BELIEF AND BELONGINGNESS: ARE SUPERNATURAL AGENTS AND FORCES

SOCIAL SURROGATES?

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Belief and belongingness: Are supernatural agents and forces social surrogates?

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ABSTRACT

Motivational approaches to the study of supernatural beliefs propose that such beliefs serve psychological functions. I tested the proposal that supernatural agents and forces are sought out as social surrogates to fulfill the need to belong. First, I present preliminary data consistent with the claim that the belongingness motive and deficits in belongingness (i.e., loneliness) are related to supernatural beliefs. Next, I report an experiment testing the supernatural social surrogate proposal. I hypothesized that affirming belongingness would reduce supernatural beliefs and that the relationship between the predictors and supernatural beliefs would weaken if one's belonging is affirmed. If supernatural beliefs are motivated by belongingness concerns, then meeting people's belongingness needs should reduce their inclination to turn to supernatural social surrogates. I further predicted these effects would remain significant when controlling for known cognitive correlates of supernatural beliefs. Results did not support the social surrogate hypothesis.

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Introduction

Magical beliefs are beliefs that defy an empirical understanding of the physical world (Broad, 1953) and they include, but are not limited to, beliefs about supernatural agents and phenomena such as deities, spirits, ghosts, miracles, the ability to read minds, manipulate spiritual energy, and communication with the dead. Motivational approaches to the study of magical and supernatural beliefs propose that such beliefs serve psychological functions. For example, research shows that superstitions help fulfill a desire for control (Keinan, 2002; Graeupner & Coman, 2016; van Prooijen & Acker, 2015; Whitson & Galinsky, 2008). In addition, a growing body of work reveals that the need to perceive life as meaningful motivates supernatural beliefs and interests (Nelson, Abeyta, & Routledge, 2018; Norenzayan & Hansen, 2006; Routledge, Roylance, & Abeyta, 2015).

In the current research, I consider a motive for belief in the supernatural that has yet to receive significant empirical attention. Specifically, I tested the proposal that supernatural agents and forces are sought out as social surrogates. That is, belief in supernatural agents and forces are potentially motivated, in part, by the need to belong. I first present preliminary correlational data in support of this proposal. In particular, individual differences in the need to belong and loneliness predict supernatural beliefs. Next, I present an experiment in which I tested the supernatural social surrogate proposal. I also tested how a competing motivation, the need for meaning, may predict belief in supernatural agents and forces.

Social Learning, Cognitive, and Personality Approaches to Supernatural Beliefs

Research suggests people hold supernatural beliefs for a variety of reasons. One perspective argues that supernatural beliefs are a product of learning (van Elk, Rutjens, van der Pligt, & van Harreveld, 2016). In an attempt to understand the world, beliefs are created and passed down from generation to generation. People in past civilizations would attribute occurrences they did not understand to gods or other magical agents. For instance, a storm may have been believed to be an angry deity. Supporting the social learning approach, research shows that individuals are more likely to accept beliefs held by those close to them in their family and community (Gervais, Willard, Norenzayan, & Henrich, 2011). Indeed, parents tend to encourage their children to hold the same beliefs as themselves (Braswell, Rosengren, & Berenbaum, 2011). When examining the beliefs people do not hold, the influence of culture becomes apparent. As Gervais et al., (2011) explain, Christians do not typically believe in Shiva. Instead, they adopt the beliefs the surrounding culture holds. The social learning perspective provides clues as to why individuals hold certain beliefs; however, it does not provide a complete understanding of the general human tendency to believe in the supernatural.

Another account focuses on social cognitive processes, particularly of agency detection. Agency detection approaches argue that people inherently detect patterns and agents, such as animals or humans, in the environment (Barrett & Lanman, 2008). This detection system can prevent individuals from encountering a predator. For example, assuming the movement in the bushes is a predator could potentially save the individual's life by influencing the person to change their route. Thus, it has been suggested that a heightened bias towards detecting patterns and agents evolved from our ancestors (van Elk et al., 2016). Once the patterns and agents are noticed, one's mind makes an inference of what they could be. A person is more likely to

attribute unknown agents to their own beliefs. To a believer, perhaps the book that fell off a shelf is not due to gravity but instead, it is a ghost (Barrett & Lanman, 2008). Moreover, those with supernatural beliefs may be more likely to attend to patterns. Research has found that higher belief in the paranormal predicted sensitivity to pattern perception, such that the believers saw more agents in the patterns than the skeptics did (Riekki, Lindeman, Aleneff, Halme, & Nuortimo, 2013; van Elk, 2013). In fact, believers have stronger brain activation in areas related to detection (Riekki, Lindeman, & Raji, 2014). Another study found that supernatural believers ascribed more purpose to natural, artificial, and random events than skeptics did (Lindeman & Aarnio, 2007). However, the literature on supernatural believers and agency detection remains mixed; using word primes of supernatural agents did not have a significant effect on participant's agency detection across five different experiments (van Elk et al., 2016).

Agency detection may partially explain why people anthropomorphize, or project human-like qualities onto inanimate objects. Anthropomorphism is associated with supernatural belief (Willard & Norenzayan, 2013), belief in telepathy, and in telekinesis (Norenzayan, Hansen, & Cady, 2008). Linderman and Aarnio (2007) observed that superstitious individuals were more likely to describe nonliving items as having desires and intentions. Due to the hyperactivity of pattern and agency detection, it appears that supernatural beliefs can be explained, in part, by social cognitive biases.

A related social cognitive account of supernatural beliefs comes from research focused on theory of mind (ToM). People differ in the extent to which they are able or inclined to imagine the thoughts, feelings, and goals of others (Premack & Woodruff, 1978). This dimension of ToM is referred to as mentalizing and is considered to be a cognitive trait implicated in supernatural thinking (Willard & Norenzayan, 2013). That is, to believe in supernatural agents and forces

requires a certain amount of mentalizing (e.g., imagining a loving god, harmful or helpful ghosts). In fact, areas of the brain associated with ToM are activated when praying to God (Schjoedt, Stødkilde-Jørgensen, Geertz, & Roepstorff., 2009) or thinking about his emotions (Kapogiannis et al., 2009). Research also shows that mentalizing (as measured by the empathy quotient or EQ; Baron-Cohen & Wheelwright, 2004) predicts higher religiosity and supernatural beliefs (Willard & Norenzayan, 2013). Similarly, women tend to score higher than men on mentalizing (Lawson, Baron-Cohen, & Wheelwright, 2004) and this difference at least partially explains the gender gap in religiosity; women tend to score higher or religiosity and spirituality (Norenzayan, Gervais, & Trzesniewski, 2012; Walter & Davie, 1998). Further, people high on the autism spectrum (who tend to be male) are less likely to believe in God than those who score low on the spectrum. This relationship is partially mediated by mentalizing (Norenzayan et al., 2012). More recently, Routledge, Abeyta, and Roylance (2017) found that not only is higher mentalizing associated with greater religiosity, but it is people who are high in mentalizing that gain the greatest psychological benefits from being religious. Taken together, mentalizing appears to play a role in the belief in the supernatural.

Lastly, supernatural beliefs may be connected to personality. Indeed, agreeableness and conscientiousness are associated with spirituality (MacDonald, 2000; Saroglou & Muñoz-García, 2008) and religiosity (Kosek, 1999; Mijares & Espinosa, 2014; Saroglou & Muñoz-García, 2008; Taylor & MacDonald, 1999), Additionally, children rated higher in these traits were significantly more religious in adulthood (McCullough, Tsang, & Brion, 2013). A further examination of spirituality and personality revealed that the dimensions of spirituality (e.g., Experiential/Phenomenological, Cognitive-Affective Orientation to Spirituality, Paranormal and Occult Beliefs, Religiousness, Existential Well-Being/Positive Self-Appraisal) were associated

with various personality traits (MacDonald, 2000). Specifically, Cognitive Orientation Towards Spirituality was related to agreeableness, conscientiousness, and openness, Spiritual Religiousness was associated with agreeableness and conscientiousness, Experiential/Phenomenological Dimension and Paranormal Beliefs were related to openness, and finally, Existential Well-Being was negatively related to neuroticism.

One possible explanation for the relationship between personality and religious belief/spirituality is that these traits orient people to certain thoughts and behaviors that help fulfill personality-driven preferences. For instance, those high in conscientiousness may be drawn to religious beliefs because it fulfills their proclivity toward order and conformity (McCullough et al., 2003).

Although hardly studied in relation to the belief in supernatural agents and forces outside of a traditional religious context, the extant literature supports the possibility of personality as a predictor. Indeed, Thalbourne, Dunbar, and Delin (1995) find a positive relationship between paranormal belief and neuroticism. Schizotypal personality traits, associated with the tendency to hold odd/magical beliefs (Boden, Berenbaum, & Topper, 2012), are negatively correlated with extraversion, agreeableness, and conscientiousness and positively correlated with neuroticism and openness to experience (Ashouri, Mohammadzadeh, Najafi, & Zeraatkar, 2016). Likewise, Farias, Claridge, and Lalljee (2005) find that magical ideation is related to higher levels of neuroticism.

While empirical evidence supports the aforementioned perspectives, psychological motives also contribute to supernatural beliefs. The current research focuses primarily on social motives. Specifically, it examines distinct ways the need to belong may contribute to supernatural beliefs.

The Need to Belong and Loneliness

Humans have an innate proclivity to forge and maintain meaningful social bonds (Baumeister and Leary, 1995). To satisfy this need, people must have frequent positive contact with their interpersonal relationships, as well as feeling as if others care for them. From an evolutionary perspective, the belongingness need ensured one's survival. Resources and opportunities, such as food, shelter, and mates, were afforded to those who successfully formed relationships with others. Thus, humans are naturally averse to the loss of a social relationship. Meeting belongingness needs typically results in positive affect. For instance, happiness in life is related with having close personal relationships (Baumeister & Leary, 1995). Because people are inclined to maintain connections, a social monitoring system keeps these individuals attuned to the social environment. The individual can respond to the situation based upon social cues, such as facial expressions and vocal tones (Pickett, Gardner, & Knowles, 2004).

Disturbance in one's perceived belonging can lead to a host of negative emotions. For instance, when ostracized or socially rejected, one may feel depressed, helpless, and unworthy (Williams & Nida, 2011). Moreover, fMRI evidence shows that social exclusion activates an area of the brain, the dorsal anterior cingulate cortex, associated with pain (See Eisenberger, 2012 for a review). Because belongingness is theorized as a need, failing to satisfy it can extend feelings beyond transient negative affect into more enduring and distressing states such as anxiety, loneliness, and stress. These negative reactions serve, in part, to motivate the person to connect with others or avoid further social exclusion (Baumeister & Leary, 1995).

Loneliness is the eventual consequence of people feeling the need to belong is not being met (Mellor, Stokes, Firth, Hayashi, & Cummins, 2008). Some researchers have classified loneliness bi-dimensionally (i.e., social and emotional loneliness) (Weiss, 1973). Emotional

loneliness results from a lack of intimate attachments to others, such as family members and close friendships. Alternatively, social loneliness occurs when an individual does not have a network of friends with which they have interests in common (Weiss, 1973). However, in the proposed work, I use the conception of loneliness most commonly used in contemporary research: the perceived disparity between one's desired and existing interpersonal relationships (Hawkley, Thisted, Masi, & Cacioppo, 2011). Lonely individuals are not necessarily physically isolated from others; in fact, they may have many friends (Asher & Paquette, 2003). Rather, they lack intimate closeness and emotional fulfilment from their social connections (Cacioppo et al., 2000; Rokach, 2004). This is distinct from isolation, in which the individual is physically removed from others (Peplau & Perlman, 1982).

Loneliness appears to be a common experience, particularly as one ages. An estimate of loneliness levels among adults age 55 and over spans from 12.4 percent of the population to 32 percent, whereas closer to 5 to 12 percent of younger and middle-aged people experience loneliness (Masi, Chen, Hawkley, & Cacioppo, 2011). In more recent years, loneliness levels have risen in younger people. Eighth and 10th graders report a 31 percent increase in loneliness levels in 2015 compared to 2011, while 12th graders report a 22 percent increase (Twenge, 2017). Loneliness can be triggered by either change in relationship status, such as the loss of a friendship, or in changes in the person's relationship needs. With the recent increases in youth loneliness, it has been argued that smartphones and social media ironically potentially contribute to loneliness by making people feel disconnected from others (Twenge, 2017). Although anyone can experience loneliness, it appears more often in those who are shy, less socially adventurous, and low in self-esteem (Peplau & Perlman, 1982).

Social relationships are imperative for physical and mental well-being. Although health behaviors do not differ between those socially embedded and those not (Cacioppo et al., 2002), a recent meta-analysis reported that loneliness may increase the risk of premature mortality by 26 percent (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). One possible contributor to this rate is loneliness' deleterious effects on heart health; those high in loneliness experience poorer cardiovascular functioning compared to those low in loneliness (Hawkley & Cacioppo, 2010; O'Luanaigh et al., 2012). Specifically, lonely individuals experience elevated systolic blood pressure as they age (Cacioppo et al., 2002). Additionally, researchers have found they experience less restorative sleep (Cacioppo et al., 2002), diminished immunity (Pressman et al., 2005), and increased hypothalamic-pituitary adrenal (HPA) activation (Cacioppo et al., 2000).

Research indicates loneliness impacts mental health as well. Over a five-year longitudinal study, Cacioppo, Hawkley, and Thisted (2010) found loneliness predicted worsened symptoms of depression, above and beyond the effects of stressful life events, social support, negative affect, and other possible contributors. While loneliness and depression are significantly linked, they are distinct experiences (Adams, Sanders, & Auth, 2004; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). Furthermore, loneliness is associated with suicide ideation and attempts (Stravynski & Boyer, 2001), decreased optimism and self-esteem (Hawkley & Cacioppo, 2010), as well as impaired executive functioning (Cacioppo & Hawkley, 2009). Those socially disconnected also tend to be angry, anxious, and negative compared to the connected (Cacioppo et al., 2000).

Individuals struggling with loneliness may wish to connect with others; however, their perspective endorses the separation. Their perceived social environment is negative and hostile (Cacioppo & Hawkley, 2009; Hawkley & Cacioppo, 2007; Heinrich & Gullone, 2006). For

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example, highly lonely participants could discern pain in dislikeable faces better than nonlonely participants (Cacioppo & Hawkley, 2009). This suggests they are sensitive to negative cues. Further, loneliness influences how one feels during social interactions; lonely people are more likely to feel anxious, worry about negative evaluations from others, and avoid social situations altogether (Cacioppo & Hawkley, 2009). They may also be self-absorbed, socially withdrawn, less intimate, and distrustful of others (Heinrich & Gullone, 2006). This behavior contributes to loneliness by creating distance between the individual and others. Consequently, their expectations of negative social outcomes are validated, resulting in them remaining lonely (Cacioppo & Hawkley, 2009). Due to the difficulties faced by those struggling with loneliness, they may establish unique and less direct ways to fulfill belonging needs.

Supernatural Agents and Forces as Social Surrogates

Past research has established that belongingness needs are associated with social connectedness-related cognitions and attitudes directed at nonhuman targets. Epley, Akalis, Waytz, and Cacioppo (2008) found that loneliness was associated with anthropomorphizing of nonhuman objects (e.g., "experiences emotion", has "intentions", "free will", "consciousness" and "a mind of its own"). Similarly, when watching a social robot (i.e., a robot with the main purpose of interacting with humans) sing and dance to songs, those high in loneliness evaluated the robot more positively and as more socially present than those low in loneliness (Lee, Jung, Kim, & Kim, 2006). Furthermore, lonely individuals describe pets with more social traits, such as thoughtful, considerate, and sympathetic (Epley et al., 2008). Researchers have found that pets can even supplant human companionship (Veevers, 1985). In addition, individuals with unmet belongingness needs may be more likely to create "parasocial attachments", the act of forming attachments to television personae, such as sitcom characters or news anchors (Horton & Wohl,

1956). Gardner, Pickett, and Knowles (2005) demonstrated that while those high and low in the need to belong can form parasocial connections with human characters in television shows, only those high in the need to belong acquire it with animated characters. Thus, the threshold for connection is lower for those with a greater belongingness orientation, opening the door for connection through other means than human contact.

People attempt to gain belonging from supernatural beliefs as well. Some scholars have described the human relationship with God as an attachment, similar to an attachment with a parent or caregiver (Brandt, 2014; Kirkpatrick & Shaver, 1992). If the believer's attachment to God is perceived as secure, they tend to report less loneliness than those with insecure attachments to God (Kirkpatrick & Shaver, 1992). There is a sense of safety instilled into the belief in a God (Brandt, 2014), particularly in a world of uncertainty (Flannelly & Galek, 2010); God watches over, listens to, and is always with the believer (Kirkpatrick, Shillito, & Kellas, 1999). The constant connection to a figure, such as God, could perhaps mitigate an unmet belonging. In fact, Gebauer and Maio (2012) reported that belief in God can be motivated by the need to belong, but only for those who view God as an accepting, loving figure. A loving God contributes to one's sense of belonging, whereas a rejecting God does not. Moreover, researchers find a negative correlation between religiosity and loneliness (Johnson & Mullins, 1989; Kirkpatrick et al., 1999), suggesting that those who believe in God are less likely to feel alone.

Research clearly links religious beliefs and identifications to perceived belongingness and thus offers support for a social motivational account of supernatural beliefs. However, this research often confounds real social connections with supernatural beliefs. That is, is it the belief in God per se that serves a belongingness need or is it the actual social connections facilitated by this shared belief? A community of believers is, after all, a social group. For example, Rote, Hill,

and Ellison (2012) found that attending religious services increased social integration and feelings of social support, which is related to lower levels of loneliness. Rather than the perceived love of God exclusively mitigating loneliness, these believers received benefits from placing themselves in a social situation with like-minded individuals.

The current research was conducted to start to address this issue by focusing on socially-motivated supernatural beliefs that tend not to be part of traditional religious groups and identities that offer culturally-established regular outlets for human social connection and engagement. Supernatural beliefs are inherently social, often involving agents (e.g., gods, angels, ghosts) that can interact with or monitor humans. Similarly, they can involve forces, such as spiritual energy, that connect others (e.g., mind reading, ability to communicate with the dead). Rogers, Qualter, and Phelps (2007) suggest that perhaps belief in telepathy or communication with the dead decreases one's sense of aloneness in the world; however, they did not empirically test this idea.

The current literature, although lacking, offers some support for loneliness predicting supernatural belief. For example, loneliness was found to mediate the relationship between childhood trauma and belief in the paranormal (Rogers et al., 2007). Most relevant to the present proposal, Epley and colleagues (2008) manipulated social connection by administering a personality questionnaire. The participants were informed that the scores they received on the questionnaire determined their future social disposition. Some were told they will be lonely (e.g., "You're the type who will end up alone later in life"), while others learned that they that will be socially connected (e.g., "You're the type who has rewarding relationships throughout life") (pg. 116). The researchers found that those in the disconnected condition scored significantly higher in a measure assessing a range of supernatural beliefs (God, ghosts, miracles, angels, curses, the

Devil). In a follow-up study, the researchers examined negative emotions (e.g., fear) as an alternative explanation, but found loneliness predicted supernatural belief beyond fear.

Extant research provides preliminary support for supernatural agents and forces as social surrogates but also has many limitations. The work by Rogers and colleagues (2007) focused on childhood trauma as the driver of loneliness and was correlational in nature. The experimental work by Epley et al. (2008) did provide evidence that induced social exclusion can lead to increased supernatural beliefs. However, those studies were extremely underpowered; the most relevant study had a total of 57 participants across three conditions. In addition, the supernatural belief measure used in the research only contained six items and four of them involved agents and forces most aligned with traditional religious beliefs (God, the Devil, angels, and miracles). Thus, it is difficult to know if social exclusion motivated a true belief in supernatural agents or merely an attempt to align oneself with beliefs valued by others. Finally, none of these studies controlled for known social cognitive or other motivational correlates of supernatural beliefs (e.g., ToM, need for meaning).

Further experiments are needed to explore the link between belongingness needs and supernatural beliefs. For example, to date, no studies have tested whether experimentally affirming belongingness reduces supernatural beliefs and the associations between the need to belong and loneliness and supernatural beliefs. The present research tested these possibilities and addressed the limitations of past work by employing a high-powered sample and controlling for possible correlates of supernatural belief.

An Alternative Explanation

Although there is some support that the need to belong can motivate such beliefs, other psychological needs (i.e., the need for meaning) must be considered, as well. Individuals differ in

the extent to which they are concerned about meaning in their life; some people reflect often on the meaning in their life, while others are "existentially unconcerned" (Schlegel & Hicks, 2017). Recently, Abeyta and Routledge (2018) examined the link between need for meaning and religious beliefs. They reported that the need for meaning predicted religious commitment, beliefs, and experiences above and beyond other motivational (e.g., the need to belong) and cognitive (e.g., mentalizing, experiential thinking) predictors. This suggests that those with a high need for meaning could be drawn to belief in supernatural agents and forces to fulfill meaning, perhaps beyond the need to belong. Similarly, a lower sense of meaning in life engenders beliefs. While utilizing an established meaning threat manipulation, participants prompted to think about life as meaningless and insignificant reported a stronger belief in God (Norenzayan & Hansen, 2006), evil spirits (Routledge, Abeyta, & Roylance, 2016), miracles (Routledge, Roylance, & Abeyta, 2015), and magical beliefs, like aliens and conspiracies (Nelson, Abeyta, & Routledge, 2018; Routledge, Abeyta, & Roylance, 2017). Because the need for meaning may contribute to supernatural beliefs beyond the need to belong, I also examined this psychological motive.

The Current Research

In the current research, I present two studies. First, I present a preliminary study testing the claim that the belongingness motive and deficits in belongingness (i.e., loneliness) are related to supernatural beliefs. I then, present an experiment further testing the supernatural surrogate proposal. Specifically, I hypothesized that affirming belongingness would reduce supernatural beliefs and that the relationship between loneliness and supernatural beliefs, as well as the need to belong and supernatural beliefs, would weaken if one's belonging is affirmed. That is, if supernatural beliefs are motivated by belongingness concerns, then meeting people's

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belongingness needs should reduce their inclination to turn to supernatural social surrogates. I also considered the effect of the need for meaning on supernatural beliefs. If belonging works through meaning, such that affirming belonging increases meaning in life, then it may reduce the positive association between need for meaning and paranormal beliefs. I further predicted my hypothesized effects would remain significant when controlling for potential cognitive and personality correlates of supernatural beliefs.

Pilot Study

In a preliminary investigation of the supernatural social surrogates proposal, as part of a larger survey, I included a need to belong scale (Leary, Kelly, Cottrell, & Schreindorfer, 2012), a loneliness scale (Russell, Peplau, & Ferguson, 1978), and a scale encompassing a range of supernatural beliefs (Tobacyk, 2004), as well as one focusing on magical ideation (Winterstein et al., 2011). I hypothesized that there would be a significant and positive relationship between the need to belong and supernatural beliefs and magical ideation. That is, if supernatural agents and forces are motivated, in part, by a belongingness need, then a greater orientation to belongingness should be associated with a greater tendency to believe in such agents and forces.

For the relation between loneliness and supernatural beliefs and magical ideation, both negative and positive correlations are theoretically plausible. That is, one might predict a negative relationship if supernatural beliefs effectively reduce loneliness. This would be consistent with past work showing a negative correlation between religiosity and loneliness (Johnson & Mullins, 1989; Kirkpatrick et al., 1999). However, a positive correlation between loneliness and supernatural beliefs would suggest that loneliness motivates supernatural beliefs. These distinct possibilities reveal the importance of experimentation, which I utilized in the

primary study. However, an initial correlation test was utilized for the development of the experimental work.

Method

Participants and Procedure

Four hundred and four (226 female, M_{age} = 34.28, SD_{age} = 10.41) participants were recruited online from Amazon Mechanical Turk (AMT) as part of a larger survey. Participants were paid a small fee for their participation.

Materials

Loneliness. Participant's level of loneliness was measured with the 10-item Revised UCLA Loneliness Scale (Russell, Peplau, & Ferguson, 1978). This is a shortened version of the original 20-item scale. This measure is reported as highly reliability and valid (Russell, Peplau, & Cutrona, 1980; Russel, 1996). A sample item is "I lack companionship" (1 = *Never*, 4 = *Often*; α = .91, M = 2.18, SD = .62).

Need to Belong. The need to establish and maintain social bonds was assessed with a well-established ten item scale (Leary et al., 2012; sample item: "I want other people to accept me", 1 = *Strongly disagree*, 5= *Strongly agree*; α = .87, M = 3.00, SD = .78).

Supernatural Beliefs. Supernatural beliefs were measured with the Revised Paranormal Belief Scale (Tobacyk, 2004). This scale consists of twenty-six items concerning beliefs in seven dimensions: religion (e.g., There is a heaven and a hell), psi (e.g., Some individuals are able to levitate (lift) objects through mental forces), witchcraft (e.g., Black magic really exists), superstition (e.g., If you break a mirror, you will have bad luck), spiritualism (e.g., During altered states, such as sleep or trances, the spirit can leave the body), extraordinary life forms (e.g., The Loch Ness monster of Scotland exists), and precognition (e.g., Some psychics can

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accurately predict the future; 1 = *Strongly disagree*, 7 = *Strongly agree* α = .96, *M* = 2.75, *SD* = 1.32). This scale is one of the most popular measures of supernatural beliefs (Rogers et al., 2007).

Magical Ideation. As a second supernatural belief scale, magical ideation was measured with the 15-item Magical Ideation subscale of the Wisconsin Schizotypy Scale (Winterstein et al., 2011). In this questionnaire, participants mark each item (e.g., I have sometimes been fearful of stepping on sidewalk cracks) as "True" or "False" (α = .83, *M* = 2.76, *SD* = 3.15). Higher scores indicate stronger magical ideation.

Results and Discussion

I computed correlations between the variables of interest (See *Table 1*).

Table 1

Zero order correlations from the pilot study

Factor	2	3	4	5	6	7	8	9	10	11
1 Loneliness	.07	.20**	.12*	.13**	.15**	.07	.12*	.07	.13**	.01
2 Need to belong	___	.22**	.16**	.11*	.07	.18**	.12*	.12**	.15**	.17**
3 Magical ideation		___	.59**	.56**	.47**	.51**	.57**	.42**	.58**	.28**
4 Total paranormal beliefs			___	.84**	.89**	.66**	.89**	.63**	.89**	.73**
5 Abilities				___	.70**	.50**	.76**	.53**	.74**	.47**
6 Witchcraft					___	.53**	.73**	.50**	.77**	.61**
7 Superstition						___	.50**	.37**	.58**	.41**
8 Spiritualism							___	.61**	.81**	.53**
9 Extraordinary Life								___	.59**	.24**
10 Precognition									___	.50**
11 Religiosity										___

Note. p < .05*, *p* < .01**, *p* < .001***

The analyses revealed both loneliness and the need to belong as significantly positively related to supernatural beliefs and magical ideation. Moreover, when looking closely at the subscales of the Revised Paranormal Belief Scale (Tobacyk, 2004), it is apparent that specific supernatural beliefs are correlated with need to belong and loneliness. These results build upon Epley et al.'s (2008) by evidencing that belongingness needs are not only associated with traditional supernatural beliefs, like religiosity, that are also strongly connected to social groups. The pilot study established a link between belongingness concerns and supernatural beliefs and paved the way for critical experimentation.

Primary Study

The primary study built upon previous research and the pilot data by experimentally investigating the relationship between belongingness needs and supernatural beliefs. Specifically, I considered the following questions. Do the relationships between need to belong and loneliness and supernatural beliefs remain significant when controlling for other known correlates of supernatural beliefs? Does satiating the need to belong experimentally decrease supernatural beliefs? Does this effect remain significant when controlling for known correlates of supernatural beliefs? Critically, does satiating the need to belong mitigate the relationships between the need to belong and loneliness and supernatural beliefs? To answer these questions, I measured the need to belong, loneliness, other cognitive and motivational variables associated with supernatural beliefs, experimentally induced feelings of belongingness, and subsequently assessed supernatural beliefs.

Method

Participants and Procedure

Based on meta-analyses of research on motivated beliefs (Burke, Martens & Faucher, 2010) as well recent discussions in quantitative psychology (Simmons, Nelson, & Simonsohn, 2011) regarding the optimal sample size to detect reliable effects, I recruited 317 (170 females, M_{age} = 19.04, SD_{age} = 1.83) undergraduate introductory psychology students from a Midwestern university. In exchange for their participation, they received course credit. Participants were informed that the study concerned the relationship between beliefs and personal experiences. Upon arrival to the laboratory, participants completed all study materials on computers in a private cubicle. Participants were thanked and verbally debriefed after completion.

Materials

Intuition. The tendency to follow one's intuitive feelings was measured with the Faith in Intuition (FI) scale. This scale, originally a subscale of the Rational-Experiential Inventory (REI; Pacini & Epstein, 1999), has been adapted throughout the literature. I administered Alós-Ferrer and Hügelschäfer's (2012) 15-item version of the scale. A sample item is "For most decisions it is reasonable to rely on one's hunches" (1 = *Completely false*, 10 = *Completely true;* α = .83, M = 6.25, SD = 1.05).

Need for Meaning. The need for meaning was measured with the Need for Meaning scale (Abeyta & Routledge, 2018), adapted from the Need to Belong scale (Leary et al., 2012). This 10-item scale assesses the extent to which participants desire to attain significance and purpose in life. Participants responded to items such as, "It bothers me a great deal when I feel like my life lacks meaning or purpose", on a 6-point scale (1 = *Strongly disagree*, 6 = *Strongly agree;* α = .79, M = 3.93, SD = .76).

Loneliness. Participant's level of loneliness was measured with the 10-item Revised UCLA Loneliness Scale (Russell, Peplau, & Ferguson, 1978) previously described in the pilot study ($\alpha = .88$, $M = 2.12$, $SD = .52$).

Anthropomorphism. Participants' tendency to anthropomorphize was measured with the 15-item Individual Differences in Anthropomorphism Questionnaire (IDAQ; Waytz, Cacioppo, & Epley, 2014). A sample item is: "To what extent does the average mountain have free will?" (1 = *Not at all*, 10 = *Very much;* $\alpha = .83$, $M = 4.27$, $SD = 1.35$).

Mentalizing. Participants' proclivity to interpret their own and other's thoughts and feelings was measured with the short form Empathizing Quotient (EQ; Wakabayashi, et al., 2006), a valid and reliable scale (Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004). The short form consists of 22 items, such as "I can tell if someone is masking their true emotion" and "It is hard for me to see why some things upset people so much" (1 = *Strongly disagree*, 4 = *Strongly agree;* $\alpha = .83$, $M = 3.15$, $SD = 2.46$).

Need to Belong. Need to belong was assessed, as in the pilot study, with Leary et al.,'s (2012) Need to Belong scale ($\alpha = .76$, $M = 3.49$, $SD = .60$).

Personality Traits. Participants' personality traits (i.e., extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience) were measured with the Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003). A sample item is: "I see myself as extraverted, enthusiastic" (1 = *Strongly disagree*, 7 = *Strongly agree).* Considering the subscales consist of only two items per trait, correlations were conducted to analyze reliability. The two items for each subscale were significantly correlated with one another, though some of these correlations were relatively small (Extraversion: $r = .62$, $p = .001$, agreeableness: $r = .21$, p

= .001, conscientiousness: $r = .28$, $p = .001$, emotional stability: $r = .45$, $p = .001$, and openness to experience: $r = .23$, $p = .001$).

Belongingness Manipulation. Participants were randomly assigned to a belonging or control condition. Participants in the belonging condition were asked to think of two people (or groups of people) they belong to and to describe each person (or group), their relationship with them, why they feel they belonged, and how that relationship makes them feel. They were also asked to reflect on an instance in which they felt a sense of belonging with the people or group. Past research has established this manipulation as an effective way to increase one's sense of belonging (Lambert et al., 2013). Participants in the control condition were asked to think about and describe positive features of their personality that make them unique. They also reported why they feel it makes them unique and how that makes them feel. Lastly, they reflected on an instance in which they demonstrated their unique positive personality traits. I chose this task of having participants in the control condition write about positive personality traits that make them unique to both control for positivity and help reduce the likelihood that they would also bring to mind experiences high in belongingness.

Supernatural Belief. Supernatural beliefs were measured as in the pilot study with the Revised Paranormal Belief Scale (Tobacyk, 2004) to measure supernatural belief ($\alpha = .92$, $M = 3.23$, $SD = .98$).

Duke religiosity. Religiosity was measured with the 5-item Duke University Religion Index (DUREL; Koenig & Büssing, 2010). A sample item is "In my life, I experience the presence of the Divine (i.e., God)" (1 = *Definitely not true*, 5 = *Definitely true of me;* $\alpha = .93$, $M = 3.39$, $SD = 1.47$).

Magical Ideation. Magical ideation was measured, as in the pilot study, with the 15-item Magical Ideation subscale of the Wisconsin Schizotypy Scale (Winterstein et al., 2011; α = .74, M = 3.66, SD = 2.60).

Spirituality. Participants' spirituality was measured with the Spiritual Transcendence Scale (Piedmont, 1999). The scale consists of 24 items. A sample is "There is a higher plane of consciousness or spirituality that binds all people" (1 = *Strongly disagree*, 7 = *Strongly agree;* α = .92, M = 4.33, SD = 1.03).

Magical Beliefs. Magical beliefs were measured with a 15-item questionnaire (Nelson et al., 2018) which assesses belief in paranormal activity (e.g., Some houses are haunted), spiritual magic (e.g., Miracles are real), extraterrestrial intelligence (e.g., There is intelligent life on other planets in the universe), conspiracies (e.g., Some conspiracy theories are true), and the existence of magical creatures (e.g., Big Foot exists; 1 = *Totally disagree*, 9 = *Totally agree;* α = .88, M = 4.59, SD = 1.58).

Presence of Meaning. Presence of meaning was assessed with a subscale of the Meaning in Life Questionnaire (MILQ; Steger, Frazier, Oishi, & Kaler, 2006). This subscale consists of five items that assess the extent to which the participants feel their life is meaningful. A sample is "My life has a clear sense of purpose" (1 = *Absolutely untrue*, 7 = *Absolutely true;* α = .91, M = 5.09, SD = 3.41).

Results

First, I computed correlations to replicate the findings from the pilot study, such that loneliness and the need to belong will be positively associated with the different measures of supernatural beliefs (e.g., Revised Paranormal Beliefs Scale, Magical Ideation, and Magical Beliefs). See *Table 2* for the zero-order correlations. The results from the Pilot Study were

partially replicated; loneliness was only positively significantly related to magical ideation. The need to belong and the need for meaning were both positively significantly associated with magical ideation, paranormal beliefs, and spirituality, but not magical beliefs. The need for meaning was also significantly related to higher Duke religiosity.

Table 2

Zero order correlations from the Primary Study

Factor	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Loneliness	.04	.12*	-.08	.05	-.21**	-.35**	-.11*	-.26**	-.36**	-.09	-.01	.11*	-.05	-.08	-.07	-.04
2 Need to belong	_	.36**	.08	.08	.11*	.13*	.13*	-.05	-.40**	-.04	.12**	.22**	.09	.16**	.05	-.08
3 Need for meaning		_	.11*	.01	.11*	.13*	.10	-.05	-.26**	.13*	.16**	.21**	.05	.33**	.25**	.04
4 Intuition			_	.24**	.25**	.21**	.08	.02	.06	.11*	.12*	.19**	.09	.10	.07	.03
5 Anthropomorphism				_	.01	.07	.02	-.01	-.05	-.01	.22**	.20**	.10	.06	.02	.00
6 Mentalizing					_	.04	.01	-.05	-.01	-.02	.09	.06	.06	.09	.05	-.01
7 Extraversion						_	.03	-.06	.04	.19**	.15**	.20**	.18**	.18**	.12*	.02
8 Agreeableness							_	.08	.09	.08	.13*	.06	.07	.31**	.28**	.10
9 Conscientiousness								_	.28**	.24**	-.14*	-.20**	-.08	-.02	.04	.10
10 Neuroticism									_	.06	-.17**	-.20**	-.13*	-.07	-.03	.15**
11 Openness to experience										_	-.04	-.03	.02	.13*	.05	.10
12 Paranormal beliefs											_	.46**	.65**	.39**	.27**	.09
13 Magical ideation												_	.40**	.36**	.13*	-.04
14 Magical beliefs													_	.21**	.09	.12*
15 Spirituality														_	.68**	.10
16 DUREL															_	.08
17 Presence of meaning																_

Note. $p < .05^{*}$, $p < .01^{**}$

Next, I assessed the effectiveness of the manipulation. To do this, trained research assistants coded participant's open-ended responses to the manipulation and control prompts. Independent-samples t-tests were conducted to compare positivity, negativity, and reported belongingness between the conditions. Participants in the belongingness condition ($M = 3.43$, $SD = .68$) reported significantly more belonging than those in the control condition ($M = 1.07$, $SD = .23$); $t(315) = 41.48$, $p < .001$. Although I attempted to control for positivity, participants in the belongingness condition ($M = 3.57$, $SD = .60$) were significantly more positive than those in the control condition ($M = 3.30$, $SD = .62$); $t(315) = 3.83$, $p < .001$, though the difference between these means was relatively small. There were no significant differences in negativity; $t(315) = -1.10$, $p = .27$.

Since my hypotheses involved both continuous (e.g., loneliness, need to belong) and categorical (e.g., the experimental manipulation) variables, I conducted a series of regression analyses. For each of the dependent variables, I simultaneously entered the cognitive, motivational, and personality predictors, as well as the manipulation (dummy coded) in the regression analyses. As can be seen in Tables 3-19, there were no significant main effects of the manipulation on any of the dependent variables ($ps > .16$). These tables also show which of the cognitive, motivational, and personality variables are significant predictors of the different forms of magical thinking.

See *Table 3* for the predictors of magical ideation. Higher levels of intuition, anthropomorphism, extraversion, and lower levels of conscientiousness were significant unique predictors of magical ideation beliefs.

Table 3

Predictors of magical ideation

Variable	B	SE B	β	t	p
Loneliness	.54	.31	.11	1.72	.09
Need to belong	.35	.26	.08	1.34	.18
Need for meaning	.36	.20	.11	1.82	.07
Intuition	.28	.14	.11	2.04	.04
Anthropomorphism	.28	.10	.14	2.65	.01
Mentalizing	.19	.48	.03	0.39	.70
Extraversion	.28	.10	.17	2.80	.01
Agreeableness	.13	.14	.05	0.88	.38
Conscientiousness	-.29	.14	-.12	-2.08	.04
Emotional Stability	-.15	.12	-.08	-1.24	.22
Openness to Experience	-.11	.13	-.05	-0.82	.41
Manipulation (dummy coded)	.06	.27	.01	.22	.83

See *Table 4* for the predictors of paranormal beliefs. Higher levels of anthropomorphism, agreeableness, and lower levels of emotional stability were significant unique predictors of paranormal beliefs.

Table 4

Predictors of paranormal beliefs

Variable	B	SE B	β	t	p
Loneliness	-.12	.12	-.06	-1.0	.32
Need to belong	-.07	.10	-.05	-.71	.48
Need for meaning	.14	.08	.11	1.77	.08
Intuition	.04	.05	.05	.80	.42
Anthropomorphism	.14	.04	.19	3.43	.001
Mentalizing	.07	.19	.03	.36	.72
Extraversion	.06	.04	.10	1.49	.14
Agreeableness	.12	.06	.13	2.22	.03
Conscientiousness	-.09	.05	-.10	-1.69	.09
Emotional Stability	-.12	.05	-.17	-2.54	.01
Openness to Experience	-.06	.05	-.07	-1.16	.25
Manipulation (dummy coded)	-.08	.11	-.04	-.78	.44

Next, I examined the predictors of the scale broken down into subscales: witchcraft, superstitious beliefs, spiritualism, extraordinary life forms, precognition, religion, and psi abilities. See *Table 5* for the predictors of the belief in witchcraft. Personality seems to be the strongest predictor of this belief, as high levels of agreeableness and lower levels of conscientiousness and emotional stability were significant predictors.

Table 5

Predictors of witchcraft belief (paranormal belief subscale)

Variable	B	SE B	β	t	p
Loneliness	-.02	.18	-.07	-.11	.91
Need to belong	-.26	.15	-.11	-1.72	.09
Need for meaning	.12	.11	.07	1.07	.29
Intuition	.07	.08	.05	.86	.39
Anthropomorphism	.07	.06	.07	1.13	.26
Mentalizing	-.04	.27	-.01	-.16	.87
Extraversion	.05	.06	.06	.92	.36
Agreeableness	.17	.08	.13	2.08	.04
Conscientiousness	-.18	.08	-.14	-2.30	.02
Emotional Stability	-.15	.07	-.15	-2.17	.03
Openness to Experience	-.03	.08	-.02	-.36	.72
Manipulation (dummy coded)	-.05	.15	-.02	-.35	.73

See *Table 6* for the predictors of superstitious beliefs. Higher levels of anthropomorphism and lower levels of openness to experience were significant predictors of this belief.

Table 6

Predictors of superstitious belief (paranormal belief subscale)

Variable	B	SE B	β	t	p
Loneliness	-.11	.16	-.05	-.70	.48
Need to belong	.09	.14	.04	.63	.53
Need for meaning	.13	.10	.08	1.30	.20
Intuition	.12	.07	.10	1.73	.08
Anthropomorphism	.18	.05	.19	3.44	.001
Mentalizing	.07	.25	.02	.29	.77
Extraversion	.05	.05	.06	.95	.34
Agreeableness	.02	.07	.02	.32	.75
Conscientiousness	-.02	.07	-.01	-.22	.83
Emotional Stability	-.07	.06	-.08	-1.19	.24
Openness to Experience	-.18	.07	-.15	-2.61	.01
Manipulation (dummy coded)	-.02	.14	-.01	-.16	.88

See *Table 7* for the predictors of the Revised Paranormal Beliefs Scale measure of spiritualism. Higher levels of anthropomorphism and lower levels of emotional stability predicted spiritualism.

Table 7

Predictors of spiritualism belief (paranormal belief subscale)

Variable	B	SE B	β	t	p
Loneliness	-.19	.18	-.07	-1.04	.30
Need to belong	-.05	.15	-.02	-.33	.74
Need for meaning	.08	.11	.04	.65	.51
Intuition	.02	.08	.02	.27	.79
Anthropomorphism	.23	.06	.22	3.86	.001
Mentalizing	.36	.28	.09	1.29	.20
Extraversion	.05	.06	.06	.90	.37
Agreeableness	.13	.08	.09	1.54	.13
Conscientiousness	-.09	.08	-.07	-1.15	.25
Emotional Stability	-.21	.07	-.20	-3.10	.002
Openness to Experience	-.06	.08	-.05	-.79	.43
Manipulation (dummy coded)	-.07	.16	-.03	-.46	.65

See *Table 8* for the predictors of belief in extraordinary life forms. This belief was predicted by lower levels of conscientiousness.

Table 8

Predictors of extraordinary life belief (paranormal belief subscale)

Variable	B	SE B	β	t	p
Loneliness	-.04	.17	-.02	-.26	.80
Need to belong	-.05	.14	-.02	-.36	.72
Need for meaning	.04	.10	.03	.42	.68
Intuition	.05	.07	.04	.71	.48
Anthropomorphism	.11	.06	.11	1.92	.06
Mentalizing	-.15	.25	-.04	-.59	.56
Extraversion	.02	.05	.03	.46	.64
Agreeableness	.002	.08	.001	.02	.98
Conscientiousness	-.21	.07	-.18	-2.83	.01
Emotional Stability	-.02	.06	-.02	-.34	.73
Openness to Experience	-.01	.07	-.01	-.10	.92
Manipulation (dummy coded)	-.08	.14	-.03	-.57	.57

See *Table 9* for the predictors of precognition beliefs. Higher levels of anthropomorphism was the only significant predictor of this belief.

Table 9

Predictors of precognition belief (paranormal belief subscale)

Variable	B	SE B	β	t	p
Loneliness	-.10	.17	-.04	-.60	.56
Need to belong	.07	.14	.03	.46	.65
Need for meaning	.06	.11	.04	.59	.55
Intuition	.06	.08	.05	.83	.41
Anthropomorphism	.28	.06	.28	5.04	.001
Mentalizing	.38	.26	.10	1.48	.14
Extraversion	.05	.05	.06	1.00	.32
Agreeableness	.05	.08	.04	.70	.48
Conscientiousness	-.10	.07	-.08	-1.36	.18
Emotional Stability	-.09	.06	-.10	-1.47	.14
Openness to Experience	-.04	.07	-.04	-.60	.55
Manipulation (dummy coded)	.02	.15	.01	.11	.91

See *Table 10* for the predictors of the Revised Paranormal Beliefs Scale measure of religious belief. Higher levels of need for meaning and agreeableness were unique predictors. While not significant at p = .051, extraversion was approaching significance.

Table 10

Predictors of religious belief (paranormal belief subscale)

Variable	B	SE B	β	t	p
Loneliness	-.17	.19	-.06	-.87	.38
Need to belong	-.003	.16	-.001	-.02	.99
Need for meaning	.38	.12	.18	3.07	.002
Intuition	.01	.09	.01	.11	.92
Anthropomorphism	-.09	.07	-.07	-1.33	.18
Mentalizing	-.05	.30	-.01	-.18	.86
Extraversion	.12	.06	.13	1.96	.05
Agreeableness	.36	.09	.24	4.01	.001
Conscientiousness	.05	.09	.04	.58	.56
Emotional Stability	-.11	.07	-.10	-1.51	.13
Openness to Experience	-.14	.08	-.10	-1.72	.09
Manipulation (dummy coded)	-.24	.17	-.08	-1.42	.16

See *Table 11* for the predictors of belief in psi abilities. Similar to the measure of spiritualism, higher levels of anthropomorphism and lower levels emotional stability predicted this belief. Additionally, the need to belong was approaching significance (*p* = .05).

Table 11

Predictors of psi abilities belief (paranormal belief subscale)

Variable	B	SE B	β	t	p
Loneliness	-.19	.15	-.08	-1.25	.21
Need to belong	-.25	.13	-.13	-1.99	.05
Need for meaning	.12	.10	.08	1.22	.22
Intuition	-.01	.07	-.01	-.19	.85
Anthropomorphism	.18	.05	.21	3.67	.001
Mentalizing	-.15	.23	-.04	-.65	.51
Extraversion	.04	.05	.06	.84	.40
Agreeableness	.07	.07	.06	1.06	.29
Conscientiousness	-.10	.07	-.09	-1.47	.14
Emotional Stability	-.12	.06	-.15	-2.15	.03
Openness to Experience	.02	.06	.02	.37	.71
Manipulation (dummy coded)	-.11	.13	-.05	-.82	.42

See *Table 12* for the predictors of magical beliefs. Higher levels of extraversion and lower levels of emotional stability were significant unique predictors of magical beliefs. Next, I assessed the predictors of the subscales in the magical belief scale: ghost belief, religious belief, extraterrestrial intelligence, conspiracies, and belief in creatures.

Table 12

Predictors of magical beliefs

Variable	B	SE B	β	t	p
Loneliness	-.15	.20	-.05	-.72	.47
Need to belong	.01	.17	.003	.04	.97
Need for meaning	-.05	.13	-.03	-.42	.68
Intuition	.06	.09	.04	.71	.48
Anthropomorphism	.09	.07	.07	1.24	.22
Mentalizing	-.09	.31	-.02	-.29	.76
Extraversion	.15	.06	.16	2.39	.02
Agreeableness	.14	.09	.09	1.50	.14
Conscientiousness	-.06	.09	-.04	-.70	.49
Emotional Stability	-.17	.08	-.15	-2.23	.03
Openness to Experience	.01	.09	.01	.12	.91
Manipulation (dummy coded)	-.17	.18	-.05	-.93	.35

See *Table 13* for the predictors of ghost belief. Higher levels of anthropomorphism, extraversion, and lower levels of emotional stability significantly predicted ghost belief.

Table 13

Predictors of ghost belief (magical beliefs subscale)

Variable	B	SE B	β	t	p
Loneliness	-.37	.31	-.08	-1.17	.24
Need to belong	.14	.26	.03	.52	.60
Need for meaning	-.03	.20	-.01	-.15	.88
Intuition	.04	.14	.02	.32	.75
Anthropomorphism	.22	.10	.12	2.12	.04
Mentalizing	-.47	.48	-.07	-.98	.33
Extraversion	.26	.10	.17	2.67	.01
Agreeableness	.24	.14	.10	1.70	.09
Conscientiousness	.17	.14	.07	1.22	.23
Emotional Stability	-.40	.12	-.22	-3.36	.001
Openness to Experience	.04	.13	.02	.33	.74
Manipulation (dummy coded)	-.21	.27	-.04	-.76	.45

See *Table 14* for the predictors of the magical beliefs' subscale of religious beliefs. Higher levels of need for meaning, extraversion, and agreeableness significantly predicted this belief.

Table 14

Predictors of religious belief (magical beliefs subscale)

Variable	B	SE B	β	t	p
Loneliness	-.28	.28	-.06	-1.01	.31
Need to belong	-.34	.24	-.09	-1.43	.16
Need for meaning	.50	.18	.17	2.80	.01
Intuition	-.12	.12	-.06	-.97	.33
Anthropomorphism	.05	.09	.03	.58	.56
Mentalizing	.11	.43	.02	.27	.79
Extraversion	.18	.09	.13	2.07	.04
Agreeableness	.60	.13	.28	4.76	.001
Conscientiousness	.06	.12	.03	.50	.62
Emotional Stability	-.15	.11	-.09	-1.38	.17
Openness to Experience	-.05	.12	-.03	-.45	.66
Manipulation (dummy coded)	-.23	.24	-.05	-.94	.35

See *Table 15* for the predictors of the belief in extraterrestrial intelligence. Lower levels of the need for meaning and conscientiousness significantly predicted the belief of extraterrestrial intelligence.

Table 15

Predictors of extraterrestrial intelligence belief (magical beliefs subscale)

Variable	B	SE B	β	t	p
Loneliness	.08	.29	.02	.27	.79
Need to belong	.24	.25	.06	.96	.34
Need for meaning	-.51	.18	-.17	-2.80	.01
Intuition	.12	.13	.05	.91	.37
Anthropomorphism	.05	.10	.03	.55	.58
Mentalizing	.06	.45	.01	.14	.89
Extraversion	.11	.09	.08	1.17	.24
Agreeableness	-.20	.13	-.09	-1.47	.14
Conscientiousness	-.33	.13	-.16	-2.60	.01
Emotional Stability	-.05	.11	-.03	-.49	.62
Openness to Experience	.05	.12	.02	.40	.69
Manipulation (dummy coded)	-.10	.25	-.002	-.04	.97

See *Table* 16 for the predictors of conspiracy beliefs. The need for meaning negatively predicted this belief.

Table 16

Predictors of conspiracy belief (magical beliefs subscale)

Variable	B	SE B	β	t	p
Loneliness	.06	.29	.01	.20	.84
Need to belong	.16	.24	.05	.67	.50
Need for meaning	-.37	.18	-.13	-2.05	.04
Intuition	.10	.13	.05	.78	.43
Anthropomorphism	.07	.10	.04	.70	.49
Mentalizing	.33	.44	.05	.74	.46
Extraversion	.10	.09	.07	1.09	.28
Agreeableness	-.04	.13	-.02	-.31	.76
Conscientiousness	-.13	.13	-.07	-1.02	.31
Emotional Stability	-.13	.11	-.08	-1.21	.23
Openness to Experience	.06	.12	.03	.46	.65
Manipulation (dummy coded)	-.13	.25	-.03	-.50	.62

See *Table 17* for predictors of belief in creatures. This belief was also not predicted by any of the factors included in this study.

Table 17

Predictors of creature belief (magical beliefs subscale)

Variable	B	SE B	β	t	p
Loneliness	-.22	.26	-.06	-.86	.39
Need to belong	-.16	.22	-.05	-.74	.46
Need for meaning	.16	.16	.06	.96	.34
Intuition	.18	.11	.10	1.58	.12
Anthropomorphism	.02	.09	.02	.28	.78
Mentalizing	-.48	.39	-.08	-1.21	.23
Extraversion	.11	.08	.09	1.39	.17
Agreeableness	.08	.12	.04	.69	.49
Conscientiousness	-.08	.11	-.04	-.68	.50
Emotional Stability	-.13	.10	-.09	-1.33	.18
Openness to Experience	-.05	.11	-.03	-.41	.68
Manipulation (dummy coded)	-.25	.22	-.07	-1.13	.26

See *Table 18* for the predictors of spirituality. Higher levels of the need for meaning and agreeableness significantly predict spirituality.

Table 18

Predictors of spirituality

Variable	B	SE B	β	t	p
Loneliness	-.14	.12	-.07	-1.14	.26
Need to belong	-.02	.10	-.01	-.24	.81
Need for meaning	.37	.08	.28	4.86	.001
Intuition	.003	.05	.004	.06	.95
Anthropomorphism	.03	.04	.04	.76	.45
Mentalizing	.20	.19	.07	1.07	.28
Extraversion	.05	.04	.08	1.38	.17
Agreeableness	.26	.06	.26	4.63	.001
Conscientiousness	-.04	.05	-.04	-.68	.50
Emotional Stability	-.04	.05	-.05	-.86	.39
Openness to Experience	.04	.05	.05	.82	.41
Manipulation (dummy coded)	-.12	.11	-.06	-1.15	.25

See *Table 19* for the predictors of Duke religiosity. Again, higher levels of the need for

meaning and agreeableness significantly predict this belief.

Table 19

Predictors of Duke religiosity

Variable	B	SE B	β	t	p
Loneliness	-.15	.21	-.05	-.72	.47
Need to belong	-.34	.18	-.12	-1.87	.06
Need for meaning	.55	.14	.24	4.06	.000
Intuition	.01	.10	.01	.10	.92
Anthropomorphism	.01	.07	.01	.20	.85
Mentalizing	.09	.33	.02	.28	.78
Extraversion	.10	.07	.09	1.41	.16
Agreeableness	.46	.10	.27	4.69	.000
Conscientiousness	.06	.09	.04	.68	.50
Emotional Stability	-.09	.08	-.07	-1.10	.27
Openness to Experience	-.05	.09	-.03	-.59	.56
Manipulation (dummy coded)	-.23	.19	-.07	-1.24	.21

Next, I tested for potential interactions between trait predictors and the experimental manipulation using the PROCESS macro. My primary prediction considers an interaction between loneliness and the manipulation, such that boosting one's belonging weakens the relationship between loneliness and supernatural beliefs. No interactions were significant (ps > .05). I was also interested in the interaction between the need to belong and the manipulation. Similarly, these interactions were non-significant (ps > .16), except for the subscale of religious beliefs from the Revised Paranormal Beliefs Scale ($F(1, 312) = 5.39$, $p = .02$, $\eta_p^2 = .02$). To probe the nature of this interaction, I used regression analyses to test predicted mean and simple slope differences. At high levels of need to belong (+ 1 SD), the effect of the manipulation was $b = -.58$, 95% CI [-1.07, -0.09], $t = -2.34$, $p = .02$, such that the belonging affirmation decreased religious belief compared to the control condition. At low levels of need to belong (- 1 SD), there was no significant effect, $b = .24$, 95% CI [-0.25, 0.72], $t = .96$, $p = .34$. Looked at differently, within the belonging affirmation condition, the relationship between need to belong and the religious subscale was non-significant, $b = .08$, 95% CI [-0.29, 0.46], $t = .44$, $p = .66$. Within the control condition, it was significant, $b = .76$, 95% CI [0.33, 1.19], $t = 3.48$, $p < .001$. These patterns suggest a fulfilled sense of belonging weakens the relationship between the need to belong and religious supernatural belief. *Figure 1* depicts this interaction.
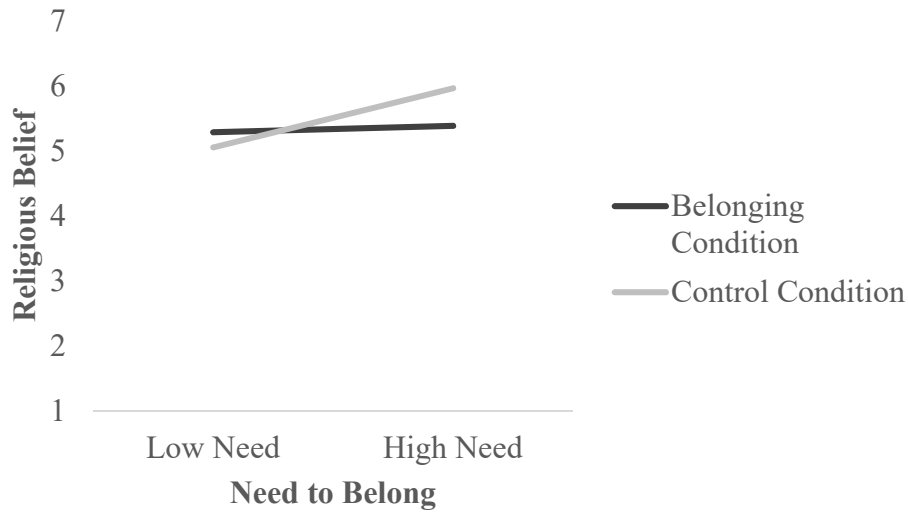
Figure 1. The interaction between the manipulation and need to belong on religious supernatural beliefs.

Since need for meaning is a well-established predictor of religious beliefs and manipulated belongingness has been shown to affirm meaning, I also assessed the interaction between the need for meaning and the manipulation. While most interactions were non-significant (ps > .36), I found interactions on the superstition and precognition subscales of the Revised Paranormal Beliefs Scale.

The interaction between the manipulation and the superstition subscale of the Revised Paranormal Beliefs Scale was significant, $F(1, 312) = 4.66$, $p = .03$, $\eta_p^2 = .02$. At high levels of need for meaning (+ 1 SD), the effect of the manipulation was non-significant, $b = -.35$, 95% CI [0.75, 0.05], $t = -1.74$, $p = .08$. At low levels of need for meaning (- 1 SD), the effect was non-significant, $b = .27$, 95% CI [-0.13, 0.67], $t = 1.33$, $p = .18$. Within the belonging condition, the relationship between need for meaning and the superstition subscale was non-significant, $b = .02$, 95% CI [-0.24, 0.26], $t = 0.09$, $p = .93$. Within the control condition, a significant effect was

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observed, $b = .42$, 95% CI [0.14, 0.70], $t = 2.96$, $p = .003$. Again, I find the same pattern, though the predicted means test was not significant. *Figure 2* shows this interaction.
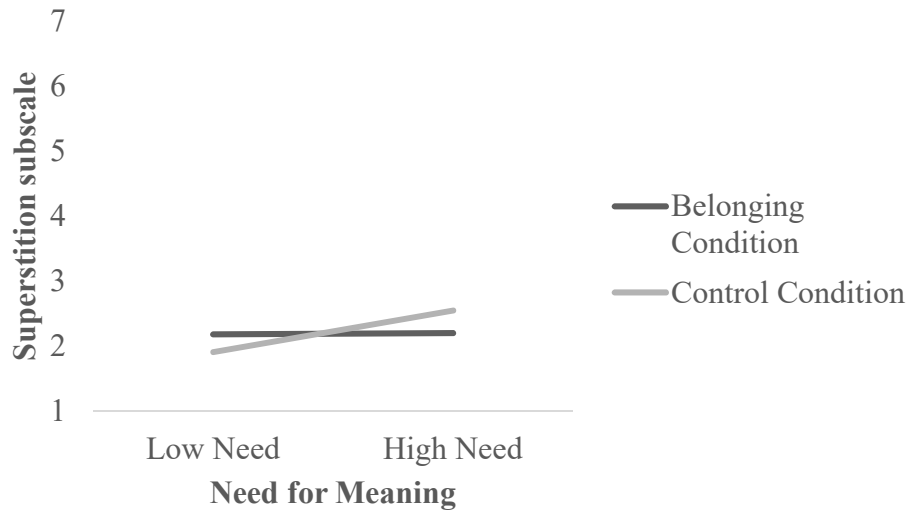

Figure 2. The interaction between the manipulation and need for meaning on the Superstition subscale of the Revised Paranormal Beliefs Scale.

Finally, there was a significant interaction on the precognition beliefs subscale of the Revised Paranormal Beliefs Scale, $F(1, 312) = 5.29$, $p = .02$, $\eta_p^2 = .02$. At high levels of need for meaning (+ 1 SD), the effect of the manipulation was non-significant, $b = -.38$, 95% CI [-0.80, 0.05], $t = -1.74$, $p = .08$. At low levels of need for meaning (- 1 SD), the observed effect was non-significant, $b = .33$, 95% CI [-0.09, 0.76], $t = 1.53$, $p = .13$. Within the belonging condition, the relationship between need for meaning and the precognition subscale was non-significant, $b = -.03$, 95% CI [-0.29, 0.23], $t = -.23$, $p = .82$. Within the control condition, a significant effect was observed, $b = .43$, 95% CI [0.14, 0.73], $t = 2.86$, $p = .01$. This pattern suggests that those with a high need for meaning reported less precognition belief when in the belonging condition as compared to those in the control condition, though again this specific predicted means test was not significant. The interaction is demonstrated in *Figure 3*.
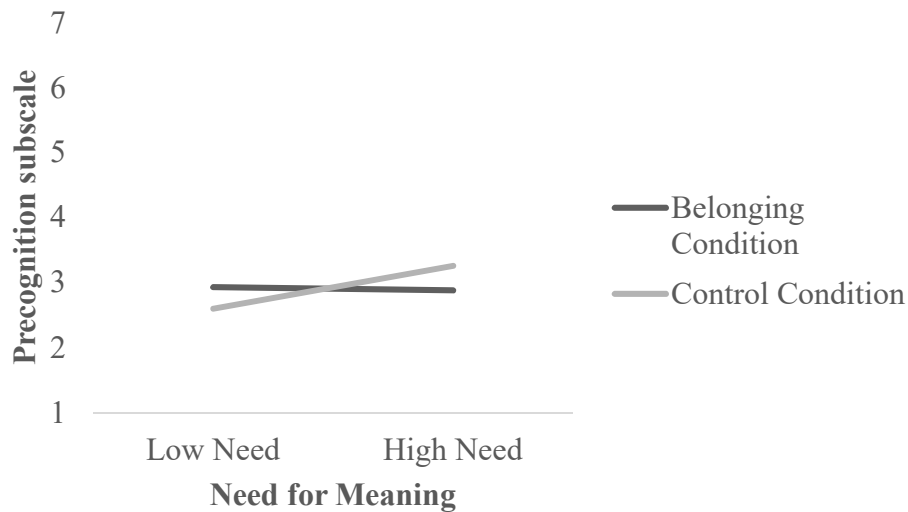
Figure 3. The interaction between the manipulation and need for meaning on the Precognition subscale of the Revised Paranormal Beliefs Scale.

Discussion

Previous literature has broadly examined how social learning, cognitive processes, personality, and psychological motives contribute to paranormal and supernatural beliefs and interests. In this study, using an experimental design, I more specifically examined how social motivation (e.g., the need to belong and loneliness) might contribute to belief in supernatural agents and forces. First, I proposed that individuals with an unmet need to belong (i.e., lonely individuals) or those dispositionally high in the need to belong will be more inclined toward supernatural beliefs. This proposal was not well supported. While some supernatural beliefs were associated with social motivators, many of the correlations did not replicate from the Pilot Study, suggesting the effect is not stable. Additionally, the need for meaning was associated with the most supernatural beliefs, rather than social motivation assessed by loneliness and the need to belong. Moreover, I did not observe any main effects for the belongingness manipulation on supernatural beliefs.

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My primary predictions involved interactions between loneliness and the manipulation, and the need to belong and the manipulation, such that boosting one's belonging weakens the relationship between loneliness (or the need to belong) and supernatural beliefs. There were no significant interactions between loneliness and the manipulation. There was one significant interaction between the need to belong and the manipulation on religious supernatural belief. The pattern of results suggested that affirming a sense of belongingness reduced religiosity among those high in the need to belong. This finding is consistent with my hypothesis that satisfying one's belonging would make individuals less likely to seek supernatural surrogates. However, this pattern is difficult to interpret, given religious supernatural beliefs also help connect people to others within a group.

Though not the primary focus of my research, I observed several interactions involving the need for meaning and the belongingness manipulation, specifically on superstitious and precognition beliefs. Affirming belonging mitigated the relationship between need for meaning and these beliefs. This general pattern is consistent with the possibility that the belongingness affirmation bolstered meaning, thus reducing the link between the need for meaning and certain supernatural beliefs. Indeed, existential threats that implicate the need for meaning are a consistent motivator of magical beliefs (Nelson et al., 2018; Norenzayan & Hansen, 2006; Routledge et al., 2017; Routledge et al., 2016; Routledge et al., 2015). This study provides more evidence in favor of the need for meaning, rather than the need to belong, as a motivator of supernatural beliefs. However, further research is needed.

When analyzing other predictors of beliefs, some interesting patterns emerged. As noted, contrary to my predictions, loneliness and the need to belong did not uniquely predict beliefs when other potential predictors were controlled. This suggests that social motives do not have a

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strong influence on the development and continuity of supernatural beliefs when compared to other predictors. Again, the need for meaning predicted higher religious belief and spirituality, consistent with recent findings (Abeyta & Routledge, 2018). However, when controlling for other predictors, the need for meaning did not reliably predict magical beliefs not traditionally associated with religiosity, suggesting those with a high need for meaning might be particularly attracted to more traditional religious beliefs to satiate their need for meaning. Additionally, the need for meaning negatively predicted extraterrestrial intelligence and conspiracy beliefs, which is potentially inconsistent with Routledge et al.'s (2017) finding that a lack of meaning and a subsequent desire to find meaning (search for meaning) strengthens belief in extraterrestrial intelligence. However, in the present work, I did not assess the search for meaning. This was the key predictor of belief in extraterrestrial intelligence identified by Routledge et al. (2017).

Personality was also a prominent predictor of supernatural beliefs in the current study. Unexpectedly, extraversion was a predictor of religious beliefs. Previous research finds no significant relationship between these variables (Saroglou & Muñoz-García, 2008). Extraversion additionally predicted magical ideation, magical beliefs in general, and ghost beliefs. In line with past research (Kosek, 1999; McCullough et al., 2013; Mijares & Espinosa, 2014; Saroglou & Muñoz-García, 2008; Taylor & MacDonald, 1999), agreeableness predicted religious and spirituality beliefs. Agreeableness also predicted overall paranormal beliefs and the belief in witchcraft. Considering the nature of agreeable individuals, this is perhaps surprising. That is, individuals concerned with the approval of others would not be expected to be drawn to fringe beliefs in the paranormal and witches. Lower levels of conscientiousness predicted belief in magical ideation, witchcraft, and alien lifeforms. Surprisingly, conscientiousness did not predict religious or spiritual beliefs, which contrasts with previous findings (Kosek, 1999; McCullough

et al., 2013; Mijares & Espinosa, 2014; Saroglou & Muñoz-García, 2008; Taylor & MacDonald, 1999). Moreover, less emotional stability predicted many beliefs. Specifically, it uniquely predicted paranormal beliefs, witchcraft, spirituality, psi abilities, general magical beliefs, and ghost belief. I did not replicate Farias et al., (2005) finding that neuroticism (i.e., less emotional stability) is associated with magical ideation. I did, however, find support for the notion that neuroticism is related to the tendency to hold paranormal and magical beliefs (Boden et al., 2012; Thalbourne et al., 1995). Lastly, openness to experience negatively predicted superstitious beliefs.

Beliefs are influenced by trait personality (McCullough et al., 2003), but in most cases, it is not theoretically clear why certain personality traits would predict specific beliefs. It is possible that, for example, belief in the existence of extraterrestrial intelligence may disrupt the known order of the world. This disturbance would cause uncertainty in those high in conscientiousness, thus explaining why lower conscientiousness predicts belief in alien lifeform. Furthermore, less emotional stability is associated with negative affect, such as fearfulness (Watson, 2000). Although I did not measure their attitudes toward these beliefs, it is possible that fear promotes belief. For instance, neuroticism might predict ghost belief because those individuals are fearful of experiences they cannot explain and thus, believe in a haunting. Future work should delve into the precise reasons personality traits predict beliefs. It is important to note that the present work was not designed to examine personality. Personality traits were measuredly largely as control variables. Thus, the short measure I used may be responsible for the unexpected results. In fact, as previously noted, each trait was assessed with only two items and the correlation between the two items for each trait was small on a number of the traits. Therefore, these results must be interpreted with caution.

When considering the cognitive predictors, mentalizing did not predict any beliefs when controlling for all other predictors. This suggests that other cognitive predictors may have a more powerful effect on the supernatural beliefs. Further, intuition predicted magical ideation, which is consistent with research showing that magical ideation implicates intuitive cognitive processes (Wolfradt, Oubaid, Straube, Bischoff, & Mischo, 1999). Of the predictors included in the study, anthropomorphism was the strongest predictor. Consistent with other findings (Linderman & Aarnio, 2007; Norenzayan et al., 2008; Willard & Norenzayan, 2013), anthropomorphism predicted belief in magical ideation, paranormal beliefs in general, superstitious beliefs, spirituality, precognition, psi abilities, and ghost belief. One's heightened attention to patterns and agents in the environment may draw them toward these beliefs.

The present research had several limitations. Although past research had success with a variant of my manipulation (Lambert et al., 2013), it may have lacked sufficient experimental impact. That is, the manipulation was subtle; merely affirming participant's belonging by asking them to reflect on their experiences may not have been strong enough to influence beliefs. Perhaps a follow-up study would address this issue by threatening belonging, which has exhibited success in the past (Epley et al., 2008; Graeupner & Coman, 2016; Rogers et al., 2007). However, regardless of the manipulation, I did not find a reliable relationship between trait belongingness variables (e.g., need to belong, loneliness), which suggests that social motives may not be particularly strong drivers of supernatural beliefs. Another limitation is the convenience sample. When interpreting results, one has to be cautious not to overstate the effect in the population. My findings are generalizable to a Western, Educated, Industrialized, Rich, and Democratic (WEIRD) sample (Henrich, Heine, & Norenzayan, 2010). Specifically, my

sample consists mainly of Caucasian college students in a Midwestern city, and thus, cannot be generalized beyond this sample.

Overall, this research did not offer support for the social surrogate hypothesis. Though initial correlations from a pilot study and related previous research suggested that non-traditional supernatural beliefs may be partially motivated by social needs, I did not find evidence for a social needs-based model in my experiment. The patterns I did observe suggest need for meaning, cognitive traits (particularly anthropomorphism), and perhaps personality, are more influential than social motives in driving diverse supernatural and paranormal beliefs. In future research, I will further examine the need for meaning as a psychological motive for supernatural belief.

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APPENDIX A. FAITH IN INTUITION (FI; ALOS-FERRER AND HUGELSCHAFER, 2012)

Instructions: Respond to the following statements based on the extent to which they are generally "true" or "false" for you (1 = *Completely false*, 10 = *Completely true*).

1. When I need to form an opinion about an issue, I completely rely on my intuition.
2. For most decisions it is reasonable to rely on one's hunches.
3. I am a very intuitive person.
4. When it comes to people, I can trust my first impressions.
5. I trust my initial feelings about people.
6. I believe in trusting my hunches.
7. The first idea is often the best one.
8. When it comes to trusting people, I usually rely on my gut feelings.
9. I can usually feel when a person is a right or wrong even if I can't explain how I know.
10. My initial impressions of people are almost always right.
11. I am quick to form impressions about people.
12. When it comes to buying decisions, I often follow my gut feelings.
13. I can typically sense right away when a person is lying.
14. If I get lost while driving or cycling, I typically decide spontaneously which direction to take.
15. I believe I can judge character pretty well from a person's appearance.

APPENDIX B. NEED FOR MEANING (ABEYTA & ROUTLEDGE, 2018)

Instructions: For each of the following statements, please indicate whether you agree or disagree by selecting the most applicable response (1 = *Strongly disagree*, 6 = *Strongly agree*).

1. If I cannot see the meaning in my life I don't let it bother me.
2. I try hard not to do things that will make me feel like my life lacks meaning.
3. I seldom worry about the meaning of life.
4. I need to feel that life is full of meaning and purpose.
5. I want to feel meaningful.
6. I do not like to feel like my life has no real meaning.
7. Being no more significant than any other organism on the planet does not bother me.
8. I have a strong need to find a sense of meaning or purpose in life.
9. It bothers me a great deal when I feel like my life lacks meaning or purpose.
10. I am easily distressed by the thought that my life is insignificant.

APPENDIX C. REVISED UCLA LONELINESS SCALE (RUSSEL ET AL., 1980)

Instructions: The following statements describe how people sometimes feel. For each statement, please indicate how often you feel the way by circling the appropriate response (1 = *Never*, 4 = *Always*).

1. How often do you feel that you lack companionship?
2. How often do you feel that you have a lot in common with the people around you?
3. How often do you feel close to people?
4. How often do you feel left out?
5. How often do you feel that no one really knows you well?
6. How often do you feel isolated from others?
7. How often do you feel that there are people who really understand you?
8. How often do you feel that people are around you but not with you?
9. How often do you feel that there are people you can talk to?
10. How often do you feel that there are people you can turn to?

APPENDIX D. INDIVIDUAL DIFFERENCES IN ANTHROPOMORPHISM

QUESTIONNAIRE (IDAQ; WAYTZ, CACIOPPO, & EPLEY, 2014)

1= Not at all, 10= Very much

1. To what extent does technology- devices and machines for manufacturing, entertainment, and productive processes (e.g., cars, computers, television sets)-have intentions?
2. To what extent does the average fish have free will?
3. To what extent does the average mountain have free will?
4. To what extent does a television set experience emotions?
5. To what extent does the average robot have consciousness?
6. To what extent do cows have intentions?
7. To what extent does a car have free will?
8. To what extent does the ocean have consciousness?
9. To what extent does the average computer have a mind of its own?
10. To what extent does a cheetah experience emotions?
11. To what extent does the environment experience emotions?
12. To what extent does the average insect have a mind of its own?
13. To what extent does a tree have a mind of its own?
14. To what extent does the wind have intentions?
15. To what extent does the average reptile have consciousness?

APPENDIX E. EMPATHIZING QUOTIENT (EQ; WAKABAYASHI ET AL., 2006)

Instructions: Read each statement carefully and judge the extent to which you agree or disagree by selecting the appropriate option for each item (1 = *Strongly disagree*, 4 = *Strongly agree*).

1. I can easily tell if someone wants to enter a conversation.
2. I really enjoy caring for other people.
3. I find it hard to know what to do in a social situation.
4. I often find it difficult to judge if something is rude or polite.
5. In a conversation, I tend to focus on my own thoughts rather than on what my listener might be thinking.
6. I can pick up quickly if someone says one thing but means another.
7. It is hard for me to see why some things upset people so much.
8. I find it easy to put myself in somebody else's shoes.
9. I am good at predicting how someone will feel.
10. I am quick to spot when someone in a group is feeling awkward or uncomfortable.
11. I can't always see why someone should have felt offended by a remark.
12. I don't tend to find social situations confusing.
13. Other people tell me I am good at understanding how they are feeling and what they are thinking.
14. I can easily tell if someone else is interested or bored with what I am saying.
15. Friends usually talk to me about their problems as they say that I am very understanding.
16. I can sense if I am intruding, even if the other person doesn't tell me.
17. Other people often say that I am insensitive, though I don't always see why.
18. I can tune into how someone else feels rapidly and intuitively.
19. I can easily work out what another person might want to talk about.
20. I can tell if someone is masking their true emotion.
21. I am good at predicting what someone will do.
22. I tend to get emotionally involved with a friend's problems.

APPENDIX F. NEED TO BELONG (LEARY ET AL., 2012)

Instructions: For each of the statements below, indicate the degree to which you agree or disagree with the statement (1 = *Strongly disagree*, 5 = *Strongly agree*).

1. If other people don't seem to accept me, I don't let it bother me.
2. I try hard not to do things that will make other people avoid or reject me.
3. I seldom worry about whether other people care about me.
4. I need to feel that there are people I can turn to in times of need.
5. I want other people to accept me.
6. I do not like being alone.
7. Being apart from my friends for long periods of time does not bother me.
8. I have a strong need to belong.
9. It bothers me a great deal when I am not included in other people's plans.
10. My feelings are easily hurt when I feel that others do not accept me.

APPENDIX G. TEN ITEM PERSONALITY INVENTORY (TIPI; GOSLING,

RENTFROW, & SWANN, 2003)

Instructions: Here are a number of personality traits that may or may not be apply to you. Please indicate the extent to which you agree or disagree with each statement. Using the scale below, you should rate the extent to which the pair of traits applies to you, even if one characteristics applies more strongly than the other.

1= Strongly disagree, 2 = Moderately disagree, 3 = Slightly disagree, 4 = Neither agree nor disagree, 5 = Slightly agree, 6 = Moderately agree, 7 = Strongly agree

I see myself as…

1. …extraverted, enthusiastic.
2. …critical, quarrelsome.
3. …dependable, self-disciplined.
4. …anxious, easily upset.
5. …open to new experiences, complex.
6. …reserved, quiet.
7. …sympathetic, warm.
8. …disorganized, careless.
9. …calm, emotionally stable.
10. …conventional, uncreative.

APPENDIX H. BELONGINGNESS MANIPULATION

Belongingness Condition:

1. Please think about two people (or groups of people) that you belong to. Describe each person (or group) and your relationship to them.
2. Why do you feel that you belong to these people (or groups of people)?
3. How do these relationships make you feel?
4. Please reflect on a particular instance in which you felt a sense of belonging with the people or groups of people you thought about.

Control Condition:

1. Please think about two positive features of your personality that makes you unique. Describe each feature.
2. Why do you feel that these features of your personality make you unique?
3. How do these features make you feel?
4. Please reflect on a particular instance in which you demonstrated your unique positive personality traits.

APPENDIX I. REVISED PARANORMAL BELIEF SCALE (TOBACYK, 2004)

Instructions: For each statement below, indicate the degree to which you agree or disagree with the statement (1 = *Strongly disagree*, 7 = *Strongly agree*).

1. The soul continues to exist though the body may die.
2. Some individuals are able to levitate (lift) objects through mental forces.
3. Black magic really exists.
4. Black cats can bring bad luck.
5. Your mind or soul can leave your body and travel (astral projection).
6. The abominable snowman of Tibet exists.
7. Astrology is a way to accurately predict the future.
8. There is a devil.
9. Psychokinesis, the movement of objects through psychic powers, does exist.
10. Witches do exist.
11. If you break a mirror, you will have bad luck.
12. During altered states, such as sleep or trances, the spirit can leave the body.
13. The Loch Ness monster of Scotland exists.
14. The horoscope accurately tells a person's future.
15. I believe in God.
16. A person's thoughts can influence the movement of a physical object.
17. Through the use of formulas and incantations, it is possible to cast spells on persons.
18. The number "13" is unlucky.
19. Reincarnation does occur.
20. There is life on other planets.
21. Some psychics can accurately predict the future.
22. There is a heaven and a hell.
23. Mind reading is not possible.
24. There are actual cases of witchcraft.
25. It is possible to communicate with the dead.
26. Some people have an unexplained ability to predict the future.

APPENDIX J. DUKE UNIVERSITY RELIGION INDEX (DUREL; KOENIG &

BUSSING, 2010)

1. How often do you attend church or other religious meetings?
   1 = Never
   2 = Once a year or less
   3 = A few times a year
   4 = A few times a month
   5 = Once a week
   6 = More than once a week
2. How often do you spend time in private religious activities, such as prayer, mediation, or Bible study?
   1 = Rarely or never
   2 = Few times a month
   3 = Once a week
   4 = Two or more times a week
   5 = Daily
   6 = More than once a day

The following section contains 3 statements about religious belief or experience. Please indicate the extent to which each statement is true or not for you (1 = *Definitely not true*, 5 = *Definitely true of me).*

3. In my life, I experience the presence of the Divine (i.e., God).
4. My religious beliefs are what really lie behind my whole approach to life.
5. I try hard to carry my religion over into all other dealings in life.

APPENDIX K. WISCONSIN SCHIZOTYPY SCALE – MAGICAL IDEATION

SUBSCALE (WINTERSTEIN ET AL., 2011)

Instructions: Please read each statement and indicate whether or not the statement is true for you. There are no right or wrong answers. Please answer as openly and honestly as possible (1 = *True*, 2 = *False*).

1. I have felt that there were messages for me in the way things were arranged, like in a store window.
2. I have occasionally had the silly feeling that a TV or radio broadcaster knew I was listening to him.
3. I have noticed sounds on my records that are not there at other times.
4. I have had the momentary feeling that someone's place has been taken by a look-alike.
5. At times I perform certain little rituals to ward off negative influences.
6. I have sometimes felt that strangers were reading my mind.
7. If reincarnation were true, it would explain some unusual experiences I have had.
8. I have sometimes had the passing thought that strangers are in love with me.
9. The hand motions that strangers make seem to influence me at times.
10. I have sometimes been fearful of stepping on sidewalk cracks.
11. Numbers like 13 and 7 have no special powers.
12. I have had the momentary feeling that I might not be human.
13. I think I could learn to read others' minds if I wanted to.
14. Horoscopes are right too often for it to be a coincidence.
15. I have worried that people on other planets may be influencing what happens on Earth.

APPENDIX L. SPIRITUAL TRANSCENDENCE SCALE (PIEDMONT, 1999)

1 = Strongly disagree, 7 = Strongly agree

1. Although dead, images of some of my relatives continue to influence my current life.
2. I meditate and/or pray so that I can reach a higher spiritual plane of consciousness.
3. I have had at least one "peak" experience.
4. I feel that on a higher level all of us share a common bond.
5. All life is interconnected.
6. There is a higher plane of consciousness or spirituality that binds all people.
7. It is important for me to give something back to my community.
8. I am a link in the chain of my family's heritage, a bridge between past and future.
9. I am concerned about those who will come after me in life.
10. I have been able to step outside of my ambitions and failures, pain and joy, to experience a larger sense of fulfillment.
11. Although individual people may be difficult, I feel an emotional bond with all of humanity.
12. I still have strong emotional ties with someone who has died.
13. I believe that there is a larger meaning to life.
14. I find inner strength and/or peace from my prayers or meditations.
15. I believe that death is a doorway to another plane of existence.
16. I believe that there is a larger plan to life.
17. Sometimes I find the details of my life to be a distraction from my prayers and/or meditations.
18. When in prayer or meditation, I have become oblivious to the events of this world.
19. I have experienced deep fulfillment and bliss through my prayers or meditations.
20. I have had a spiritual experience where I lost track of where I was or the passage of time.
21. The desires of my body do not keep me from my prayers or meditations.
22. Although there is good and bad in people, I believe that humanity as a whole is basically good.
23. There is an order to the universe that transcends human thinking.
24. I believe that on some level my life is intimately tied to all of humankind.

APPENDIX M. MAGICAL BELIEFS SCALE (NELSON, ABEYTA, & ROUTLEDGE,

2018)

Instructions: Using the scale provided, please rate the extent to which you agree with the following statements.

     1 = Totally disagree, 9 = Totally agree

1. Ghosts exist.
2. Some houses are haunted.
3. Some people have special abilities that allow them to communicate with the supernatural.
4. Demon possession is real.
5. People sometimes receive signs from God.
6. Miracles are real.
7. There is intelligent life on other planets in the universe.
8. UFOs are real.
9. The government has information about the existence of aliens that is being kept secret from the general public.
10. Some conspiracy theories are true.
11. The government is hiding information about the assassination of JFK.
12. There are secret societies (e.g., Free Masons) that have a lot of power in this country and around the world.
13. Big Foot exists.
14. The Lochness Monster is real.
15. The stories about the Bermuda Triangle are true.

APPENDIX N. PRESENCE OF MEANING (STEGER ET AL., 2006)

Instructions: Please take a moment to think about what makes your life and existence feel important and significant to you. Please respond to the following statements as truthfully and accurately as you can, and also please remember that these are very subjective questions and that there are no right or wrong answers.

1 = Absolutely untrue, 7 = Absolutely true

1. I understand my life's meaning.

2. My life has a clear sense of purpose.

3. I have a good sense of what makes my life meaningful.

4. I have discovered a satisfying life purpose.

5. My life has no clear purpose.