgroups thereof (quasi-believers and informed believers) have no significant correlations between them (note, too, that generally the correlations are very weak for those subgroups).

Bonferroni correction was made by dividing the critical p value ($\alpha \leq .05$) by the number of correlations, which was 63: The new critical $p = .05/63 = .0008$. The nine full-sample correlations remain significant, as do

TABLE 6
Correlations: Reality Testing Deficits (IPO-RT)
by Paranormal Belief, Item, and Psi Category

Variable (75-items)	Full Sample (N = 343)	Primary Non- Believers (n = 115)	Informed Skeptics (n = 87)	Mixed- Believers (n = 180)	Primary Believers (n = 48)	Quasi- Believers (n = 17)	Informed Believers (n = 31)
Primary Items							
ESP	.40***	.29**	.33**	.01	.05	.01	.02
PK	.41***	.29**	.30**	.20*	-.09	-.07	-.14
LAD	.34***	.18*	.22*	.03	.26	.35	.18
All Psi (P)	.41***	.32***	.34**	.09	.02	-.02	-.08
Secondary Items							
ESP	.40***	.24**	.23*	.12	.20	.20	.14
PK	.35***	.22*	.19	.12	.09	-.06	.14
LAD	.43***	.14	.10	.26***	.10	-.10	.10
All Psi (S)	.45***	.29**	.25*	.20**	.16	.01	.15
All Psi + (P + S)	.44***	.32**	.31**	.15*	.07	-.02	.01

All Psi = ESP + PK + LAD; P = Primary; S = Secondary; *** $p < .001$ (two-tailed); ** $p < .01$ (two-tailed); * $p < .05$ (two-tailed)

two others: (i) ‘All Psi’ (primary items only) for primary non-believers, and (ii) LAD (secondary items only) for mixed believers.

We then tested the difference between the correlation coefficients using the r_s values for the full sample as test statistics for comparisons against the corresponding r_s values for each group. There were 32 significant z -score differences out of 54 (59%). A Bonferroni correction was made by dividing the critical p value ($\alpha = .05$) by the number of tests. The new critical $p = .05/54 = .0009$. The count was reduced to 6/54, or 11%, which is more than twice the 5% we might expect by chance.

The hypothesis of relationships between paranormal belief and reality testing deficits was supported for the full sample across psi categories and item types, but not generally across believer types.

Depression. Table 2 above shows descriptive statistics for the BDI-II (Depression) scale ($N = 343$)—we note the mean BDI score is 11.36 ($SD = 11.30$), which is in the “minimal depression” (i.e. lowest) range of

0 to 13 (Beck, Steer, & Garbin 1988). Table 4 above lists BDI mean scores by believer types. It can be seen that mean scores for depression generally decrease across the groups and is lowest for primary believers. However, a Jonckheere-Terpstra test for ordered alternatives showed that the trend of higher median BDI-II scores with lower levels of PB was not significant, $T_{JT} = 17,891.00$, $z = 0.48$, $p = .629$ (two-tailed). Kendall's tau-b shows no effect (BDI-II is effectively constant across groups), $r_{\tau}(341) = .02$, $p = .629$ (two-tailed).

We ran tests on the 75-item dataset, using believer category, item category, and psi category, as before. For the full sample, correlations ranged between $-.001$ and $.03$ (none were significant); primary non-believers, correlations ranged between $-.02$ and $.16$ (none were significant); mixed believers, correlations ranged between $-.01$ and $.06$ (none were significant); and primary believers, of which correlations were all negative, ranging between $-.01$ to $-.44$ (the latter being significant, $p = .002$). This one significant correlation out of 24 tests can be attributed to chance, and the general picture is that depression is constant whatever the level of PB.

Discriminant functions analysis. It must be borne in mind that the PBIS has primary and secondary subscales, scores of which are used to construct the three different groups, primary non-believers, mixed believers, and primary believers. Since this grouping factor cannot be taken into account in a regression analysis, we reversed our aims and conducted a discriminant functions analysis to find a model that might predict membership in the three groups based on scores on reality testing deficits (IPO-RT) and depression (BDI-II). If the literature is correct, this model should show that reality testing deficits and depression predict membership in the paranormal belief groups, but we propose that these relationships are tenuous and do not apply across all believer groups.

The assumption of equal group variance was met, as Box's M test was not significant at the critical level $\alpha < .001$, $F(6, 179044.94) = 2.48$, $p = .021$. As there were three groups, two functions were extracted. Only the first discriminant function was significant, Wilks' $\lambda = 0.80$, $\chi(4, N = 343) = 76.47$, $p < .001$ (Canonical correlation = $.45$). Function 1 had an Eigenvalue of 0.25 , accounting for 100% of the explained variance between groups. Function 2 had an Eigenvalue of zero, explaining 0% of variance. We conclude that the reality testing measure (IPO-RT) has some predictive capacity, but depression (BDI-II) does not.

From Table 7 it can be seen that membership of mixed believers was predicted with the greatest accuracy (80.0%), followed by primary non-believers (53.9%). However, primary believers were predicted with least accuracy (2.1%). Although 60.3% of the original grouped cases have been

TABLE 7
Group Classification Matrix Using Reality Testing Deficits (IPO-RT) and Depression (BDI-II) as Predictors of Believer Group Membership

Group	Predicted Group Membership			Total Count (%)
	Primary Non-Believers	Mixed Believers	Primary Believers	
Primary Non-Believers	62 (53.9%)	53 (46.1%)	0 (3.0%)	115 (100%)
Mixed Believers	34 (18.9%)	144 (80.0%)	2 (1.1%)	180 (100%)
Primary Believers	4 (08.3%)	43 (89.6%)	1 (2.1%)	48 (100%)

correctly classified, the model fails for primary believers. In essence, reality testing did not predict for primary believers (see Discussion for more details).

Post Hoc Analyses

A reconsideration of reality testing. As a defense of the PBIS, we conducted Spearman's r_s tests on the reality testing variable with the nine PB scales and nine PB subscales (as well as the BDI-II, Conformity, and the SES). These correlations are presented in Table 8. Focusing on the established PB scales only, all 18 of 18 correlations are significant for the full sample, primary believers, skeptics. It seems an insurmountable fact that there are weak-to-moderate relationships between paranormal belief (in some of its various forms) and reality testing deficits. However, the trend starts to fragment as we move through the remaining types: Fourteen are significant for mixed believers; five are significant for primary believers; only three for quasi-believers, and only two for informed believers.

If we correct for multiple analysis (Bonferroni adjusted to $p = .05/126 = .0004$), our findings do not change for counts at the level of $p < .001$ (full sample, and most correlations for primary non-believers, informed skeptics, and mixed believers). The only significant correlation for primary believers (MIS; $r = .64$) maintains significance after adjustment, and bootstrapping revealed that the 95% CI [.39, .80] does not include zero. As we may expect, no correlations maintained significance for quasi-believers and informed believers.

We then tested the difference between the correlation coefficients using the r_s values for the full sample as test statistics for comparisons against the

TABLE 8
Reality Testing (IPO-RT) Correlations (Spearman's r_s): Ten PB Scales,
Depression (BDI-II), Conformity, and Spiritual Emergency

Scale	Reality Testing Deficits						
	Full Sample (<i>N</i> = 343)	Primary Non-Believers (<i>n</i> = 115)	Informed Skeptics (<i>n</i> = 87)	Mixed Believers (<i>n</i> = 180)	Primary Believers (<i>n</i> = 48)	Quasi-Believers (<i>n</i> = 17)	Informed Believers (<i>n</i> = 31)
1. AEI	.44***	.27**	.22*	.20**	.09	-.02	.11
2. ASGS (R)	.54***	.59***	.52***	.27***	.09	-.01	.11
3. BLPQ (R)	.55***	.57***	.52***	.33**	-.04	-.17	.02
4. BPS	.49***	.51***	.53***	.18*	.27	.19	.31
5. EBI	.51***	.48***	.50***	.24**	.40**	.50*	.33
6. JBQ	.55***	.50***	.45***	.34***	.38**	.58*	.23
7. MIS	.66***	.43***	.34**	.61***	.64***	.70**	.55**
8. PBS (R) Full	.51***	.45***	.44***	.26***	.30*	.40	.22
Extraor. Life Form	.39***	.24**	.26*	.21**	.17	.39	.07
Precognition	.47***	.48***	.44***	.19*	.07	.26	-.09
Psi	.41***	.38***	.41***	.06	-.01	-.29	.27
Spiritualism	.46***	.41***	.41***	.18*	.07	-.07	.06
Superstition	.43***	.42***	.41***	.35***	.43**	.40	.49**
Trad. Religious Belief	.23***	.23*	.25*	.05	.08	.18	.05
Witchcraft	.40***	.40***	.43***	.13	.19	.34	.08
9. PSI	.49***	.42***	.42***	.25**	.09	.20	.02
10a. SPB-NAB (R)	.48***	.50***	.46***	.20**	.07	.05	.04
10b. SPB-TRB (R)	.18**	.26**	.29*	.01	.11	.24	.07
11. BDI-II	.31***	.33***	.34**	.34***	.41**	.43	.45*
12. Conformity	.20***	.40***	.45***	.21**	.13	.34	.10
13. SES	.61***	.47***	.40***	.49***	.31*	.18	.37*

Note that 'Quasi-Believers' and 'Informed Believers' are subsets of 'Primary Believers'. AEI = Anomalous Experiences Inventory; ASGS (R) = Rasch-scaled Australian Sheep-Goat Scale; BLPQ (R) = Rasch-scaled Basic Limiting Principles Questionnaire; BPS = Belief in the Paranormal Scale; EBI = Extraordinary Beliefs Inventory; JBQ = Jinks' Belief Questionnaire; MIS = Magical Ideation Scale; PBS-R Full = Paranormal Belief Scale-Revised (Full Scale); PSI = Paranormal Short Inventory; SPB-NAB = Rasch-Scaled Survey of Popular Beliefs (New Age Belief); Rasch-Scaled SPB-TRB = Survey of Popular Beliefs (Traditional Religious Belief); BDI-II (Beck Depression Inventory II); SES = Spiritual Emergency Scale (Likert scale version); *** $p < .001$ (two-tailed); ** $p < .01$; * $p < .05$ (two-tailed).

corresponding r_s values for each group. There were 45 significant z -score differences out of 108 (42%). A Bonferroni correction was made by dividing the critical p value ($\alpha = .05$) by the number of tests. The new critical $p = .05/108 = .0005$. The count was reduced to 10/108, or 9%, which is greater than the 5% we might expect by chance.

Even if we regard the correlations for quasi-believers and informed believers as spurious due to small n , revised statistics are even more supportive of a decline. There would be 28 significant z -score differences out of 72 (39%). A Bonferroni correction gives a new critical $p = .05/72 = .0007$. The corrected count is now 11/72, or 15%, which is three times greater than that 5% expected by chance. We cannot dismiss the evidence of a decline in the number of significant relationships between reality testing and paranormal belief as we move through the groups from primary non-believers to primary believers.

Sample size. It is well-noted that small samples are best tested using nonparametric tests (Corder & Foreman 2014). We used Spearman's r_s , and argue that low- n and reduced variance are not likely to explain the decline in numbers of significant correlations across believer types (see Tables 6 and 8): First, most groups were of a suitable size, though the sub-groups are small (with the exception of informed skeptics; $n = 87$). The smallest group (primary believers; $n = 48$) has a maximum margin of error at 95% CI of about $\pm 14\%$ (i.e. $.98/\sqrt{n}$; Mallard 2011), and the 95% CIs drop to $\pm 7\%$ for the largest group (mixed believers; $n = 180$), and assuming the rank correlation coefficients should maintain their magnitude across types (under the assumption that the alternative hypothesis is true) only the p values should change (i.e. increase) as size of n changes (i.e. decreases).

Second, primary non-believers not only have the smallest SD (12.58) for IPO-RT (see Table 4), they also have the smallest SD s on all paranormal belief categories except for Primary LAD (see Table 5), yet primary non-believers produced eight significant correlations out of nine in Table 6.

Third, the mixed believers (the biggest n) not only have the largest SD (14.47) for IPO-RT (see Table 4), they also have the largest SD s on all paranormal belief categories except Primary PK (see Table 5), yet they produced only four significant correlations out of nine in Table 6.

Other correlates of reality testing. Looking at other correlations, we note that IPO-RT correlates positively and significantly with depression (BDI-II) across all believer types except quasi-believers due to low n (but even then, we can regard the correlation of .43 for quasi-believers as a replication). If there are RT deficits, there tends to be evidence of depression no matter what the type.

Finally, conformity correlates significantly and positively with reality

testing deficits four times out of seven (though not for primary believers, quasi-believers, or informed believers), and spiritual emergency (SES) correlates significantly and positively with reality testing deficits 6 times out of 7.⁸ (These findings are discussed further in the Discussion section.)

Discussion

Jinks (2012a) claimed that his findings demonstrated that “most participants identified as strong believers in a select range of anomalous topics ([i.e. primary] items) were *less* likely to support the legitimacy of equivalent [secondary] items, or items expressing a widely held (anomalous) explanation for the topic” (p. 143). Items in the first class (primary items) would replicate the familiar propositions found in common PB questionnaires referring to, for example, anomalous occurrences like ESP, PK, and LAD. Items in the second class (secondary items) variously represent the standard anomalous explanations for the primary items, or they offer an alternative example of the primary item, or they are the primary items reworded so as to exclude specific reference to (in our example) any anomalous occurrences like ESP, PK, and LAD. For pragmatic (research) purposes, we aimed to investigate these differences, our first step being to explore whether, and which, paranormal belief items from standard (validated) scales could be designated ‘primary’ and ‘secondary,’ followed by the systematic development of a questionnaire set containing those two classes of item. Our preliminary evaluations of the ASGS and the BLPQ (Thalbourne 2010), the RPBS (Tobacyk 2004), and the SPB (Irwin & Marks 2013) indicated that such an undertaking was possible.

We stress that if the theoretical underpinnings of this qualitative process amounted to nothing more than random assignation, we could not expect significant scoring differences between the two sets of items as proposed in our hypotheses. On the contrary, we did demonstrate differences between primary and secondary items; and these differences support our theory. Namely, that there are such things as primary and secondary items *in extant scales*, and these two types of items *elicit different responses*. We add that the results of *H1* and *H2* show that the PBIS can be used as a predictor of responses to primary and secondary items in the range of extant belief scales tested in the present study. Also, we were able to show that belief in secondary items is not as strong as belief in primary items, but only for two types of paranormal phenomena, ESP and LAD, with no strong evidence that the claim is true for PK due to the low item count in that category. We found that the primary/secondary effect occurs across believer types,⁹ and is therefore not confined to so-called ‘strong’ believers. We also found that paranormal belief was (a) not always predicted by reality testing

deficits, and (b) not predicted *at all* by depression. We will now discuss these findings in detail.

Primary vs. Secondary Items

In testing *H1*, we found primary/secondary differences for ESP and LAD, but we found that the difference between primary and secondary PK items was not in the direction hypothesized—i.e. the mean score for primary items was *not* higher than the mean score for secondary items. We pointed out that we were skeptical about the test validity on PK items with so few primary and secondary items (especially as there are only three secondary PK items in the whole set of 75 items), and it is clear that this bias adversely affected the outcomes for the test on paranormal belief. Ironically, it is not so much a failure of the present paper to deliver the kind of result we hypothesized regarding PK, as much as it is a shortcoming in scale designs over the past four decades for not having more PK items—after all, we can only work with what we have available to us. A count of the items in the scales used in this study (not including the JBQ) shows an overwhelming obsession with ESP and mental states, and a corresponding lack of interest in PK and physical states—we counted 72 ESP items (52% of the total), but only 32 PK items (23% of the total). There were 35 LAD items (25%; note that due to concept overlap, some items were counted more than once so that 107 items becomes 139 counts). This bias probably has disciplinary roots—it is mostly psychologists who do parapsychology (their focus tends to be on the ‘mental,’ and it is they who design PB scales), whereas we see lesser numbers of physicists and biologists doing parapsychology (their focus tends to be on the ‘physical,’ but they do not design PB scales). It is an oversight (for want of a better word) that may or may not have gone unnoticed by other researchers, but it is certainly not a talking point among parapsychologists as far as we know. Perhaps the present paper will bring some attention to this bias.

Informed Believers vs. Quasi-Believers

Notwithstanding the issues just raised, we can say that designation of PB items as either primary or secondary aided us in identifying two other types of paranormal believer—we have shown that there is evidence that respondents in our sample can hold *quasi-beliefs* (semi-propositional representations of the world superficially believed to be true prior to any truth evaluation), or they can hold *informed beliefs* (which indicate greater knowledge of the topic). For *H2*, we showed that quasi-believers and informed believers respond differently to the large pool of secondary items

with quasi-believers endorsing secondary items significantly less often than informed believers.

In *H2*, we also looked at some inconsistent responses among quasi-believers, confining our comparisons to ESP, PK, and LAD items in the PBIS. It would appear that quasi-belief implies no deep understanding. Responses are either fashioned during the test session itself, or they are outwardly believed in, and have existed as part of an unchallenged belief structure for some time. Thus, we cannot assume with certainty that beliefs quantified by items in a paranormal questionnaire are stable constructs, or are well-formed and logically consistent, yet these are the very assumptions that are often being made by researchers.

Reality Testing Deficits and Depression

In *H3*, we showed that scoring on the reality testing deficits measure (IPO-RT) is related to paranormal belief. Table 8 shows that nine PB scales, and nine PB sub-scales, correlate significantly with IPO-RT. While these results support (and even replicate) those of Dagnall et al. (2010), Drinkwater et al. (2012), Irwin (2004), Irwin, Dagnall, and Drinkwater (2015), etc., we argue that the results may be misleading because they have been generalized to all paranormal believers. We cannot assume that what appears true for a type is true for a sub-type, and we showed this to be the case when we ran tests on the three believer types: primary believers, quasi-believers, and informed believers. As Table 8 also shows, while scoring on conventional PB scales does not reliably predict reality testing deficits for primary believers, and even mixed belief on a few occasions, it does for primary non-believers, including informed skeptics.

In *H3*, we also showed that depression was not related to paranormal belief, and there were no significant differences between believer types. These results, supported by the recent findings of Billows and Storm (2015a, 2016), are a move away from the mixed results of the past, toward the likelihood that PB does not predict depression, and vice versa.

The discriminant functions analysis produced a model that successfully identified membership for primary non-believers and mixed believers, but it also revealed that group membership for primary believers is not predicted by scores on the reality testing measure. While the model would prefer to classify this type as mixed believers (see Table 7), it seems not to distinguish how the two groups are constructed—primary believers have to believe in *all* 10 primary items in the PBIS; mixed believers do not. We suggest this is the kind of problem that arises in conventional paranormal belief testing—special cases are not discerned, yet these may be the very cases to whom past trends and correlations reported in the literature do not apply.

Finally, we note (post hoc) that RT deficits correlated positively and significantly with depression (BDI-II) across all believer types—where there are RT deficits there tends to be evidence of depression. Space does not permit an attempted explanation of the causality underlying this relationship but, given our other findings, we cannot suggest at this stage that PB is instrumental in this relationship.

Though also post hoc, conformity and spiritual emergency appear to correlate significantly and positively with reality testing deficits across most PB groups (though for conformity, we exclude all primary believers). For the SES, we do note that it is a predictor of a number of psychosis symptoms and indicators, but not depression, and the SES does contain a number of paranormal items (Goretzki, Storm, & Thalbourne 2014). Therefore, while we suggest some findings of PB research may be misleading, or misrepresent subsets of paranormal believers, we naturally have reservations about applying that assumption to all PB research as far as some deficits and dysfunctions are concerned. We plan to investigate the PB/SES relationship in more detail in a later study.

Conclusions

In the present study, we demonstrated the tendency for the number of significant PB/IPO-RT correlations to decrease across believer types. We found no evidence of significant correlations of PB with depression (as measured on the BDI-II). Some paranormal beliefs may not be mere expressions of a cultural trend, or fanciful or popular notions that embody contradictions evident in, for example, scoring differences between primary and secondary items. It may be the case that an informed or sufficiently informed subset of paranormal believers, albeit small, has a genuine understanding of the phenomena not entirely (if at all) governed or brought about by some number of deficits, dysfunctions, or disorders. Conventional procedures do not identify this type, possibly because the designers do not concede its likelihood. We do not argue that there is anything fundamentally at fault with the basic constructs investigated in the present study—it is merely our suggestion that there may be subtle differences among paranormal believers, especially those who are high-scoring, but investigators do not seek out those differences. As Jinks (2012a) has said “. . . items in paranormal and anomalous belief questionnaires are not necessarily homogenous devices successfully extracting ‘informed’ beliefs possessing a rational basis” (p. 148). Our findings suggest that if researchers continue to make generalizations from samples and measures that are clearly heterogeneous, gains will be slow in our understanding of paranormal belief.

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Notes

- ¹ PB scales, such as Thalbourne's (1995) Australian Sheep–Goat Scale, and Tobacyk's (2004) Revised Paranormal Belief Scale, are often used to identify paranormal believers and disbelievers (i.e. 'sheep' and 'goats,' respectively—see Schmeidler 1945).
- ² A person's informed belief itself does not necessarily have to be legitimate. For example, an individual might possess an informed belief, gleaned through intensive research, regarding the legitimacy of psi. Nevertheless, the veracity of psi effects remains controversial, and might not be legitimate. Similarly, another person's belief in psi could be a quasi-belief if it was accepted blindly without question.
- ³ Irwin (2015), citing an example from Quine and Ullian (1970), has recently made a similar argument about belief formation and maintenance.
- ⁴ Top-down purification refers to a set of Rasch-scaling procedures that identify and remedy differential item functioning in questionnaires (i.e. response biases related to extraneous variables such as respondents' age, gender, or even culture).
- ⁵ The Spiritual Emergency Scale (SES) (Goretzki, Storm, & Thalbourne 2014) was also administered, for purposes to be explained in a future article.
- ⁶ Jinks (2012a) does not use the term *primary believer*. His term 'quasi-believer' refers to a respondent who holds a 'strong' belief (i.e. "very probably" or "definitely") in a given primary item, but does not endorse the relevant secondary item(s). Our term 'primary believer' is provisional and refers to a respondent who expresses agreement to *all* ten primary items—he/she is either a quasi-believer or an informed believer depending on his/her responses to the secondary items in the PBIS.
- ⁷ Note that by Jinks' (2012a:134) criteria, assignment to primary belief status was less restricted, in accordance with categories consisting of no more than a few items. For example, in the "Nostradamus" category, there were 49 "quasi-believers" and only 2 "informed believers" (i.e. 51 primary believers), whereas in the "Ghosts" category there were 27 "quasi-believers" and 7 "informed believers" (i.e. 34 primary believers).
- ⁸ Two versions of the 30-item Spiritual Emergency Scale were

administered—the forced-choice (‘Yes’/‘No’) version, and a five-point Likert-scale version (‘Never’ to ‘Very Often’). These two scales correlate significantly and the relationship is strong, $r(341) = .76, p < .001$. The Likert scale version is used in Table 8. We note that both versions do not correlate with depression, suggesting that spiritual emergency is independent of depression.

- ⁹ Of course, it was always expected that PB mean scores on the 75 remaining items would increase across believer types which were defined by scores on the PBIS, items of which were drawn from the same pool as the 75 items. Therefore, we might logically expect mean PB scores to increase significantly across believer categories. Nevertheless, these between-group differences must be proven statistically—we cannot make scientific statements prior to testing, which is the only way to determine the sizes of the main effects and interaction effect, and confirm (or not) the theoretical premise we are trying to demonstrate.

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APPENDIX A
Paranormal Belief Informedness Scale (20 Items):
Items, Factor Loadings & Extraction Communalities

Item	Code	Item wording (ESP, PK, and/or LAD)	P/R *	Loadings	Communalities
1	ebi10	Psychics possess a mysterious ability to know things about a person's past and future. (ESP)	P	.904	.817
2	ebi19	There is such a thing as <i>extrasensory perception</i> . (ESP)	P	.895	.802
3	ebi27	There is such a thing as <i>telepathy</i> (communication directly from mind to mind). (ESP)	P	.892	.795
4	bps1	I believe psychic phenomena are real and should become a part of psychology and be studied scientifically. (ESP/PK/LAD)	S	.874	.763
5	psi13	Contrary to scientific belief, some people can make contact with dead people. (PK/LAD)	S	.872	.760
6	psi1	It is probably true that some people can predict the future quite accurately. (ESP)	P	.870	.757
7	ebi23	Some people have a mysterious ability to accurately predict such things as natural disasters, election results, political assassinations, etc. (ESP)	S	.865	.748
8	pbs21	Some psychics can accurately predict the future. (ESP)	P	.864	.747
9	ebi11	The spirits of people who have died can sometimes communicate with the living. (LAD)	S	.863	.744
10	bps11	Some individuals are able to levitate (lift objects) through mysterious mental forces. (PK)	S	.862	.743
11	bps8	Through psychic individuals it is possible to communicate with the dead. (LAD)	P	.860	.739
12	pbs26	Some people have an unexplained ability to predict the future. (ESP)	S	.858	.737
13	bps12	I believe that many special persons throughout the world have the ability to predict the future. (ESP)	P	.858	.737
14	ebi1	There is a real phenomenon known as <i>psychokinesis</i> (the ability to move objects by the power of the mind). (PK)	P	.858	.736
15	blpq24	I believe that <i>psychic healing</i> occurs. (PK)	P	.852	.725
16	psi5	In spite of the laws of science, some people can use their psychic powers to make objects move. (PK)	P	.851	.724
17	pbs16	A person's thoughts can influence the movement of a physical object. (PK)	S	.848	.720
18	ebi12	There is such a thing as <i>astral projection</i> (where the body remains behind while the spirit travels). (LAD)	S	.847	.717
19	ebi25	There is such a thing as <i>levitation</i> (raising the body through mental power). (PK)	S	.841	.708
20	blpq14	I believe some people can contact spirits of the dead. (LAD)	S	.828	.685

* P = Primary item, S = Secondary item