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Prayer and Perceptual (and Other) Experiences

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Abstract

Prayer, a repeated practice of paying attention to one's inner mental world, is a core behavior across many faiths and traditions, understudied by cognitive scientists. Previous research suggests that humans pray because prayer changes the way they feel or how they think. This paper makes a novel argument: that prayer changes what they feel that they perceive. Those who pray, we find, are more likely to report sensory and perceptual experiences which they take to be evidence of a god or spirit. Across three studies encompassing data from thousands of participants across five different cultures, we find that the amount of time spent daily in prayer is associated with the frequency of such events—and that prayer is associated with some of these experiences more strongly than others. Time in prayer has the strongest relationship with the frequency of everyday events (like dreams or strong emotion) that are experienced as not generated by the self but by a god or spirit. Prayer is also associated with more anomalous experiences like voices and a sense of presence, but prayer has no association with more dramatic events such as possession, out-of-body experiences, and sleep paralysis. Our results not only suggest interesting relationships between practice and experience in a religious domain, but hint at the power of practice to shape experience more broadly.

Keywords: Prayer; Cognitive science of religion; Culture; Religion; Perception; Attention; Experience; Spiritual events

The insistence that one should pray runs throughout and across faiths. In the Christian Gospels: “Pray without ceasing. In everything give thanks: for this is the will of God in Christ Jesus concerning you” (1 Thessalonians 5:17-22 KJV). In the Hebrew Bible: “Let everyone who is godly offer prayer to you at a time when you may be found” (Job 22:27). Allah says in the Qur’an (20:14, or Sura Taha 14), “Establish prayer for my remembrance.” Many accounts of so-called traditional religions, like Godfrey Lienhardt’s *Divinity and Experience* (1961),

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make it abundantly clear that prayers to divinity are expected, required, and prized as the means to a good life. By “prayer” here, we mean a specific behavior in which words are spoken inwardly or out loud and addressed to a god, often with additional prescribed behavior (the head is bowed, the body is prostrate, the hands are folded together, and so forth). Prayer is often glossed as the act of talking to God.

Most of the (secular) scholarly work on prayer assumes that this practice affects the human’s emotional state in some useful manner, and that this impact is ultimately the point of the prayer. Scholars have proposed that prayer creates an exchange relationship in which humans offer worship in exchange for help, and thus delivers to humans a sense of protection and care (Robertson Smith, [1890], 2017). They have claimed that prayer is a kind of narrative sense-making: as a person prays with their own words, describing the day, that person comes to a different—and more optimal—understanding of that day (Baquedano-Lopez, 1999). They have suggested that prayer can signal ingroup status and commitment to other ingroup members (Ruffle & Sosis, 2007; Watson-Jones & Legare, 2016) and promote prosociality (Xygalatas et al., 2013). Some have ventured that prayer offers a way to manage inner anxiety and uncertainty (Boelens, Reeves, Replogle, & Koenig, 2009; Sosis & Handwerker, 2011); that it is a metacognitive process which heightens gratitude and well-being (Luhrmann, 2020); that it offers an approach to problem-solving that feels collaborative with God (Schille-Hudson, Luhrmann, & Landy, 2024). An abundance of social science research on prayer has shown that prayer improves cardiovascular function, immune response, and health more generally (Koenig, King, & Carson, 2012; Lueke et al., 2023). In short, the consensus among both secular observers and scholars is that humans pray because prayer makes people think better and feel better.

This paper makes a different and novel argument: that the act of prayer changes the most basic way a person experiences the god to whom they pray. (We will use “god” for the abstract concept and “God” for the Christian/Abrahamic divinity.) Those who pray, we find, are more likely to report sensory and perceptual experiences of spiritual presence. To be clear, we are distinguishing here between a behavioral action, which is prayer, from a felt experience—not a belief that God is always present, or that God hears one’s prayer, but a phenomenological experience that stands out to the person as unusual. These phenomenological experiences are not always present when people pray, nor indeed are they necessarily experienced during prayer. They are startling, unexpected events like having a thought that does not feel like one’s own, seeing a vision, having a dream that feels as if it has an outside source, and so forth.

These experiences matter. For as long as we have records, people have reported hearing the voice of gods, seeing visions of spirits and angels, and feeling the presence of the supernatural as if the spirit were a person that could be touched. A spiritual presence lies at the heart of most religions. Abraham knew that God was present because he heard his voice. Mohammed knew that the Qu’ran was divine because he felt that the words came from outside him, from the angel Gabriel. The disciples knew that Jesus in some sense lived after his death because they saw him and they heard him speak. These striking events have changed individual lives and social history. Joseph Smith would not have founded Mormonism without his personal experience with miraculous plates no one else saw; George W. Bush has said that he decided to invade Iraq because God spoke to him (MacAskill, 2005).

In previous work, we have shown that two factors make these vivid events more common: a person's tendency to become immersed or "absorbed" in their own experiences, and a person's belief that the mind-world boundary is, under certain conditions, porous (Luhrmann et al., 2021). In this paper, we demonstrate that prayer is a likely third factor. Drawing on data from three studies, spanning thousands of participants across five countries, we show that people who pray more also report more spiritual presence events, and that this relationship between prayer and experience is stronger for some kinds of events than for others.

1. Overview

This paper presents data from three studies designed to develop a deeper understanding of the factors that facilitate moments in which someone feels that a god or spirit has been present or has communicated with them. We call these "spiritual presence events." In all of these studies, participants were asked a wide range of questions about their own experiences of spiritual presence. These questions centered on a list of spiritual events thought to be experienced in many cultures in similar forms—the voice of a god or spirit spoken audibly or experienced in the mind; visions or dreams sent by a god or spirit; the felt presence of gods, spirits, ghosts, ancestors, or demons; sleep paralysis; and more uncommon events like out-of-body experiences and moments of possession. Although we understand these spiritual presence experiences to be rooted (at least proximally) in a person's own psychological and physiological processes, such events are characterized by a "not me" quality. People say: *the thought did not feel like mine*, or *it did not sound like my voice*. They say that the sense of another presence did not feel as if it was generated by their own bodily process but instead was something they felt because, for example, a dead person was in the room. These events do not necessarily occur during prayer or worship, but unexpectedly at points throughout the day. (See Table 1 for a full list of the events included in these studies.)

The first two studies were collected as part of a long-term collaboration grounded in cultural anthropology and experimental psychology which involved qualitative and quantitative data collection with several thousand participants in five countries between 2016 and 2019 (the Mind and Spirit Project; our overview draws upon our summary presentation in Luhrmann, 2020; and Luhrmann et al., 2021). We chose to work in countries which ethnographies have represented as being home to a wide range of cultural understandings about minds and persons; to enable comparison across these sites, we also chose settings with vibrant populations of charismatic evangelical Christians, as well as people from other faiths, from west to east: the United States, Ghana, Thailand, China, and Vanuatu. In each country, an anthropologist with local expertise lived on site for 8–9 months and led a team that continued the research upon the anthropologist's departure. The third study, conducted in 2022, was designed to be a direct replication of some of the key findings from the Mind and Spirit Project in a large online sample of U.S. adults (Weisman & Luhrmann, accepted).

Spiritual presence events are of obvious importance in human history, but they are difficult to study because they rely on verbal report. We used a wide range of methods to capture these events more accurately than one method alone would allow.

Table 1
Full list of spiritual presence events questions

Question	Label	Category	Study
Some people say that God (or a spirit) speaks to them through pictures that he may have placed in their minds. Does this happen to you?	vision in the mind	para-ordinary	1, 2, 3
Some people say that God or a spirit gives them impressions to guide them—that is, inner events that are n’t really thoughts or sensations but more inner ways of knowing. Does this ever happen to you?	knowing	para-ordinary	1
Some people say that that God or a spirit gives them sensations to guide them. Have you ever had a physical awareness of God or a spirit’s presence?	sensation	para-ordinary	1
Some people have particular experiences in your body that they associate with God or a spirit or spirit. Does that happen for you? [examples: warm hands, goosebumps, fire in the belly]	bodily experience	para-ordinary	1
Some people say that God or a spirit sends them dreams. Does this happen to you?	dreams	para-ordinary	1, 2, 3
Some people say that God or a spirit speaks to them in their minds, through thoughts that he may have placed in their minds (e.g., there is a difference between own thoughts and God thoughts). Does this happen to you?	thought in the mind	para-ordinary	1, 2, 3
Some people say that they have had experiences of intense, overwhelming emotion that felt like a spiritual experience. Has this ever happened to you?	intense emotion	para-ordinary	1, 3
Some people say that the divine or supernatural speaks to them in their minds as a distinct voice in their minds, but not an audible voice. Has it happened to you?	voice in the mind	para-ordinary	2, 3
Have you ever experienced the presence of God through pain (such as headaches, bodily aches and pains, stomachaches)?	pain	para-ordinary	3

(Continued)

Table 1
(Continued)

Question	Label	Category	Study
Have you ever experienced the presence of God through illness (including as warning or punishment)?	illness	para-ordinary	3
Some people say that they have smelled God or a spirit through a real smell. Has this ever happened to you?	smell	sensory	1, 2, 3
Some people say that they have felt God or a spirit touch them on the skin, or through their clothes. Has this ever happened to you?	touch	sensory	1, 2, 3
Some people say that they have had a vision from God or a spirit—they have a picture, but it is like they see it with their eyes. Has anything like that happened to you?	vision with eyes	sensory	1, 2, 3
Some people say that they have heard God or a spirit speak out loud to them. Has this ever happened to you?	voice in ears	sensory	1, 2, 3
Have you ever seen or heard a spirit or entity who was not God or a spirit, anything we have not asked about yet?	see/hear other being	sensory	1
Have you ever felt that you tasted God or a spirit?	taste	sensory	3
Some people say that they have had the clear sense that God or a spirit was almost tangibly present, as if God or a spirit was sitting or standing beside them, almost like you could point to where he was. Has this ever happened to you?	presence of god	felt presence	1, 2, 3
Some people say that they have experienced demons. Have you ever experienced a demonic presence?	presence of demon	felt presence	1, 2, 3
Some people say they have felt the presence of a person or entity who was not God or a spirit? Like a ghost or an ancestor? Has this ever happened to you?	presence of ghost, angel, spirit	felt presence	1, 2
Some people say they have felt the presence of a witch (or someone who knows black magic/sorcery/ etc). Has this ever happened to you?	presence of witch, sorcerer	felt presence	2
Some people say they have felt the presence of the dead. Has this ever happened to you?	presence of dead	felt presence	2

(Continued)

Table 1
(Continued)

Question	Label	Category	Study
Some people say they have felt the presence of a nature spirit. Has this ever happened to you?	presence of nature spirit, animal spirit	felt presence	2
Have you ever experienced a supernatural presence that was not God, a spirit, or a demon?	presence of other	felt presence	3
Some people find that sometimes another being will enter their body. Does this ever happen to you?	possession (self)		1, 2, 3
Some people think it is possible for humans to shift into other forms? Have you seen this happen?	shapeshifter		1, 2
Some people say that they have had events when their mind or spirit leaves their body. When this happens, sometimes people report that they are able to turn and see their body as if from outside. Have you had an event where your mind or spirit has left your body?	out of body		1, 2, 3
Some people have had the experience of waking up but being unable to move. Has this ever happened to you?	sleep paralysis		1, 2, 3

Notes. We identify the way we categorized each question, and which study the question appeared in. Not all questions appeared in each study, and in different studies, the specific wording of each question varied slightly. Interviewers used local categories for the best example of the supernatural actor (listed here as “God”).

2. Methods

2.1. Study 1

In Study 1, we sought out people with strong religious commitments living in both urban and rural field sites within each of the five countries included in the Mind and Spirit Project. In each site, we worked with charismatic evangelical Christians, all of whom shared the common goal of seeking an intimate and experiential relationship with God. This facilitated direct comparison across sites, as the faith has a relatively consistent theology and practice (Appadurai, 1996:90; Robbins, 2003). We also worked with practitioners of another faith salient in each local setting: Methodism in the United States; a traditional Akan religion in Ghana; Buddhism in Thailand and urban China; spirit mediumship in rural China; Presbyterianism in urban Vanuatu; and ancestral *kastom* practices in rural Vanuatu.

In Study 1, we used a method we call “comparative phenomenology” (Luhrmann, 2020), using semi-structured, multi-hour interviews to probe for details about participants’ experiences in the manner of a clinical interview. The questions were structured around our list

of spiritual presence events and included specific follow-up questions designed to capture the phenomenological qualities of the participant's experience. Interviewers—experienced ethnographers skilled in the local language with cultural expertise specific to that site—conducted these conversations in a style they judged would be invitational to that participant and appropriate in that cultural setting.

At each site, fieldworkers recruited participants via word-of-mouth at churches and other community settings. A total of $N = 338$ adults were interviewed, including about 30–40 per each urban and rural site, roughly half charismatic Christians and half practitioners of the local faith. (For a detailed breakdown, see Table A2 in the Supplementary Appendix.) Interviews were each approximately 3 hours and were conducted over 1–2 sittings. Interviews were conducted in a common local language—English in the United States, English (the language of instruction) or Fante in Ghana, Thai in Thailand, Mandarin in China, and Bislama in Vanuatu. Questions not in English were translated, back-translated, and piloted in the target language after discussion with the local team.

During those semi-structured interviews, participants were asked questions about their spiritual practices. This included, among other things, a series of questions about whether they pray, and if so, how often and how long they pray on average per day. The answers were recorded using a 4-point scale (1 = “0–15 min,” 2 = “15–30 min,” 3 = “30–60 min,” 4 = “more than 60 min”). Participants' responses were often detailed and contextualized. For example, a charismatic Christian in rural Ghana, when asked how much they pray, said “In the morning, if I just woke up and I'm going out, sometimes about 5–10 minutes. But before then I pick a scripture, I read something. And I say about two to three things. So sometimes, it takes about 5–10 minutes.” Participants, like one urban Methodist in the United States, would sometimes respond normatively to the question, saying they do not pray “as often as I should.” The interviewer would then prod them to reflect on what their actual daily prayer practice (rather than their aspirational one) looked like. This kind of self-report is widely understood to be the gold standard for measuring prayer practice (Poloma and Gallup, 1992).

Participants then proceeded through the questions about spiritual presence events. For each event, participants were asked if they had ever experienced such an event. If so, fieldworkers probed for more details, and for a detailed example of such an experience.

Interviews were recorded, transcribed, translated, and then coded. For each spiritual presence event item, the fieldworkers (and later, at least one independent coder) made a yes-or-no judgment of whether the participant had experienced that spiritual event.

We note that this interview included a wide range of questions beyond the scope of the current paper, and that this was one of several research protocols administered by fieldworkers to these participants over the course of two or more study sessions. Fieldworkers were not probing for any particular relationship between prayer and spiritual experience at this time.

2.2. Study 2

In Study 2, we recruited participants in public places selected to attract a representative sample of the general population of the urban field sites in each of the five countries included in the Mind and Spirit Project (e.g., the Department of Motor Vehicles, a bus station hub).

We chose this approach so that people from the general population, including people of many different religions, socioeconomic, and educational backgrounds, could be sampled. In addition to adults from the general population, these interviews were conducted with a smaller number of charismatic evangelical Christians in each setting.

In Study 2, we maintained a focus on eliciting open-ended responses from participants in face-to-face conversations, but we explored the questions more briefly, with a slightly different wording, and used a stricter interview protocol administered by trained local research assistants. Again, material not in English was translated, back-translated, and piloted in the target language after discussion with the local team.

A total of $N = 1026$ adults were interviewed; across sites, a total of $n = 766$ were drawn from the general population and an additional $n = 260$ were explicitly chosen as charismatic evangelical Christian participants.¹ (For a detailed breakdown, see Table A3 in the Supplementary Appendix.) Researchers conducted these interviews face-to-face, in a common local language, with each interview lasting 20–30 min. Again, participants were asked about their prayer practice (“Do you pray regularly?”; and “On an average day, how many minutes do you pray?”; responses were recorded via the same 4-point scale as in Study 1, but participants who explicitly said they did not pray at all were recorded as 0). Participants were also asked about spiritual presence events (see Table 1). For each event, interviewers asked whether the participant had ever had such an experience, asked for a description of that experience, and asked how often the participant had experienced such an event. Participants responded via a 6-point scale (0 = “never,” 1 = “once or twice,” 2 = “at least once per year,” 3 = “at least once per month,” 4 = “at least once per week,” and 5 = “even more”).

In Study 2, participants reported their religiosity by responding to the statement “I consider myself a religious or spiritual person” via a 5-point scale (1 = “Strongly Disagree,” 2 = “Disagree,” 3 = “Neither Agree nor Disagree,” 4 = “Agree,” and 5 = “Strongly Agree”).

2.3. Study 3

Study 3 was designed to replicate and extend some of the key findings from the Mind and Spirit Project in a large online sample of U.S. adults (Weisman & Luhrmann, accepted); it was a direct replication of Luhrmann et al. (2021), Study 4.

We recruited participants using the online crowdsourcing platform Prolific. Participants completed an asynchronous, unsupervised, online survey consisting of nine measures, including an inventory of spiritual events closely based on the list of spiritual events included in Studies 1 and 2 (see Table 1). For each event, participants indicated how often they had experienced such an event (0 = “never,” 1 = “once,” 2 = “several times,” 3 = “fairly often,” and 4 = “very often”). Participants were also asked how often they pray (“Outside of attending religious services, how often do you pray?”); participants responded via a 7-point scale (0 = “never,” 1 = “seldom,” 2 = “a few times a month,” 3 = “once a week,” 4 = “a few times a week,” 5 = “once a day,” 6 = “several times a day”). Participants also reported their religiosity by answering the question “How important is religion in your life?” via a 4-point scale (1 = “Not at all important,” 2 = “Not too important,” 3 = “Somewhat important,” and 4 = “Very important”).

A total of $N = 1779$ participants participated. In contrast to Studies 1 and 2, all participants were from the United States within this study, but there was a range of religious affiliations (Christian $n = 768$, Buddhist $n = 16$, Hindu $n = 4$, Jewish $n = 25$, New-Age/Spiritual $n = 116$, Nonreligious $n = 702$, More than one religion/spirituality $n = 103$, Muslim $n = 11$, and Other $n = 34$). Among the Christian participants, $n = 120$ identified as “evangelical or ‘born again.’”

3. Qualitative analysis: “prayer” and “spiritual presence events” are meaningful concepts

We begin with some qualitative observations from the rich ethnographic data gathered as part of Study 1. We offer these observations as evidence that our questions about prayer and about spiritual presence events were meaningful to participants and that participants were not simply saying yes in order to appear more pious in our eyes.

3.1. Prayer

We define prayer as a private, reflective, mental activity which involves speaking to God or spirit more broadly, with the expectation that this inner (or sometimes outer) speech is a communication. We understand prayer to be a practice, perhaps even a skill, that practitioners develop through effort and focus. We operationalized prayer in our methodology by asking how much time people spend in prayer per day (rather than, say, how many times per day) because we are interested in the amount of time people regularly spend effortfully focused in prayer. We believe that a person who prays only once per day, but for longer than an hour, would be practicing more intensely than a person who prays many times per day in short bursts. Prayer was, of course, a very legible concept to our Christian practitioners across cultures. We took great care, however, with the language used to communicate the concept of prayer in different religious contexts. All interview and survey questions were put through an extensive process of translation and back-translation from English to Fante (rural Ghana), Thai, Mandarin, and Bislama (Vanuatu), with significant discussion among the fieldworkers about what we were seeking to identify and what was being compared. It is clear from the transcripts that participants treated prayer as talking to a god or spirit in their minds or out loud.

Christian participants consistently described prayer as communication with God. They spoke of addressing God directly: “Dear God,” like the beginning of a letter. Some, like one charismatic Thai Christian in Chiang Mai city, described an imaginative process of “hugging God or Jesus Christ,” while speaking directly to him, as in “God, I’m so tired today. Please help me.” Other Christians described prayer as a more reflective process. They said that prayer was a time to express gratitude to God and reflect on the day. Christians also described prayer as mutual interaction with God. A Thai Christian described prayer as a “two-way communication” process with God, as a practice in which God responds. A Methodist in the San Francisco Bay area described prayer as “a conversation knowing that it is being heard.” When

asked to give an example of what they did in prayer, many participants recounted examples of asking God for something. Some of these were physical requests, like a new apartment building or a safe getaway from a dangerous situation; some were spiritual, like peace or strength. Combinations of physical and spiritual requests often showed up in requests for healing.

We note that even non-Christians described prayer as communication with a god or a spirit. These communications also often took the form of requests, like a *kastom* villager in Vanuatu who described “talking to the bigman” when he needed help finding a missing belonging. An *okomfo* priest (a priest of the traditional religion in Ghana) described a morning prayer routine of “tell[ing] the gods where I am going. If I am going to Accra, I pray for a safe journey.” Sometimes these requests even happened in the absence of a sense of communication with a god or a spirit, as when one Thai Buddhist described “pray[ing] for wealth, money,” yet said at the same time that he does not “ask anything from the invisible” or “pray to the ancestors.” The same Thai Buddhist also described his meditation/prayer practice as being one where “I sit still and review myself.”

It is true that our Buddhist participants had a concept of prayer which included a wider range of behaviors than Christians did. They referred to both meditation and chanting as prayer. Despite this, we are confident that the great majority of our participants, including our Buddhist participants, understood prayer to be some kind of mental action that involves communication to spirit, broadly conceived. And indeed, scholars argue that Buddhists do often frame prayer as communication to a god even in a context in which they do not technically believe in a god; in an earthly, unenlightened state, Gross argues, both self and spirits feel real (Gross, 2002).

3.2. *Spiritual presence events*

Spiritual presence events, by contrast to prayer, are felt experiences, or phenomenological events. These are experiences which *happen* to people rather than an activity regularly and intentionally engaged in, like prayer. They may coincide with prayer, happening during or shortly after prayer—but they may not. Indeed we found in our interviews that participants reported most spiritual presence events *outside* of prayer. These events are thoughts and sensations that are experienced as not one’s own, and which stand out to people. These kinds of experiences draw a sharp distinction between knowledge and experience. For example, most (if not all) of our Christian participants believe that God is omnipresent, that God is always present. But there is a phenomenological distinction between *knowing* God is present and *feeling* the presence of God. The moments of feeling the presence of God stand out to the participants who report it. They remember the experience as a distinctive one.

Our interview method, comparative phenomenology, is clinical in its style, although it does not presume pathology. The fieldworkers who conducted Study 1 interviews were carefully trained both before fieldwork and in an initial pilot period to probe thoughtfully and attentively for the participant’s experience. They were trained to ask questions precisely, as in “have you ever heard God speak to you in a way you could hear with your ears?” If the answer was yes, the interviewer followed up with more detailed questions aimed at understanding the phenomenological experience. “Did you turn your head to see who was speaking? Did you

feel as if the voices came from outside your head? Did the voice have a timbre?” Fieldworkers were also trained to ask questions that compared spiritual presence events to more common events, “I’d like you to think back on a conversation you had earlier today. How was that experience like or unlike the experience you are reporting here?” Responses to these follow-up questions bolstered our confidence that the participants had indeed experienced the event they described.

Participants in Study 1 generally behaved as if the fieldworkers were asking about experiences they recognized. This was true when participants reported having had the experience in question—but also when they reported *not* having had that particular experience. For example, a Methodist participant in the San Francisco Bay area was asked, “Some people find that sometimes another being will enter their body. Have you ever had that experience?” She responded clearly, “No, I have never had that experience.” Another participant, a Thai Buddhist, answering the same question, said, “When we meditate, some people might misunderstand. ‘Is this spirit possession?’ ‘Is this shamanism?’ But it’s actually not.”

When participants did say that they had themselves experienced some event, they provided details which persuaded the interviewer that something experiential had occurred—in other words, that they had actually heard something, seen something, or otherwise had a sensory or quasi-sensory experience. For example, a charismatic Christian woman in Ghana was asked, “Some people say that God speaks to them in their minds, through thoughts that he may have placed in their minds. Does this happen to you?” She responded by telling a story of a time she needed to catch a car to travel to another town. She stopped a passing car but “something told [her] not to board it.” Later, after catching another car to where she was going, she learned that the first car had been in an accident. She used this story as an example of a time God spoke to her by placing a thought in her mind. In this case, she recognized the event (a thought in her mind that did not feel like hers) and attributed it to God; she wanted to tell us that she felt justified in having done so because, she said, the thought had protected her from a car crash.

We now turn to our quantitative results.

4. Analysis 1: Time spent in prayer is associated with more spiritual presence events

How is time in prayer related to the experience of spiritual presence events? We find that those who spent more time in prayer reported both more kinds of spiritual experiences and higher frequencies of spiritual experiences.

As described above, participants in all three studies were asked a list of questions about spiritual presence events (see Table 1). In Study 1, each participant’s answer to each item was coded as either “yes” (coded as 1) or “no” (0), indicating whether they had ever experienced such an event. These responses were averaged for each participant such that every participant had a *spiritual events score* between 0 and 1. The score thus represents not absolute numbers of events a person had experienced in their lifetime (since they might have experienced one kind of event several times), but rather the number of kinds of events each person experienced.

For Studies 2 and 3, each participant gave a frequency response to each spiritual presence item on a Likert-type scale from 0–5 (Study 2) or 0–4 (Study 3). These responses were

averaged and scaled for each participant such that every participant had a *spiritual events score* between 0 and 1. Scores for Studies 2 and 3 thus reflect a blend of both the number of kinds of events that a participant had ever experienced, and the frequency with which they had experienced these events.

We structured our data in Studies 1 and 2 to understand the relationship between prayer and spiritual presence events both broadly among all participants and specifically in charismatic evangelical Christians. In these studies, we present analyses of all participants, as well as the subset of charismatic evangelical Christian participants considered alone. We structured our data in Study 3 to explore a broader array of faiths within a single national setting (the United States); for this study, we present analyses of all participants and of the subset of Christian participants considered alone; these Christian participants include members of a wide array of denominations and traditions (i.e., not just charismatic evangelical traditions).

To examine the relationship between prayer and spiritual presence events, we employed linear mixed effects models in which spiritual presence events score was predicted by prayer and nested random intercepts which varied by study (see Supplementary Appendix A for details). In Studies 2 and 3, we statistically controlled for participants' self-reported religiosity by including religiosity and the interaction between prayer and religiosity as predictors. (Note: there was no religiosity question asked in Study 1, but all participants recruited in Study 1 were committed religious practitioners. We assume that religiosity would be uniformly high among these participants.) Unless otherwise noted, we have standardized all continuous variables in these regressions to produce standardized beta coefficients as an index of effect size that can be compared across models.

4.1. Study 1 results

We found that people who reported spending more time praying also reported experiencing more spiritual presence events (Fig. 1). For all participants, there was a significant main effect of prayer on spiritual presence events score ($b = 0.22, p < .001$). There was also a significant main effect of prayer on spiritual presence events for charismatic Christians alone ($b = 0.20, p = .003$). (A table of all statistical model outputs from analysis 1 can be found in the Supplementary Appendix.)

We found that in the full sample, the mean number of kinds of spiritual presence events endorsed increased by about 2 between 0–15 min of prayer daily ($\mu = 10.50$ events) and 15–30 min of prayer daily ($\mu = 12.42$ events). This was also true among the sample of charismatic evangelical Christians. An increase from 0–15 min of prayer daily ($\mu = 11.43$ events) to 15–30 min of prayer daily ($\mu = 13.53$ events) corresponded to an average increase of two additional kinds of spiritual presence events.

4.2. Study 2 results

As in Study 1, Study 2 also showed a significant positive effect of prayer on spiritual presence events score, both in the full sample ($b = 0.28, p < .001$) and among the subset of charismatic Christians ($b = 0.38, p < .001$). In other words, people who spent more time in prayer reported more and more frequent spiritual events (Fig. 1). This positive relationship

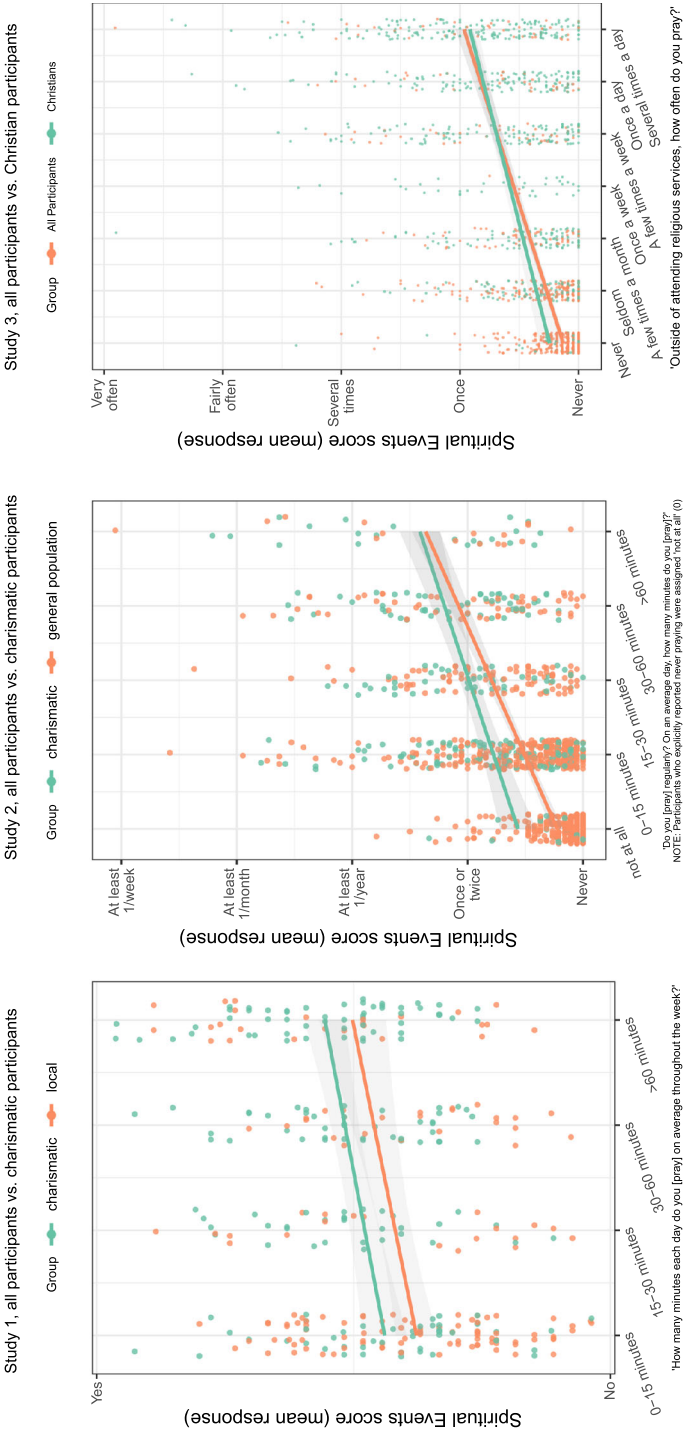


Fig. 1. Relationship between prayer and spiritual events score for all three studies. Panel (a) shows this relationship for all participants versus charismatic Christian participants in Study 1, panel (b) shows this relationship for all participants versus charismatic Christian participants in Study 2, and panel (c) shows the relationship for all participants versus all Christian participants. Across all three studies, the relationship between prayer and spiritual experience was positive.

between time spent in prayer and spiritual events held for the general population participants across all countries, even in China, which was our most secularized sample (see Fig. 2). Religiosity was a significant predictor of spiritual presence events for the sample of all participants ($b = 0.16, p < .001$), but not for the sample of charismatic Christians ($b = 0.14, p = .095$).

For each participant, we also counted the number of kinds of spiritual presence events they experienced—directly comparable to the “spiritual events scores” in Study 1. Again, the number of kinds of events was positively related to the amount of time spent in prayer, with the biggest difference observed between participants who reported never praying ($\mu = 2.57$ events) to those who reported praying between 0–15 min per day ($\mu = 5.80$ events).

Finally, for each individual event included in our list of spiritual presence events, we examined the relationship between participants’ reports of time spent in prayer and the frequency with which they experienced that kind of event. Nearly all of these correlations were positive (see Table B2 in the Supplementary Appendix for a full list of correlations between spiritual events items and prayer by Study). These correlations suggest that time spent in prayer is associated with not only more kinds of experience, but also more frequent experiences.

4.3. Study 3 results

As in Studies 1 and 2, in this new study of nearly 1800 U.S. adults on an online platform, we found that people who reported praying more also reported more and more frequent experiences of spiritual presence events (Fig. 1). We found a significant positive effect of prayer on spiritual presence events score among all participants in Study 3 ($b = 0.32, p < .001$), as well as among Christian participants considered alone ($n = 768, b = 0.19, p < .001$). Religiosity was also a significant predictor of spiritual presence events for all participants ($b = 0.25, p < .001$) and Christians alone ($b = 0.23, p < .001$).

Echoing Study 2, we observed the largest increase in the number of kinds of spiritual events endorsed between participants who reported “never” praying versus participants who reported “seldom” praying, both in the full sample (“never”: $\mu = 1.23$ events; “seldom”: $\mu = 3.90$ events) and among Christian participants considered alone (“never”: $\mu = 1.48$ events; “seldom”: $\mu = 3.83$ events). As in Study 2, we found participants’ frequency responses to nearly every spiritual events item positively correlated with prayer (see Table B2).

In sum, no matter how we asked the questions, no matter whether participants were Christians or not, the more minutes a day they prayed, the more kinds of spiritual presence events they reported, and the more frequently they reported having these experiences.

5. Analysis 2: Prayer predicts some spiritual presence events more than others

We now turn to the question of whether prayer practice facilitates some kinds of spiritual events more than others. If prayer is differently related to different kinds of events, that could suggest specific cognitive mechanisms used in prayer which affect human experience. We think that a good way to answer this question is by grouping our questions into

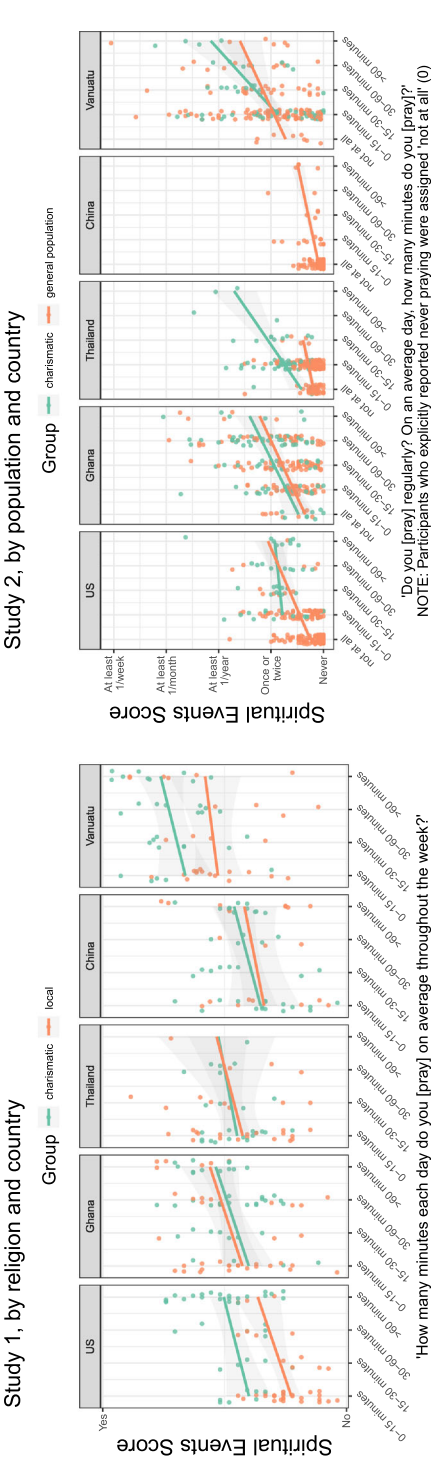


Fig. 2. Relationship between prayer and Spiritual Events score broken down by country for Studies 1 and 2. Panel (a) shows this relationship for all participants versus charismatic Christian participants in Study 1, panel (b) shows this relationship for all participants versus charismatic Christian participants in Study 2. Across studies, populations, and countries, the relationship between prayer and spiritual experience was positive. For more detailed demographic information about participants in each country, see Tables A2 and A3 in the Supplementary Appendix.

larger theoretically driven categories based on *prima facie* qualities of spiritual presence events.

Spiritual presence events are complicated: they involve both pathways in the body and the labels which the social world gives to these (Taves, 2009). On the one hand, there seem to be universal experiences that can occur seemingly independently of a person's beliefs, knowledge, or intention, and which form distinct classes with stable patterns. For example, everywhere in the world, some people report that they have heard a voice when alone, or seen something that others cannot, or felt a presence that was invisible to others. Sometimes they are identified with a name that is meaningful within a social community; sometimes not. On the other hand, there are also culturally specific experiences, like the presence of "the Holy Spirit," which are recognized within a specific community but which do not seem to imply a specific bodily event. There are also, in many communities, mundane events that are relatively common (a powerful inner thought) and which are identified as spiritual ("God spoke to me") when the event stands out to the person who experiences it as "not me." There are many arguments about the underlying structure of these phenomena, about how much an individual's access to an event cognition ("a Holy Spirit experience") alters the individual's experience, and about whether these experiences will ultimately be understood as more dimensional or more like a taxonomy (Wildman, 2011; Yaden & Newberg, 2022; Alderson-Day et al., 2023).

Nevertheless, our spiritual presence events do appear to fall into different categories based on blunt phenomenological features. These categories include (1) ordinary experiences of thoughts and sensations which feel to participants as if they are special communications from a god or spirit: we will call these "para-ordinary events"; (2) hallucination-like events: we will call these "outer sensory events"; and (3) moments in which people said that they felt the presence of a god or spirit even though they had no sensory content to the feeling: we will call these "mere presence events." See Table 1 for a list of the questions included within each category for each study. In most cases, separating experiences into these categories generated "subscales" with moderate to high internal consistency for para-ordinary events (Study 1 $\alpha = 0.61$; Study 2 $\alpha = 0.73$; Study 3 $\alpha = 0.87$), outer sensory events (Study 1 $\alpha = 0.65$; Study 2 $\alpha = 0.60$; Study 3 $\alpha = 0.82$), and presence events (Study 1 $\alpha = 0.51$; Study 2 $\alpha = 0.65$; Study 3 $\alpha = 0.73$).

Here, we expand on these categories and give specific examples of items that we included within them.

5.1. Para-ordinary events

This category comprised thoughts and sensations that are common in everyday human lives, but which are sometimes identified as signs of presence or communication because they stand out for people in particular ways: dreams, overwhelming emotion, bodily events like goosebumps, a thought in the mind, a mental image in the mind. People say that they know that the dream or thought or feeling was not their own but from a god because it felt louder, more spontaneous, captures their attention more, or concerns a god directly. Otherwise, ordinary experiences that stand out in this way have been reported as signs of spirit presence in much research (e.g., James, 1902; Hardy, 1979).

Examples:

Dream (Ghana urban charismatic Christian): *I spoke to God and asked him how I'm I going to take care of my children, what money I'm I going to use to feed my children, pay for rent, do this that, and then, so I spoke to God and then I needed an answer from him. So I slept and then I had a dream that someone is telling me that you go and do this and then I also responded by doing exactly what I was told in the dream and then yeah, it worked.*

Thought from God in the mind (Thailand urban charismatic Christian): *Yes, suddenly there came an idea that I could do that very moment... different [from ordinary thought]. it's hard to explain [but] If it's a thought from God, we can know straightaway.... I feel 'Huh why do I think about it?' 'Why [did] this thought suddenly pop up?'*

5.2. Outer sensory events

These are hallucination-like experiences explicitly identified as hearing, seeing, touching, smelling, and even tasting a spirit without a sensory stimulus. Interviewers probed participants to verify that the participant's experience had sensory content (e.g., that they had heard something with their ears, and not just in their mind).

Examples:

Vision (Vanuatu rural kastom practitioner): *I just saw something that came and stood by the door and not long after, it disappeared.*

Voice (U.S. rural charismatic Christian): *When I first came to church I volunteered a lot of my time and I was cleaning the chapel. I was cleaning the chairs because they were dirty. I was the only one there in the chapel and I was in the middle section. I was on my knees wiping the chairs down and I heard somebody call me by my name, so I jump up and I looked around and I didn't see anybody. I first thought it was Bryant and Jane [all personal names have been changed]; they were always messing with me because they were jokesters. I was like, "Oh okay" so I went back to work and I heard the voice again. ... It was an audible voice. ... It was awesome.*

Smell (China urban charismatic Christian): *First I share with my friend that I smell a very strong fragrance. My friend does not smell it like me, but he later smelled the fragrance. When you walk into the hall, you will smell it. Such a huge hall, it cannot be covered fully by perfume. The entire hall is permeated with fragrance. This is an absolutely unusual situation because the oil is running out, and the fragrance is permeating the whole hall.*

5.3. Felt presence events

These are the items which asked specifically and primarily about presence. Felt presence is usually characterized by a basic feeling that someone is present in the immediate environment without any clear sensory content (Critchley, 1955; Blanke et al., 2014; Alderson-Day, 2023). In this case, the presence is understood to be that of a god or spirit.

Examples:

Presence (China urban charismatic Christian): *Sometimes I feel God is right next to me. I feel it exists, I believe that God has a feeling of existing. Sometimes you think there are some angels around, but sometimes I wonder if it's an angel.*

Presence (U.S. urban Methodist): *After my first really good friend Sally died three and a half years ago ... we ran the marathon on what would have been her birthday. So I felt really good and had fun and enjoyed the whole time, and I said that I felt like she was with me; her presence was there. ... I felt like she was with me.*

Presence (Ghana rural charismatic Christian): *For His presence, I feel within me that the presence of God is here. Sometimes I see that I have become heavy and sometimes too depending on the atmosphere, I am able to tell that the presence of God is around. Although the atmosphere is invisible, I see that something new is happening.... Like at the beginning of prayers, I may feel very dull but as times go on, I realize that I have been revived. Even when I have taken my time to pray, I feel that I am praying more. I can worship God for a long time without getting tired. That makes me feel the presence of God. [Interviewer: It means you get a sort of energy?] Yes, a different feeling altogether.*

5.4. Uncategorized events

In addition to the three categories described above, we had asked about a set of more unusual and often more dramatic experiences recognized in the scientific literature (and in some cases produced in the laboratory: Blanke et al., 2014). They include out-of-body experiences (Blanke, Landis, Spinelli, & Seeck, 2004), possession experiences (Cohen, 2008), shapeshifting (Smith, 2020), and sleep paralysis (Hufford, 1982; Adler, 2011). We had no theoretical reason to believe that such events would hang together in people's responses; indeed, "subscales" of these events were not internally consistent (Study 1 $\alpha = 0.40$; Study 2 $\alpha = 0.32$; Study 3 $\alpha = 0.49$). Because of the relative lack of both theoretical and data-driven coherence in the dramatic category, we chose to analyze these items individually.

5.5. Analysis methods

To determine whether prayer is differentially related to certain categories of spiritual presence events, we employed linear mixed effects models in which we predicted spiritual presence events score by time spent in prayer, category of event (as just described), and the interaction of category with prayer, with random intercepts by participants nested within

other grouping factors (see Supplementary Appendix B for details). Categories were effect-coded for comparison to the grand mean. As in analysis 1, we also included religiosity and interactions with religiosity in our models for Studies 2 and 3. Unless otherwise noted, we have standardized all continuous variables in these regressions to produce standardized beta coefficients as an index of effect size that can be compared across models.

Each of the statistical models yielded three types of information of interest to us: (1) the fixed effect of prayer time on spiritual presence events; (2) the relative frequency of the categories of experience—that is, the fixed effect of category—and, of primary interest; (3) the interaction between prayer and each category of experience on reports of spiritual presence events.

6. Results

We once again found a consistent significant positive effect of prayer on spiritual presence events in all our statistical models for analysis 2. (This is what we would expect, given that we are reanalyzing a subset of the same data with similar statistical models.) This was true across all the studies, for all participants, for all Christians in Study 3, and all charismatic Christians in Studies 1 and 2 (see Table B1 in Supplementary Appendix B).

More strikingly, these analyses also revealed that the proportion of participants who reported spiritual presence events varied significantly across our three categories of events (para-ordinary, outer sensory, and felt presence) (Study 1), as did the frequency with which participants reported experiencing these events (Studies 2 and 3). Across studies, para-ordinary experiences were more common and more frequent than other categories; see Fig. 3. (See Table B1 in Supplementary Appendix B for complete statistical model outputs.)

The primary purpose of the current analyses, however, was to examine whether the relationship between prayer and experience varied across our three categories of experience.

In almost all of the statistical models we examined, we found that the association with prayer was stronger for the category of para-ordinary experiences, relative to the grand mean across categories of experience. This was true in all statistical models of the full sample of participants in any study (Study 1 $b = 0.12$, $p < .001$, Study 2 $b = 0.30$, $p < .001$, Study 3 $b = 0.20$, $p < .001$), and in separate statistical models of charismatic Christians in Study 2 ($b = 0.17$, $p < .001$) and Christians in Study 3 ($b = 0.16$, $p < .001$). This positive interaction effect can be seen in Fig. 3, where the slope of the para-ordinary category regression line is steeper than those of the other categories in all three studies.

There was one exception to this rule: We did not find this positive interaction between prayer and para-ordinary experiences for charismatic Christians in Study 1 ($b = 0.09$, $p = .065$). We think this difference in pattern may be due to a kind of ceiling effect. Charismatic Christians in Study 1 who reported praying 15–30 min per day or more had an average spiritual events score of 0.76. Almost all these participants, then, had experienced almost all of these events. The data in Study 1 are also the only data presented here which did not take frequency into account, which may have made it more difficult to detect such an interaction.

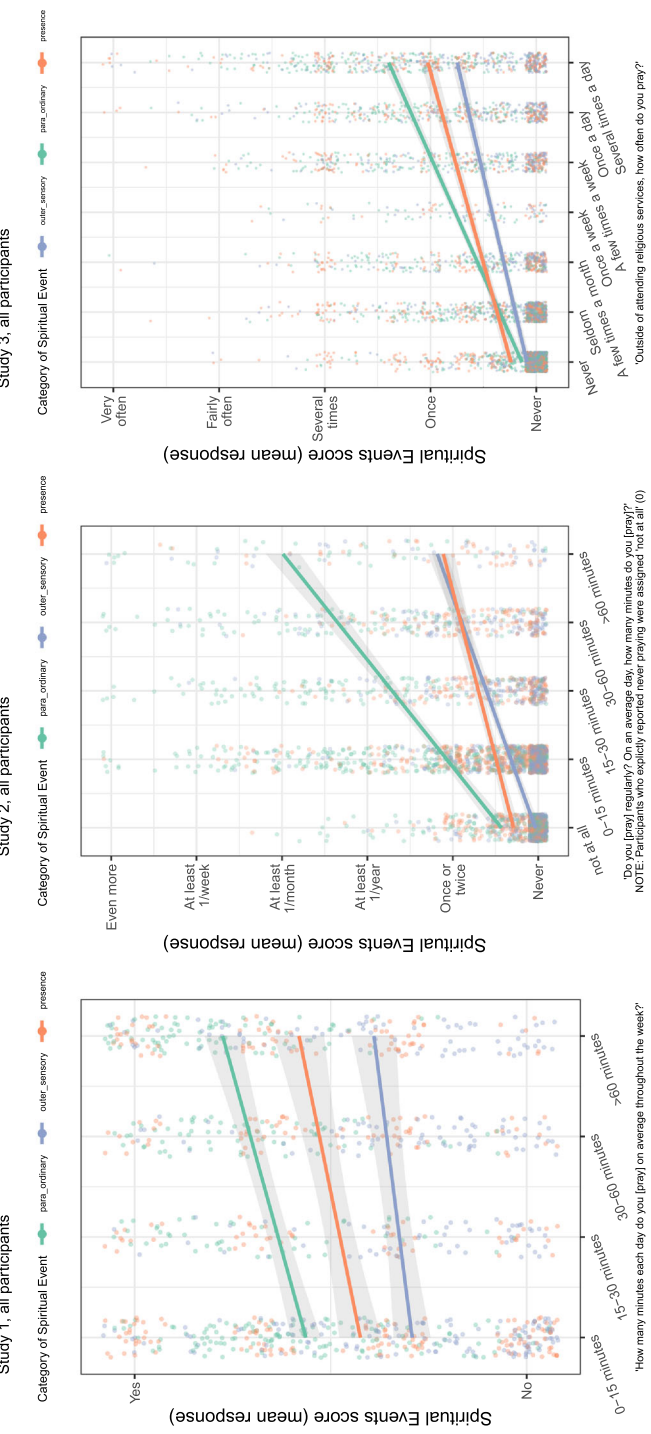


Fig. 3. Relationships between prayer and experience, broken down by categories in Study 1 (panel a), Study 2 (panel b), and Study 3 (panel c). The relationship between prayer and spiritual experience is positive for all three studies, but this plot illustrates that para-ordinary experiences (in green) were consistently the most common and had the strongest positive relationship with prayer (indicated by the relatively steeper slope).

Patterns of interaction between prayer and other categories were less consistent across studies. In some statistical models we examined, we found that the relationship with prayer was stronger for the category of outer sensory experiences, relative to the strength of its overall relationship across categories of experience. This was the case among all participants in Study 2 ($b = 0.08$, $p = .002$) and among charismatic Christians in Study 2 ($b = 0.14$, $p = .001$). However, among all participants in Study 3, we found that the relationship with prayer was slightly *weaker* for outer sensory experiences relative to the strength of its overall relationship ($b = -0.05$, $p = .015$). In the remaining analyses, we found no difference in the relationship with prayer and outer sensory experiences, relative to its overall relationship across categories of experience (Study 1, all participants: $b = -0.03$, $p = .461$; Study 1, charismatic Christian participants: $b = 0.02$, $p = .641$; Study 3, Christian participants: $b = -8.79\text{e-}03$, $p = .732$).

Similarly, the pattern of results for the category of felt presence experiences was mixed. Among all participants and charismatic Christians in Study 2, we found that the relationship with prayer was weaker for the category of felt presence experiences, compared to its overall relationship (all participants: $b = -0.15$, $p < .001$; charismatic Christians: $b = -0.10$, $p < .027$). However, the opposite was true among all participants in Study 3 ($b = 0.06$, $p = .003$). In all other analyses, there was no significant difference in the association between prayer and felt presence experiences relative to its overall relationship (see Table B1 in the Supplementary Appendix for all statistical model results).

Across all analyses, we found that prayer had no relationship with whether participants endorsed the dramatic events which we did not place into a larger category. The rates of sleep paralysis, possession, out-of-body experiences, and witnessing shapeshifting remained relatively constant regardless of how much participants prayed. For example, sleep paralysis was not correlated with prayer in any of the three studies (Study 1 $r = -.05$; Study 2 $r = .15$; Study 3 $r = -.01$; see Figs. B1–B3 in the Supplementary Appendix for percentage of yes and no responses to the sleep paralysis question, plotted against time spent in prayer for all three studies). By contrast, on average, individual items in the para-ordinary category were strongly correlated with prayer. (Study 1: $0.07 < r < .27$; Study 2: $0.31 < r < .43$; Study 3: $0.17 < r < .63$; see Table B2 in Supplementary Appendix B for a full list of correlations).

These observations suggest that prayer practice does predict the likeliness of outer sensory (hallucination-like) events and felt presence events, but that this relationship is strongest for what we have called “para-ordinary” events, that is, otherwise ordinary events which stand out to people as evidence of the presence of a god or spirit. In contrast, prayer practice appears to have no consistent association with sleep paralysis, out-of-body experiences, shapeshifting observations, possession, and other rare “dramatic” events.

One important caveat here is that we are attempting to predict relatively rare events, and some of these events are rarer than others (again, see Fig. 3). On the one hand, this presents challenges to our statistical modeling and its interpretation. Events that are rare are, by definition, characterized by low variability across participants; for many people, they just never happen. This “restricted range” in reports of spiritual experiences, in turn, leads to problems with heteroscedasticity: There is less variability in experience among people who pray less (whose reports of experiences are uniformly near zero) than there is among people who pray more (some but not all of whom have more frequent experiences). In our case, the challenge

of heteroscedasticity is further compounded by the fact that the degree of range restriction, and hence the severity of heteroscedasticity, varies systematically across categories of experience. Para-ordinary events are rare, but not as rare as outer sensory or felt presence events, so these model challenges are less pronounced in the case of para-ordinary events than in other cases.

On the other hand, this variability is part of the phenomenon of interest: If it were the case that prayer had the power to drastically increase the likelihood of experiencing *any* kind of spiritual presence event, these events might be more uniformly frequent. Instead, para-ordinary experiences of otherwise ordinary events stand out as the most common across participants, the most frequently experienced, and the most strongly related to prayer practice—perhaps, in part, *because* practices like prayer have the power to facilitate them. In sum, there are many levels of explanation for the observed differences across categories in the strength of the relationship between prayer and experience, but we take our results to be highly consistent with the possibility that prayer practice has a particularly strong role to play in facilitating what we have called para-ordinary events.

7. General discussion

Across the three studies reported in this paper, we observed a clear pattern: People who prayed more also reported a wider variety of spiritual presence events (Studies 1–3) and experienced such events more frequently (Studies 2 and 3). Another clear pattern emerged: in most cases, the relationship between prayer and spiritual experience was particularly pronounced for what we have called “para-ordinary” experiences—otherwise ordinary events like thoughts and dreams that are experienced as special communications from a god or spirit.

It is remarkable that we found such robust and consistent relationships between prayer and spiritual experience across such a diverse group of participants. Collecting and analyzing cross-cultural data is challenging, which means that it is relatively rare within cognitive science as a discipline (Schulz, Bahrami-Rad, Beauchamp, & Henrich, 2018). Collecting data from thousands of participants across five countries is nearly unprecedented (although this is changing (Richert et al., 2022; Jacoby et al., 2024)). Our studies included not only undergraduate participants, but also adults recruited from the general population as well as specially recruited committed practitioners of Christianity and other religious traditions. A correlation between prayer and frequency of spiritual experience on its face might not seem to be surprising, but this robust relationship across studies and samples was not given. We could have found, for example, that the relationship between prayer and spiritual experience held only in the United States, or only among Christians, or only among English-speakers, or only among undergraduates. Such results might have suggested that there is a popular belief or doctrine among certain groups of people that changes the way people talk, and maybe the way people think, but not what they actually experience; or that prayer plays radically different roles in different cultural-religious settings. Instead, we found a clear relationship between time spent in prayer and reports of spiritual presence events across a diversity of sites and samples.

The key question remains: what is the nature of this relationship? We are sure that there is a confluence of many causal factors at play here. There could be a common trait that leads people both to pray more and have more spiritual experiences. There could be beliefs, desires to hear God, or even perceptual proclivities that induce some people to pray more than others and independently affect the diversity and frequency of spiritual presence events. And, of course, experiencing stand-out spiritual presence events such as conversion experiences can lead people to lives of prayer. Surely, all these factors are at work in our data and in the wider world. However, merely desiring these experiences and believing the right things do not inevitably lead people to have them. There are many people of faith who wish for a more vivid experience of God and yet they do not (Luhrmann, 2012). We believe that there may be a unique contribution of *practice* to the experience of spiritual presence events. We are inclined, then, to explore a possible causal argument that prayer practice changes spiritual experience.

The first reason to take seriously the argument that prayer leads to more spiritual experience is that people say that to know God, one must pray. This is an explicit, prescriptive claim made in Christianity. For example, the Apostle Paul says in 1 Thessalonians that one should “pray without ceasing.” Prayer manuals are rich with such exhortations. For example: “We can never draw close to God and get to know Him well, or develop the kind of intimate relationship we want, unless we spend time alone with Him” (Omartian, 2014). This is not so much a theological claim as it is a phenomenological one. The prayer manuals—and sermons and prayer groups and so forth—insist that to feel God’s presence, one must pray. Indeed, participants in the current Study 1 made similar comments in their interviews. For example, a charismatic Christian in urban China said, “When you use a gun, without training, you cannot use it. At church there is continuous training. You look at an image that comes from God, and with training, you will know how to discern and you will know how to respond. You will open up spiritually.” A Presbyterian Christian in urban Vanuatu said that she prays “Because when I pray, I can see that God is always with me. At times, I can sense that he will talk to me and we’d talk together.”

The second reason to believe that prayer affects spiritual experience is that there is experimental evidence which points to such a causal relationship. In Luhrmann et al.’s *Spiritual Disciplines Project* (2013), Christian participants who engaged in imagery-rich (kataphatic) prayer reported more spiritual presence events at the end of the month than participants in the control condition. Similarly, research on meditation has found that mental practice and attending to inner experience differently changes experience. Meditation can improve the ability to sustain attention and leads to intense spiritual experience (Newberg et al., 2003; Lutz et al., 2009). A meta-analysis of “focused attention” meditation showed that advanced practitioners can create a sense of physical lightness or vigor (Lutz, Slagter, Dunne, & Davidson, 2008; see Yaden & Newberg, 2022 for an excellent overview).

Finally, we found in our interviews, participants connected their prayers to particular experiences of spiritual presence. Consistently, participants would report an experience of spiritual presence and confidently connect it back to their prayers even though their experiences did not necessarily take place during prayer. Sometimes, the cause-and-effect structure they narrated was very stark, such as a charismatic Christian woman in the United States who was distressed because she heard that her sister was hit in the eye with a softball and was in

the hospital. She was praying and said “not even five seconds later, a song came on and it was my song, I guess. It played and then just after that I had a peace, and I knew that everything was going to be ok, and it was.” Spiritual presence events were often reported as an “answer to prayer.” But participants also described a general alertness to God’s presence which they cultivated through prayer and made them more sensitive to spiritual presence events. As a charismatic Christian in urban Thailand reported, “After [praying for] a while, I start to have experiences and think ‘Hmm there’s someone always listening and responding to me.’”

What cognitive mechanisms might explain such a possible causal relationship between prayer practice and spiritual presence events? What might practitioners be practicing in prayer that is able to change their experience?

More work is needed, but we feel confident enough to offer some hypotheses. Let us return to what prayer *is*. Brusquely stated, prayer involves the repeated practice of paying attention to one’s inner mental world. This practice takes different forms, but at its core, across religious traditions and cultures, the consistent hallmark of prayer is an attentional shift from everyday awareness to words and images held in the mind. It is a metacognitive practice (Luhrmann, 2020; see also Cook, 2023). And if prayer is an act of paying attention to inner experience, it is likely to change inner experience. We suggest that there are several cognitive processes involved in this practice that could lead a person to judge inner events and sensations as not their own and not entirely inside them—thus, transforming otherwise mundane experiences into experiences of spiritual presence. Here, we discuss three: (1) heightened metacognitive attention to inner experience makes some experiences stand out; (2) inner sense cultivation increases vividness, which affects reality monitoring; and (3) the cultivation of an as-if presence increases the feeling of realism.

7.1. *Heightened metacognitive attention to inner experience*

Our findings here as well as in many ethnographic and historical accounts show that people of faith frequently report experiences that are common in ordinary human lives, but which they identify as signals from a god or spirit (e.g., Hardy, 1979; Taves, 2009; Mittermaier, 2010; Orsi, 2016; Bialecki, 2017; Bilu, 2020; Yaden & Newberg, 2022). People often dream, but sometimes a dream stands out to them as some kind of communication from a god. People often have goosebumps, but sometimes those goosebumps are taken as evidence that a god is present. Those who pray within a specific tradition can often specify their criteria for determining when such an event comes from god or a spirit. For example, charismatic evangelical Christians often say that if a thought feels more surprising or spontaneous and is the kind of thing they expected their God to say, such a thought may have come from God.

If prayer is indeed a metacognitive process that directs attention toward particular thoughts and changes the pattern of how one notices thoughts, then we would expect more time in prayer to lead to more thoughts which the person praying identifies as a thought sent by God. In fact, in ethnographic work, we have found that people describe special thoughts as becoming increasingly distinct and feeling less their own as they start praying and searching for their god’s response. It is as if they recognize a particular kind of thought—the kind of thought that feels as if it could be from their god (it is more spontaneous, it is louder, it directs

on to do things their god would want them to do)—and that as they get better at recognizing these kinds of thoughts, those thoughts stand out even more. We expect that a similar kind of phenomenon, a kind of reinforcing metacognition, is at work in all the items we have called “para-ordinary experiences,” in dreams that come to be understood as from a god, mental images that come to be understood as from a god, and overwhelming emotions that are thought to arise from the presence of a god.

7.2. *Inner sense cultivation and reality monitoring*

We suggest that another mechanism is the cultivation of mental imagery, or inner sense cultivation. (We use the term “inner sense” to make explicit the involvement of all inner senses, not just visual inner imagery.) People shut their eyes, and seek to experience something that cannot be seen or heard or otherwise sensed—and to experience it in their minds as vividly as possible. People talk about praying while sitting in Jesus’s lap, walking by God’s side, imagining that the Goddess Tara looks over at them, and so forth.

Across Luhrmann’s (1989, 2012, 2020) ethnographic studies of neopagans, kabbalists, santeria initiates, Black Catholics, newly orthodox Jews, and charismatic evangelicals, practitioners were very clear that prayer sharpened their mental imagery and led to more vivid experiences of their god. One person described the way prayer changed her mental experience by saying, “Depending on the prayers and depending on what’s going on, the images that I see [in prayer] are very real and lucid. Different than just daydreaming. I mean it’s, sometimes it’s almost like a PowerPoint presentation.” This woman said that she felt that intense prayer enabled her almost to see into a different realm, and that this was a semi-sensory experience, the way heat from a cup of coffee distorted what one could see behind it. Person after person repeated some version of this account, about how prayer changed the way that person experienced their god in a somewhat sensory way. One man, for example, explained that he had decided to pray intensely when he was in college. He chose a place to pray. “After a while, it was like God was waiting for me.” His sense that God was waiting for him was not so much a belief as something he felt when he arrived in the place. Our work in this paper has provided quantitative support for these ethnographic observations.

In earlier experimental work, we found that increased time in imaginative prayer not only led participants to report that their mental imagery is more vivid, but also led to slightly better performance on mental imagery tasks, such as mental rotation and letter detection (Luhrmann, Nusbaum, & Thisted, 2013). Both historical and ethnographic studies suggest that mental imagery training increases the subjective vividness of mental imagery (Yates, 1966; Beyer, 1969). Neuroscientific work has been more equivocal, in part due to the challenge of assessing increased vividness objectively, but such work does find that mental imagery training affects mental imagery experience (Lutz et al., 2009; Rademaker and Pearson, 2012).

If inner imagery is at least subjectively felt to become more vivid with inner sense cultivation practice, that practice might well alter an individual’s reality monitoring, and that in turn would increase the likelihood of hallucination-like events. Reality monitoring is a theory which argues that people decide whether information has an internal or external source through a set of judgments and—crucially—that these microsecond judgments are based on

features of the event (Johnson & Raye, 1981). Externally generated representations also tend to contain more, and more specific, information than internally generated representations (Johnson & Raye, 1981). As a result, remembered information with more spatial, temporal, and sensory attributes will lead an event to be more likely to be judged as having an external source.

We suggest that if prayer engages inner sense cultivation, and inner sense cultivation leads to more powerful and sharper internal imagery, this may in turn lead to more judgments that an event had an external rather than an internal source. A more vivid internal representation may then lead to an experience such as hearing a voice *outside* of one's head, judged as coming in perceptually through the ears rather than having an internal source. Alongside this change, prayer may also shift the metacognitive priors in response to an event, making the central question not, "Was that me I heard?" but rather, "Was that God I heard?" Note that we would expect what feels like an effect on perception to be relatively infrequent.

7.3. *Cultivation of as-if presence*

Prayer demands that the person praying repeatedly imagine the god or spirit to whom they pray as present: "as if" the god or spirit were physically there. The person praying thus must create some form of internal representation again and again, in multiply different ways, as if the person praying is playing, imagining, or pretending that the god or spirit is there, even when the person praying does not regard God as a fictional entity (e.g., Huizinga, 2016). In modern evangelical Christianity, some people even put out a coffee cup for their God (Luhrmann, 2012). This as-if quality has long been recognized as a way to help people of faith feel that the invisible spirit is present. C.S. Lewis, in his famous book about Christianity, *Mere Christianity*, entitled a chapter "Let's Pretend." In it, he points out that just saying the Lord's Prayer is an act of pretend-play (1980: 193).

As-if practice increases a feeling of realness, and that increased feeling of realness likely facilitates more moments in which a god or spirit feel present. Note that we are not trying to explain ontology or ontological realness here, but phenomenological experiences; many scholars have noted the centrality of play-like performance to religious worship (e.g., Handelman and Shuman, 1997; Seligman, Weller, Puett, & Simon, 2008; Stromberg, 2009; Huizinga, 2016). Over time, repeated play-like practice can help the central actions of the play have a greater feeling of familiarity and of there-ness. Play blurs the boundary between reality and fiction, and makes a practice feel more emotional. Play demands that the person playing invests a personal dimension into the practice. This repeated investment, particularly if coupled with what Sarah Iles Johnston (2016) calls plurimediality, or the exposure to different representations of the as-if being, may facilitate a more frequent experience of sensed presence.

7.4. *Support for the spiritual kindling theory*

All these proposed mechanisms—the metacognitive process of increasing attention to certain special experiences and thoughts, inner sense cultivation and reality monitoring, and the cultivation of as-if presence—are consistent with a kindling argument. Spiritual (or cultural)

“kindling” (Cassaniti & Luhrmann, 2014; Luhrmann, 2020) is a theory which suggests that the frequency of events deemed spiritual is shaped both by culture and by bodily constraints. When certain events are more culturally or socially significant, they are in general more easily identified by the individual. For example, if spontaneous thoughts full of good advice or goosebumps are taken to be signs of the presence of God, in a specific social world, people will notice them more and trust them as evidence of their god’s presence. Culture makes some experiences more salient, and people likely notice them more. Kindling theory further suggests that once “experience pathways” are established for an individual, those individuals are more likely to have that experience in the future. Kindled events are habituated responses which become more fluent and more frequent.

Our data here are consistent with that theory. Our data are also consistent with the kindling prediction that not all spiritual presence events will be kindled equally easily. Some experiences are more or less vulnerable to these shifting expectations and attention thresholds. And indeed, we found that prayer had a stronger relationship with exactly the kind of events that we would expect to be easier to shift, namely, para-ordinary events. Kindling theory predicts that spiritual presence events with commonplace bodily anchors (a thought in the mind, a dream, overwhelming emotion) are more likely to be experienced by a wider range of people, and that spiritual presence events which are strikingly anomalous will be experienced less frequently because such events involve proclivities that vary across individual bodies (e.g., a proclivity for “mistakes” in reality monitoring and related self-source-monitoring that facilitate the experience of hearing a voice (Waters et al., 2012)). Kindling theory describes an interaction between social meaning and bodily pathways. Again, we see this clearly in our data. Sleep paralysis, for example, which had little spiritual meaning for our participants, was unaffected by prayer practice.

We believe that what we see is a new step in the kindling theory hypothesis in specifying three possible cognitive mechanisms that facilitate spiritual presence events: intense inner attention, mental imagery cultivation, and as-if practice. All three seem to facilitate a shift in the basic human sense of what William James called “myness” (James, 1902)—the basic phenomenological feeling that our thoughts, feelings, and actions are our own. After all, at least in the proximate sense, spiritual presence events are thoughts and sensations that are experienced as not one’s own. They are rare because the sense that our thoughts and sensations are our own is so ubiquitous and profound. In the face of this profound sense of myness, it is striking that every so often an ordinary Teresa will feel the presence of God in the garden, and a Virginia Woolf will hear the birds singing in Greek (Woolf, 1985; Peers, 1991).

8. Conclusion

Across three studies encompassing data from thousands of participants across five different cultures, we found that people who prayed more had more varied and more frequent experiences of spiritual presence events. Prayer was associated more strongly with some of these experiences than others. Time in prayer was particularly strongly associated with the experiences we call “para-ordinary,” like spiritual dreams and overwhelming emotion; it had

some effect on outer sensory events like hearing a voice and on felt presence; whereas there was no consistent relationship between prayer and more dramatic, anomalous events such as possession, out-of-body experiences, and sleep paralysis. We argue that this correlation may reflect an underlying causal relationship between prayer practice and spiritual presence events, in which practitioners are cultivating certain cognitive pathways during prayer which have downstream effects on experience.

These findings should matter to the cognitive science community because they suggest that prayer might actually change people's *experiences*. The cognitive mechanisms engaged in prayer alter the way people attend to their own experiences and, we argue, change those experiences in sensory and perceptual ways that they treat as evidence of gods and spirits. In this way, our results not only suggest interesting relationships between practice and experience in a religious domain, but hint at the power of practice to shape experience more broadly.


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Data availability statement

Data and analysis scripts are available at https://github.com/erbschille/prayer_spiritualevents

Open Research Badges

 This article has earned Open Data badges. Data is available at https://github.com/erbschille/prayer_spiritualevents.

Ethics approval statement

This research was approved by IRB 36980.

Note

1 No charismatic evangelical Christian participants were recruited in China in Study 2.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix