Paranormal belief, infrasound, transliminality and anomalous perceptions

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ABSTRACT

The present study investigated whether level of paranormal belief and transliminality, and the use of suggestion and infrasound, had an effect on participants' expectations of the likelihood of paranormal phenomena and associated emotions. Participants were provided with a short written history of the building with either the suggestion that the building was haunted or that is was no simply disused. They then watched a short video walkthrough of the building and were then required to answer a series of questionnaires (Revised Paranormal Belief Scale; Exploring and Visiting; Environmental Perceptions and Phenomena; Opinions and Previous Experiences; Revised Transliminality Scale). Half of the participants were subject to a low level of infrasound played into the experiment room via equipment set up in an adjacent room. Results showed no significant effects for suggestion or infrasound, however, level of paranormal belief did show a significant effect on all scales. Paranormal belief is also shown to be a reliable predictor, whereas transliminality does not. Suggestions for future research are also discussed.

KEY WORDS:	PARANORMAL BELIEF	SUGGESTION	INFRASOUND	TRANSLIMINAL	PERCEPTION

Introduction

The term ‘paranormal’ can be defined as “Beyond the normal” or “…inexplicable by the laws of science or reason.” (Colman, 2009: 550). Irwin (2009) stated that it is phenomena that cannot be explained by science but is generated and endorsed by people that would normally be considered capable of rational thought. A 2005 Gallup poll found that the majority of Americans believe in at least one form of paranormal phenomena, whether that be hauntings, extrasensory perception (ESP), psychokinesis, astrology or the existence of UFOs (Moore, 2005). However, research into these beliefs is shifting away from whether paranormal phenomena actually exists and becoming increasingly concerned with why people hold these beliefs and how they affect perception.

A 1991 study suggests that belief in the paranormal may be a cognitive defence against the uncertainty of life and that, for some, it may be indicative of psychopathology (Williams & Irwin, 1991). They found that, while believers understand the concept of randomness, they reject the idea of chance and their paranormal beliefs may be an attempt to achieve some metacognitive understanding of the world. In a later study, Irwin (1994) found there to be a positive correlation between dissociation and paranormal belief and suggested that this may be further evidence of paranormal belief being used as a complex cognitive defence framework to enable people to make sense of the perceived uncontrollability of life events. A weak correlation has also been found between loss of control in childhood and belief in the paranormal (Watt et al., 2006), however, it has been cautioned that other factors should be considered such as previous paranormal experience, media influences and hearing reports of paranormal experiences from influential others. Irwin (2009:102) argues that “…proneness to the illusion of control over fundamentally uncontrollable events is a simple consequence of paranormal belief.” Therefore, paranormal belief can be seen to reinforce the impression that one’s own actions can influence events that are not, in reality, dependent on one’s actions, provided that they cannot be perceived as being under the control of others or due to a lack of control of others.

In terms of psychopathology, it has been suggested that the formation and maintenance of paranormal beliefs may involve deficiencies in reality testing (Irwin, 2004). This suggests that, when faced with an anomalous experience, some people may believe it to be paranormal without critically testing the logical plausibility of that belief. Dagnall et al. (in press) found a significant positive correlation between paranormal belief and reality-testing deficits and also found that, together, they explained a unique variance within expectations of haunt-related phenomena. They state, however, that the contribution of reality-testing deficits is minor compared to level of belief in the paranormal. A later study by Irwin et al. (2012) concluded that the New Age Philosophy and Traditional Paranormal Belief dimensions of paranormal belief were found to relate to schizotypal biases in reasoning and that emotion-based reasoning was the most successful predictor of paranormal belief. This suggests that these beliefs are validated by the believer on their emotional, rather than, rational, appeal. Houran, Irwin and Lange (2001) examined the clinical relevance of the

Revised Paranormal Belief Scale and found differences in the relevance of the New Age Philosophy (NAP) and Traditional Paranormal Belief (TPB) dimensions. They found that NAP includes beliefs that have some basis in psychopathology, or adverse personality structure, and that TPBs may be seen as substitute religious beliefs with a social learning basis. They suggest that psychiatric models best explain a NAP whilst psychological models best explain TBP.

A study on thinking styles found that psychology and medical students were less likely to believe in the paranormal and that education and theology students were more likely to believe (Aarnio & Lindeman, 2005). They suggested that this is due to the former's preference for analytical thinking and also found that intuitive thinking positively correlates with paranormal belief. A 1998 study suggested that left hemisphere language dominance failure, which is observed in patients exhibiting acute psychosis, may facilitate the emergence of paranormal belief (Leonhard & Brugger, 1998). This may be due to coarse semantic activation in right hemisphere associative processing characteristics which is also observed in creative thinking. It has also been concluded that believers are less likely to be logical and more likely to be open-minded than non-believers (Lester et al., 1987). This may be due to a preference for feeling, perceiving and intuiting rather than thinking, judging and sensing. However, although high believers score more highly on scales for aggression and defence, it has been found that there are no other differences between believers and non-believers on other personality scales (Auton et al., 2003). Houran et al. (2001) suggest, that openness to experience accounts for the differences between NAP and TPB but they argue that transliminality may be a more important factor in these differences.

Transliminality can be described as the ability of psychological material to cross in and out of the conscious threshold (Lange, et al., 2000). Thalbourne and Houran (2000) found that those high in transliminality were likely to report more unusual and paranormal experiences, and to believe in more unusual and psi-related events. Persinger (1984) found that temporal lobe lability correlates with the propensity to report paranormal experiences. This increased activity in the temporal lobes, or micro-seizures, has been hypothesised to account for mystical and religious experiences (Persinger, 1983), and Thalbourne et al. (2003) observed a strong association between temporal lobe lability and transliminality. Further to this, Fleck, et al. (2008) found differences in baseline EEG recordings for those high in transliminality scores compared to those who score low in transliminality. They suggest that this is consistent with brain activity found in schizotypy and schizophrenia spectrum disorders. Dagnall, et al. (2010) also found a positive correlation between the cognitive-perceptual factors of schizotypal personality and transliminality and explain that this is due to a considerable common variance that is shared by both constructs.

Boundaries of the mind have also been associated with transliminality. Hartmann et al. (2001) describe those with thick boundaries as being able to focus intently and being able to clearly separate thoughts and feelings, while those with thin boundaries will have difficulty focusing and will allow a lot of sensory material in at once. Thalbourne and Maltby (2008) found there to be a significant correlation between

transliminality and boundaries and this suggests that it is possible for psychological material to flow more easily from the subconscious to the conscious for some more than others.

As transliminality is thought to be associated with heightened sensitivity to sensory stimuli, Thalbourne et al. (2001) hypothesised that there should therefore be a similar association between transliminality and synaesthesia. This is a phenomena whereby a sensory experience elicited by a stimulus occurs in a different modality, for example, sound inducing sensations of colour, or smells inducing sounds. They found a mild correlation between the two constructs, however, they also concede that it is debateable whether any of their participants could be said to have experienced genuine synaesthesia. The reliability of the self-report measure of synaesthesia used in their study is also questioned.

The concept of transliminality therefore suggests that sensory stimuli may be experienced in many different ways and research has been conducted into whether environmental stimuli, such as geomagnetic fields (Braud & Dennis, 1989), seismic activity (Persinger & Derr, 1985) and infrasound (Tandy & Lawrence, 1998), can cause anomalous experiences. Tandy and Lawrence's research found that a room in which people felt uncomfortable and reported odd experiences was also occupied by a standing wave of 18.9Hz created by an extractor fan. Once a modification was made to the mounting of the fan the apparent 'ghost' disappeared. Frequencies of below 20Hz are referred to as infrasound and are commonly considered to be below the level of normal human hearing. However, Leventhall (2007) argues that this assertion is incorrect, with measurements of acoustic thresholds being made at levels as low as 4Hz when exposed in an acoustic chamber and even as low as 1.5Hz for earphone listening. Research by Tandy (2000) supports the notion that infrasound may play a role in paranormal phenomena. On investigating a cellar in Coventry that was reported to leave people with a sense of unease, a sense of presence and reported apparitions, Tandy found infrasound of 19Hz present in the cellar and concluded that infrasound should be of particular interest in paranormal investigations, pointing to a study by Green and Dunn (1968) in which infrasound from approaching storms was used to study its effects on human behaviour. They found a correlation between naturally occurring infrasound and changes in behaviour relating to school absenteeism and vehicular accident rates.

In their study, Tandy and Lawrence (1998) contended that the human eyeball oscillates at around 18Hz and that infrasound played at a similar level may produce visual distortions. French et al. (2009) attempted to create a haunted room by manipulating electromagnetic fields and infrasound. They found no significant differences and concluded that reported anomalous sensations were more the result of suggestion than as a result of manipulating electromagnetic fields and infrasound. With regards to infrasound causing visual distortions, they cite Braithwaite and Townsend's (2006, cited in French et al., 2009) assertion that, if this were the case, distortions would be present across the whole field of vision rather than one specific area and would not be sufficient enough to create sustained hallucinatory experiences.

Research has shown, however, that there may be weight to the assertion that suggestion may result in increased reports of anomalous phenomena, rather than environmental manipulations. Wiseman, et al. (2003) found that believers are more prone to suggestion when it concurs with their belief in the paranormal and that approximately one fifth of participants believed fake séances to be genuine paranormal phenomena. This supports previous research that hypnotic susceptibility significantly correlates with reported psychic experiences and attitudes towards the supernatural and parapsychology (Wagner & Ratzeburg, 1987). Suggestion was also the focus of Lange and Houran's (1997) study which invited 22 participants to visit five areas of a performance theatre. Half of the participants were informed the building was haunted and the other half were told the building was simply being renovated. They found that demand characteristics can stimulate paranormal experiences with significantly more intense perceptual experiences being reported in the informed condition.

Sparks et al. (1997) explored the relationship between exposure to television programs depicting paranormal phenomena and belief in the paranormal and found an association with endorsement of the paranormal. However, this relationship was only observed in those participants who had reported no previous personal paranormal experience. Conversely, a replication of this study (Sparks & Miller, 2001) produced directly opposing findings in that the same relationship was found, however, only in those participants who had reported previous personal paranormal experiences. Ramsey et al. (2011) concludes that paranormal belief is a narrative malleable construct and that source credibility influences the persuasiveness of the narrative. Therefore, for suggestion to be effective, it would appear that the source offering the suggestion must be seen as credible and reliable.

A more recent study investigated paranormal belief, suggestion and social influence (Wilson & French, 2014). Their study comprised of participants being asked to watch an alleged psychic purportedly bending a key by psychokinesis with half of participants being informed that the key continued to bend after it had been placed on a table. Participants were also exposed to either negative, positive or no social influence in the way of confederates in the audience who would either disagree that the key continued to bend, concurred that it did continue to bend or offered no influence at all. They found that participants exposed to the suggestion were more likely to report the key continuing to bend, they also found that those who had been exposed to positive social influence were more likely to report the key continuing to bend than in the other social influence conditions. Nees and Phillips' (2014) examination of electronic voice phenomena (EVP) and suggestion also found that participants were more likely to perceive voices in EVP and degraded speech stimuli where a paranormal prime had previously been given.

The current study aims to examine the contribution of infrasound, suggestion, belief in the paranormal and transliminality to the perceptions of paranormal phenomena, emotions and opinions of the paranormal. It is expected that level of belief in the paranormal will increase the expectation of haunt phenomena, emotions and opinions

of the paranormal. It is also predicted that the use of infrasound and suggestion will increase these expectations. Transliminality has been included in this study to assess whether it accounts for any additional variance.

Method

Design

This research employs a 2 (suggestion) x 2 (infrasound) x 2 (level of paranormal belief) factorial design. Participants were allocated into one of four conditions where infrasound was either present or not and participants were either told that the building in the video they were to view was haunted or was simply no longer in use. The four conditions are; no infrasound and no suggestion, infrasound and no suggestion, no infrasound and suggestion, and infrasound and suggestion. Participants responded to personal requests to take part in a psychological study.

Participants

An opportunity sample of 80 participants was collected from a Manchester Metropolitan University campus. Mean age 23.70 years (*SD* = 7.80), range 18-63. The sample consisted of 74% females (*M* = 24.14, *SD* = 8.63, 19-63 years) and 26% males (*M* = 22.48, *SD* = 4.76, 18-38 years).

Materials and Apparatus

Participants were required to watch a five minute video clip of a walkthrough of a disused university building filmed with a hand held video camera. Speakers, an amplifier and a sound generator were used generate infrasound of 18.9Hz which was maintained at a level of 50dB in the experiment room. Participants were initially provided with a short brief and consent form prior to watching the video. After watching the video participants were then provided with a questionnaire consisting of five measures and a de-brief outlining the purpose of the research and explaining the condition they had been allocated to.

Measures

The measures provided in this research were five questionnaires measuring belief in the paranormal, transliminality, exploring and visiting, environmental perceptions and phenomena, and opinions and previous experiences.

The first of these measures, the Revised Paranormal Belief Scale (R-PBS: Tobacyk, 2004) is a 26-item measure of paranormal belief over seven dimensions; traditional

religious belief, witchcraft, superstition, psi, spiritualism, precognition and extraordinary life-forms. It is a revised version of the earlier Paranormal Belief Scale (Tobacyk & Milford, 1983). Its revision extended the rating scale to allow participants to more precisely report their level of belief whilst reducing the restriction of range. Changes were also made to items in three of the subscales in order to increase reliability and cross-cultural validity in the measurement of paranormal belief in Western cultures. Lange et al.'s (2000) top-down purification of the R-PBS generated two correlated clusters of items which they termed New Age Philosophy (NAP) and Traditional Paranormal Belief (TPB) which suggests that paranormal belief can be distinguished by serving individual (NAP) or social (TPB) functions.

The second measure used is the Revised Transliminality Scale (RTS: Lange et al., 2000). This is 29-item Rasch scaled questionnaire measuring transliminality by addressing magical ideation, mystical experience, absorption, hyperaesthesia, manic experience, dream interpretation and fantasy-proneness. This revision corrects for gender and age biases and ensures its unidimensionality by Rasch criteria.

The third measure is the Exploring and Visiting Scale, an 18-item scale which measures positive and negative affect in relation to the building seen in the video. It is a modified version of the Positive and Negative Affect Schedule (PANAS: Watson, Clark & Tellegen, 1988). This measure asks participants to rate the extent to which they would expect to feel certain emotions if they were to visit the building in question. The positive items rate emotions such as 'exciting' and 'thrilling' and the negative items rate emotions such as 'claustrophobic' and 'scary'. For the purposes of this study this measure has been separated into positive and negative results. Unlike the five point Likert scale used in the PANAS, this measure employs a seven point Likert scale to allow greater precision for participants to report their emotions.

The fourth measure is the Environmental Perceptions and Phenomena questionnaire, a 17-item measure which requires participants to report how likely they feel they would be expected to encounter various haunt-related phenomena within the administrative building. This measure employs a percentage scale ranging from 0% (certainly not) to 100% (certainly) and has been adapted from Wiseman et al.'s (2003) study of Hampton Court Palace. Haunt-related phenomena in the questionnaire include hearing noises, feeling of sensed presence and environmental changes.

The fifth measure is Opinions and Previous Experiences. This is a 9-item questionnaire which asks participants to rate their opinions, previous experiences and observations. The first question asks to what extent they believe the administrative building to be haunted. Seven of the questions ask participants to rate their belief in ghosts, their observations of the video they saw and of the space they took part in the study in, and whether they believe they have had a genuine paranormal experience. Responses to these questions are indicated on a 7-point Likert scale. The final

question asks participants to state whether they believe in the paranormal by indicating either a yes or no response.

Previous research has suggested that the order in which questionnaires are presented may prime participants and influence their responses to subsequent questions (Dudley, 2002). In order to control for order effects, in this study the order of the questionnaires provided to participants were alternated, therefore, five different versions of the questionnaire packs were used.

Procedure

On recruitment participants were told that they would be required to read a briefing sheet, watch a short five minute video and then complete a series of questionnaires. They were then asked to sit in a psychology testing room for approximately fifteen minutes whilst they read the brief, watched the video and completed the questionnaires. On completing this, participants were then supplied with a de-brief which explained the full nature of the study. The nature of the study was not disclosed prior to participation as it may have resulted in priming participants.

In the infrasound conditions, the level of infrasound was maintained at 18.9Hz and a level of 50dB. The infrasound equipment was set up in an adjacent room with the speakers being placed directly facing the wall to enable the infrasound to transmit into the experiment room whilst concealing the equipment. Where infrasound was used, the equipment was turned on prior to participants being recruited. Although this is an artificial setting, it has been previously found that it is possible to artificially replicate natural phenomena (Persinger, Tiller & Koren, 2000).

Ethics

The main ethical consideration in this study is the use of infrasound as it has been purported to make people feel uncomfortable and to possibly induce anomalous sensations. The infrasound used in this study was maintained at a level of 18.9Hz in line with Tandy and Lawrence's (1998) and Tandy's (2000) studies and is no more than participants would be likely to encounter in their normal day-to-day lives. Deception was also a consideration in this study. In order to prevent possible priming, participants were not advised of the full nature of the study prior to participation but were simply asked to read something, watch something and complete some questionnaires. On the briefing sheet participants were required to read at the beginning of the study, participants were fully advised that they were able to withdraw at any point should they so wish and written consent was obtained before commencing the next stage of the experiment. Once participants had completed the experiment they were provided with a de-brief of the full nature of the experiment and informed which experimental condition they had been subject to. They were also given the opportunity to discuss any questions or concerns with the experimenter.

Results

Cronbach's alpha (α) was used to assess the internal reliability of each of the scales used. The RTS has a reliability of (α=.83). The Exploring and Visiting Scale (EVPOS) has a reliability of (α=.85) with the positive scale items (EVPOS) having a reliability of (α=.93) and negative scale items (EVNEG) having a reliability of (α=.92). The Environmental Perceptions and Phenomena (EPP) scale has a reliability of (α=.96) and the Opinions and Previous Experiences scale (OPE) has a reliability of (α=.85). The Revised Paranormal Belief Scale (R-PBS) has an overall reliability of (α=.90) with the subscales of New Age Philosophy (NAP) and Traditional Paranormal Beliefs (TPB) also showing high internal reliability (NAP; α=.84) (TPB; α=.75). Table 1 shows the descriptive statistics for the scales used.

Participants (N=80) were asked to read a brief description of a building and watch a five minute video, after which they were required to complete a questionnaire containing five separate scales; RTS (M: 9.31, SD: 5.10), Exploring and Visiting (EVPOS: M: 21.79, SD: 12.88. EVNEG; M: 28.33, SD: 13.42), Environmental Perceptions and Phenomena (M: 59.60, SD: 34.19), Opinions and Previous Experiences (M: 14.94, SD: 9.58) and R-PBS (m: 49.22, SD: 24.43).

Table 1. Scale descriptive statistics

	α	*M*	*SD*	Range
RTS	.83	9.31	5.10	0.00-22.00
EVPOS	.93	21.79	12.88	0.00-47.00
EVNEG	.92	28.33	13.42	0.00-54.00
EPP	.96	59.60	34.19	0.00-132.00
OPE	.85	14.94	9.58	1.00-39.00
R-PBS	.90	49.23	24.43	3.00-108.00
NAP	84	21.33	4.34	6.85-28.87
TPB	.75	22.34	5.28	11.16-43.24

A Pearson product-moment correlation coefficient was performed to observe the relationship between the separate scales and also the relationship between the scales. Table 2 shows the correlational analysis for the scales. A significant positive correlation was observed between the RTS and the Environmental Perceptions and Phenomena, r = .24, n = 80, $p < .05$. This suggests that transliminality and environmental perceptions are significantly related. A significant positive correlation was also observed between the RTS and the R-PBS, r = .25, n = 80, $p < .05$, and the NAP subscale of the R-PBS, r = .24, n = 80, $p < .05$. This suggests that transliminality and paranormal belief are significantly related.

Table 2. Matrix of Pearson product moment correlations between study variables

	1	2	3	4	5	6	7	8
1. RTS								
2. EVPOS	.13							
3. EVNEG	-.07	-.11						
4. EPP	.24*	.14	.34**					
5. OPE	.16	.00	.48**	.76**				
6. R-PBS	.25*	.10	.26**	.58**	.62**			
7. NAP	.24*	.11	.23*	.51**	.46**	.84**		
8. TPB	.15	.02	.28**	.51**	.48**	.80**	.57**	

*. Correlation is significant at the 0.05 level (1-tailed)
**. Correlation is significant at the 0.01 level (1-tailed)

No significant correlations were observed between the positive items of the Exploring and Visiting scale and the other scales, which suggests that positive affect is not significantly related to any of the other scales. However, significant positive correlations were observed between the negative items of the Exploring and Visiting scale and Environmental Perceptions and Phenomena (r = .34, n = 80, p .01), Opinions and Previous Experiences (r = .48, n = 80, $p < .01$), R-PBS (r = .36, n = 80, $p < .01$), NAP (r = .23, n = 80, $p < .05$) and TPB (r = .28, n = 80, $p < .01$). This suggests that negative affect is significantly related to environmental perceptions, opinions and previous experiences of the paranormal, and belief in the paranormal.

Significant positive correlations were also observed between Environmental Perceptions and Phenomena and Opinions and Previous Experiences (r = .76, n = 80, $p < .01$), R-PBS (r = .58, n = 80, $p < .01$), NAP (r = .51, n = 80, $p < .01$) and TPB (r = .15, n = 80, $p < .01$). This suggests that there is a significant relationship between opinions and previous experiences, belief in the paranormal, and environmental perceptions.

Significant positive correlations were similarly observed between Opinions and Previous Experiences and R-PBS (r = .62, n = 80, $p < .01$), NAP (r = .46, n = 80, $p < .01$) and TPB (r = .48, n = 80, $p < .01$). This suggests that opinions and previous experiences are significantly related to belief in the paranormal.

A 2 (suggestion) x 2 (infrasound) x 2 (level of paranormal belief) independent analysis of variance (ANOVA) was conducted for each of the dependent variables (Exploring and Visiting (positive and negative affect), Environmental Perceptions and Phenomena, and Opinions and Previous Experiences). Table 3 shows the descriptive statistics for each ANOVA.

On the Exploring and Visiting scale no significant effects or interactions were observed for positive scale items. For negative scale items no significant main effect was found for suggestion (no suggestion, $M = 28.45$, $SD = 14.12$ vs. suggestion, $M = 28.20$, $SD = 12.86$), $F(1,72) = .09$, $p > .05$, $\eta p^2 = .001$, or for infrasound (no infrasound, $M = 29.30$, $SD = 14.07$ vs. infrasound, $M = 27.35$, $SD = 12.84$), $F(1,72) = .73$, $p > .05$, $\eta p^2 = .010$. A significant main effect was found for level of paranormal belief, $F(1,72) = 6.03$, $p < .05$, $\eta p^2 = .077$. Participants scoring above the median ($M = 32.25$, $SD = 11.51$) rated negative scale items higher than participants scoring below the median ($M = 24.40$, $SD = 14.16$). Higher scores indicate a higher expectancy of experiencing negative emotions when visiting the administrative building. No significant interactions were observed.

On the Environmental Perceptions and Phenomena scale no significant main effect was found for suggestion (no suggestion, $M = 64.40$, $SD = 33.48$ vs. suggestion, $M = 54.80$, $SD = 34.63$), $F(1,72) = 2.78$, $p > .05$, $\eta p^2 = .037$, or for infrasound (no infrasound, $M = 59.50$, $SD = 33.10$ vs. infrasound, $M = 59.70$, $SD = 35.66$), $F(1,72) = .00$, $p > .05$, $\eta p^2 = .000$. A significant main effect was found for level of paranormal belief, $F(1,72) = 33.33$, $p < .01$, $\eta p^2 = .316$. Participants scoring above the median ($M = 78.40$, $SD = 28.23$) rated scale items higher than participants scoring below the median ($M = 40.80$, $SD = 29.08$). Higher scores indicate a higher expectancy of haunt phenomena occurring within the administrative building. No significant interactions were observed.

Table 3. Level of paranormal belief

	Level of Paranormal Belief					
	Below Median		Above Median		Overall	
	M	*SD*	*M*	*SD*	*M*	*SD*
EVPOS						
No Suggestion/No Infrasound	22.42	12.69	21.50	13.73	22.05	12.76
No Suggestion/Infrasound	20.56	12.70	23.55	9.80	22.20	10.99
Suggestion/No Infrasound	18.38	13.32	21.30	14.44	20.15	13.72
Suggestion/Infrasound	19.36	14.20	26.89	14.89	22.75	14.64
Overall	20.35	12.82	23.23	12.95	21.79	12.88
EVNEG						
No Suggestion/No Infrasound	21.50	15.85	34.25	12.83	26.60	15.72
No Suggestion/Infrasound	25.22	11.53	34.45	12.07	30.30	12.44
Suggestion/No Infrasound	28.75	14.45	34.17	10.15	32.00	12.00
Suggestion/Infrasound	23.73	15.07	25.22	10.32	24.40	12.84
Overall	24.40	14.16	32.25	11.51	28.33	13.42
EPP						
No Suggestion/No Infrasound	45.33	20.41	84.25	28.60	60.90	30.42
No Suggestion/Infrasound	48.00	37.71	84.18	27.91	67.90	36.74
Suggestion/No Infrasound	40.13	31.44	70.08	35.49	58.10	36.33
Suggestion/Infrasound	30.45	28.64	77.22	16.68	51.50	33.45
Overall	40.80	29.08	78.40	28.23	59.60	34.19
OPE						
No Suggestion/No Infrasound	7.33	5.50	21.25	6.96	12.90	9.18
No Suggestion/Infrasound	14.67	9.26	23.36	9.34	19.45	10.09
Suggestion/No Infrasound	9.13	5.46	17.83	9.02	14.35	8.79
Suggestion/Infrasound	6.45	5.50	21.11	6.25	13.05	9.40
Overall	9.10	7.02	20.78	8.17	14.94	9.58

On the Opinions and Previous Experiences scale no significant main effect was found for suggestion (no suggestion, M = 16.18, SD = 10.08 vs. suggestion, M = 13.70, SD = 9.01), $F(1,72) = 3.25$, $p > .05$, $\eta p^2 = .043$, or for infrasound (no infrasound, M = 13.63, SD = 8.90 vs. infrasound, M = 16.25, SD = 10.15), $F(1,72) = 2.25$, $p > .05$, $\eta p^2 = .030$. A significant main effect was found for level of paranormal belief, $F(1,72) = 46.94$, $p < .01$, $\eta p^2 = .395$. Participants scoring above the median (M = 20.78, SD = 8.17) rated scale items higher than participants scoring below the median (M = 9.10, SD = 7.02). Higher scores indicate that participants are more likely to rate their opinions and previous experiences of the paranormal more highly.

Prior to performing multiple regression analysis, positive correlations were found between: the R-PBS and the dependent variables (EVNEG; r = .36, df = 80, $p < .01$: EPP; r = .58, df = 80, $p < .01$: OPE; r = .62, df = 80, $p < .01$). A multiple regression using forward selection was used. This method enters the predictor variables into the model one at a time depending on the strength of the relationship between the predictor and criterion. This method has been used because it is predicted that level of paranormal belief would better predict emotions and perceptions than transliminality.

R-PBS was a significant predictor of negative emotions on the Exploring and Visiting scale (EVNEG), $F_{1,78} = 11.31$, $p < .01$, explaining 13% of the variance. R-PBS was also a significant predictor of Environmental Perceptions and Phenomena (EPP), $F_{1,78} = 38.85$ $p < .01$, explaining 33% of the variance. R-PBS was also a significant predictor of Opinions and Previous Experiences, $F_{1,78} = 48.74$, $p < .01$, explaining 39% of the variance. No significant model emerged with regards to positive emotions on the Exploring and Visiting Scale. Transliminality did not account for any additional variance on any of the scales.

Discussion

It was predicted that level of belief in the paranormal would affect the degree to which haunt-related phenomena is expected, increase emotional expectations and increase opinions of the paranormal, and that transliminality would add additional variance. This hypothesis was fully supported, however, transliminality did not add any additional variance. It was also predicted that the use of suggestion and infrasound would also increase these expectations. This hypothesis, however, was not supported.

The observed relationship between level of belief in the paranormal and increased expectations of haunt-related phenomena concurs with Dagnall et al.'s (in press) assertion that this increased expectation is a function of paranormal belief. It also concurs with Wiseman et al.'s (2002) observation that believers are significantly more likely to report experiencing haunt-related phenomena than non-believers and are also significantly more likely to attribute their experiences to ghosts. The current study found that belief in the paranormal predisposed participants to expect haunt-related phenomena within the administrative building. This is consistent with previous findings that contextual variables influence the reporting of haunt phenomena (Harte, 2000), therefore, expectations may arise due to a building's appearance and knowledge of its history. It may also support Lester et al.'s (1987) assertion that believers are more likely to prefer intuitive thinking rather than logical thinking as it is possible their expectation of haunt-related phenomena is rated on the basis of an instinctive reaction rather than logical consideration.

The observed relationship between level of paranormal belief and increased expectations of experiencing negative emotions within the administrative building concurs with Dudley's (2000) findings that belief in the paranormal significantly positively correlates with negative affect. The present study found that belief in the paranormal increased expectations of experiencing negative emotions within the administrative building. This further supports the assertion of a significant relationship between negative affect and paranormal belief and concurs with Dudley and Whisnand's (2000) findings of significantly higher depressive attributional styles in those scoring high in paranormal belief than those who score low on belief. This may also support Houran et al.'s (2001) postulation that paranormal beliefs are validated on their emotional, rather than rational, appeal in that believers tend to rate negative emotions more highly than positive ones.

Although the present study observed a relationship between paranormal belief and the Opinions and Previous Experiences scale, this is unsurprising. The scale used contains a variety of different questions relating to separate elements. The first question asks to what extent participants believe that there is a history of paranormal activity within the administrative building. This could be interpreted as a haunt-related phenomenon question which, instead, could be included in the Environmental Perceptions and Phenomena scale. The second question, asking if participants believe that ghosts exist, would be expected to be rated more highly by believers than non-believers as a matter of course. One question also asks participants to rate whether they feel they have had a genuine paranormal experience, however, this question is ambiguous as it is not clear whether the question relates to the context of the experiment itself or as a matter of generality and could be interpreted by participants in either way. For these reasons, this questionnaire is not considered an accurate measure of paranormal opinions in this study.

Although the present study found that suggestion had no effect on expectations of haunt phenomena and expected emotions, previous findings have been mixed. Wiseman et al. (2002) found suggestion to have no effect on perception of phenomena or attribution. However, they did find that believers in the suggestion condition were more likely to report experiences than non-believers. In the present study, whilst believers scored more highly than non-believers on all scales in suggestion conditions, the difference in scores was not significant. Considering then Ramsey at al.'s (2011) assertion of paranormal belief being a narrative malleable construct it is possible that, in the current study, source credibility may have diminished the effect of suggestion. The current study could be amended to change the way in which the suggestion is made and examining whether source credibility is a factor in suggestion conditions is a consideration for future research. Also some participants were staff and students who had previously worked and studied at the, now disused, former campus site and, although most will never have accessed that particular building, they may have already formed opinions of whether or not the building was haunted prior to taking part in the experiment. However, Dagnall et al.'s (in press) study utilised the same video walkthrough footage and gave participants a fictitious history of being a hospital administrative building. Their study also included staff and student participants who may have attended the former university campus. Their findings concur that suggestion has no effect. A lack of significant results may also be due to context. Previous research has shown suggestion to be effective in experiments that have taken place in real-life settings (Lange & Houran, 1997; Wilson & French, 2014). The present study's virtual tour of an allegedly haunted building may mean that suggestion may have had a diminished effect than it would if participants were taken on an actual tour of the building.

The present study found that infrasound had no effect on expectations of haunt phenomena and expected emotions, however, the use of generated infrasound is, in itself, problematic. Although infrasound is inaudible, generating frequencies below 20Hz results in some residual noise in the form of a low hum due to speaker vibration. Whilst the infrasound equipment was located in an adjacent room this residual noise was still audible in the experiment room and some participants commented on this whilst others did not. Tandy and Lawrence (1998) and Tandy (2000) concluded that, in their studies, infrasound did have an effect, however, French et al. (2002) found that manipulation of infrasound in their study did not have an effect. One possibility is that subconscious processing may occur in which the infrasound is processed even though an audible sound is not heard. Salt and Kaltenbach (2011) contend that responses to infrasound reach the brain by pathways that do not involve conscious hearing and Kihlstrom (1987) states that events can affect mental functions even though they may not be consciously perceived. As infrasound has been noted to cause feelings of unease, it is possible that this may cause defensiveness to occur. Defensiveness is the concept of distorted perceptions of potentially threatening information (Watt, 2001) and it is possible that, although participants are unaware of the infrasound, they may also be subconsciously avoiding it by defending themselves against it. If this is the case then, it is possible that, instead of having the predicted direct effect of increasing expectations of haunt phenomena and negative emotions, the use of infrasound may have had an indirect effect by participants subconsciously defending against the infrasound. Greenwald and Draine (2014) state that, in order to argue that an indirect effect has occurred, researchers must demonstrate that a null result has occurred,

however, this can be criticised for inappropriately stating the truth about a null hypothesis. Future research on the effects of infrasound may seek to examine whether there are differences in responses in areas of naturally occurring infrasound versus areas with no infrasound present. This, however, would involve the use of more than one location which gives rise to the possibility of the locations themselves acting as extraneous variables in that they may not be similar enough. This may though be preferable than attempts to generate infrasound in a laboratory setting.

Amount of exposure to the infrasound is also consideration for its lack of effect. Participants in French et al.'s (2009) study spent a considerable amount of time in the experiment room (50 minutes), whereas participants in the current study were only exposed to infrasound for a maximum of 20-25 minutes, depending on how long it took to complete the questionnaires. Nonetheless, French et al. (2009) also failed to obtain any significant findings for infrasound, despite the extended length of time participants were exposed to it.

In the current study, data was collected in groups ranging from one to five participants and it is possible that this may have been detrimental. In the case of participants who took part individually, it may be that they felt intimidated by the setting and rushed their responses. In the case of group participants it may be that distractions occurred, such as talking, which may have caused a reduction in focus on the video. Wiseman, et al. (2010) in their Hampton Court Palace study suggest that group contagion may affect haunt experiences. Van der Schalk, et al. (2011) found that in-group expressions of anger and fear are mimicked to a greater extent that out-group expressions of these emotions, therefore in the current study, where participants have taken part with their friends, the emotions of a member of the group may have had an increased or decreased effect on the responses of other group members.

In conclusion, the current study adds to the body of existing research demonstrating that belief in the paranormal has an effect on the expectation of haunt phenomena and on the expectations of negative emotions. As established above, suggestion and infrasound do not appear to have any effect on these expectations, however, it would be advantageous to explore these areas in further research. Whilst this study does not attempt to demonstrate that paranormal experiences are fully understandable by way of psychological means, it demonstrates that psychology may explain the perception of the expectation of paranormal phenomena and the expectation of associated negative emotions.

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