Does she still love and feel hungry? Afterlife beliefs, mind-body dualism, and religion across 24 countries

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Abstract

All over the world, people reason dualistically. We consider it more probable that mental states, such as love, continue after biological death than we think bodily states, such as hunger, will continue. However the extent to which culture affects mind-body dualism remains unclear. Here, we draw on a large and diverse cross-cultural sample (24 countries, $N = 10195$) to systematically quantify cultural variation in tendencies for mind-body dualism. Our findings replicate previous work suggesting that mind-body dualism is culturally universal. Furthermore, our experiment reveals that religion amplifies dualistic tendencies. At the same time, however, the modal response across most countries was the cessation of all states. In addition, explicit afterlife beliefs were more prevalent than implicit afterlife beliefs (i.e., continuity judgments). Overall, these data suggest that intuitive materialism is the cross-cultural norm, with dualism arising from culturally acquired beliefs.

Keywords: Religion, Mind-body dualism, Afterlife beliefs, Culture

Introduction

The relationship between the human mind and body has intrigued philosophers and theologians for centuries. Over the last several decades, social scientists have joined the discussion by exploring laypeople's conceptualization of the mind. Many people nowadays endorse the neuroscientific view of the mind as a product of the physical brain (Berent & Platt, 2021; Riekki et al., 2013; Valtonen et al., 2021). At the same time, substantial research has shown that people from a variety of cultures and age groups reason dualistically, as they treat psychological and biological states differently (Astuti & Harris, 2008; Bering, 2002, 2006; Bering & Bjorklund, 2004; Bloom, 2007; Chudek et al., 2013; Cohen et al., 2011; Forstmann & Burgmer, 2015;

Preregistration, data, and analysis code are provided at https://osf.io/3p78n/.

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Harris & Giménez, 2005; Huang et al., 2013).

Philosophical thought experiments about body duplication and transfer have been used to probe how people think about the mind and the body (Parfit, 1984). This research suggests, among other things, that bodily features (e.g., having a scar) are more likely to be judged as transferable to another person than are individual mental states (e.g., remembering one's relatives; Forstmann and Burgmer, 2015; Hood et al., 2012). By contrast, mental states are rated as more likely to transfer to another individual than are body-related states in scenarios involving mind-switching (in which the mind of person A is transferred to the body of person B; Cohen and Barrett, 2008; Hood et al., 2012), in pre-life settings (i.e., the existence of states prior to biological conception; Emmons and Kelemen, 2014), and in afterlife settings (i.e., the continuation of states after biological death). More specifically, many people seem to implicitly believe that while states often classified as bodily, such as hunger, cease at death, high-level mental states, such as love, do not.[1] Here, we distinguish between implicit and explicit afterlife beliefs, in the sense that the implicit measures do not directly assess people's beliefs about the existence of an afterlife, a soul or disembodied spirits, whereas explicit afterlife beliefs refer to people's overt self-reported beliefs. As shown by the prevalent coexistence of seemingly incompatible beliefs about the nature of death (Astuti & Harris, 2008; Harris & Giménez, 2005; Legare et al., 2012; Watson-Jones et al., 2017), these implicit beliefs may exist even among people who explicitly reject an afterlife, such as atheists.

Mind-body dualism is typically measured by asking about the continuity of various processes of a deceased individual (Bering, 2002; Harris & Giménez, 2005). Participants read a vignette about a person who has recently died and are asked to what extent they think that person can, for instance, still experience hunger and pain (physical) or feel love and have memories (mental) after they have died (see Figure 1 for an example). Mind-body dualism is then operationalized as the relative difference in continuity judgments for mental and physical states (Astuti & Harris, 2008; Bering, 2002; Harris & Giménez, 2005; Watson-Jones et al., 2017). In the

[1] We note that hunger is arguably also a mental state. In the mind-body dualism paradigm, a distinction is typically made between states that are strongly body-dependent such as hunger, feeling pain, seeing or hearing and high-level mental states that are less closely linked to the physical body such as love, knowledge, desire. Throughout the literature various terms have been used to denote the body-dependent states, e.g., psychobiological, physiological, physical, body-related. Here, we use the term 'bodily states' to clearly contrast these body-dependent states with the high-order mental states, that are simply referred to as 'mental states'.

current study, we investigated the universality of mind-body dualism, and whether the expression of mind-body dualism varies as a function of religiosity. That is, we set out to conceptually replicate the main finding that mental states are more likely to be judged to continue after death than bodily states in a large cross-cultural sample (N = 10,195 participants from 24 countries). In addition, we assessed to what extent individual religiosity of the rater and a contextual emphasis on religion influence both the tendency to make overall continuity judgments and to reason dualistically (i.e., to make more continuity judgements for mental states relative to biological states). This cross-cultural replication attempt was motivated by theoretical and methodological concerns regarding the prevalence of mind-body dualism, on which we elaborate below.

Several theories have been proposed to explain folk dualistic reasoning and the link with explicit afterlife beliefs. A basic premise of mind-body dualism is what H. C. Barrett et al. (2021) call the *parallel systems* account. According to this account, people can think about organisms in two distinct ways: as agents and as physical objects. By default, agency is attributed to living people and animals, but not to deceased ones (e.g., H. C. Barrett & Behne, 2005; H. M. Gray et al., 2007). The shift in focus between agency and body allows for the possibility to distinguish between a mind and a body, and reason about people's emotions and physical movements, respectively.

Some authors, however, have taken the mind-body distinction one step further (e.g., Bering, 2002; Bloom, 2005; Slingerland & Chudek, 2011). Specifically, it has been argued that humans are not only capable of distinguishing between a mind and a body, but that doing so is the cognitive default: dualistic beliefs about the mind and body as being separate entities are natural and innate. This has led to the influential 'intuitive dualism' approach. In other words, folk dualism might be a universal default that can be *unlearned* through formal education, rather than that it is *learned* through cultural narratives. Bloom (2005), for instance, argued that humans are intuitive Cartesian substance dualists: we intuit that the mind is separate from the body, that the mind is the sole source of our identity and that the body is no more than a vehicle for the mind. Bering (2002, 2006) introduced the 'simulation constraint hypothesis' as a potential causal mechanism for folk dualism: because it is impossible to imagine what it's like to be dead –specifically what it is like to be devoid of emotions and cognitions– we (mistakenly) assume that dead

individuals still possess mental capacities.

However, other scholars have challenged the naturalness of mind-body dualism. They argue that the 'intentional stance' and 'offline social reasoning' provide more parsimonious accounts to explain empirical patterns of dualistic reasoning showing that mental states are judged as more likely to continue after death than physical states (Dennett, 2006; Hodge, 2008, 2011b). People use intentionality to reason about other individuals, including deceased ones and because of the focus on intentions and social relations, mental states are more likely to be thought of as continuing compared to physical states. This does not assume, however, that we intuitively view humans as disembodied minds. Relatedly, H. C. Barrett et al. (2021) and Barlev and Shtulman (2021) argued that the empirical patterns are in fact at odds with an intuitive dualism account: across most studies, the modal response of continuity judgments is cessation rather than continuation, even for high-level mental states such as love. Instead, an *intuitive materialism* account might be more appropriate, in which the default is to view death in biological terms upon which all mental activity ends. According to H. C. Barrett et al. (2021), the fact that a small group of people in these vignette studies do make continuity judgments for dead agents is a result of explicit afterlife beliefs that are culturally acquired. Barlev and Shtulman (2021) similarly argue that mind-body dualism observed in afterlife scenarios and the widespread belief in disembodied beings (ghosts, spirits, God etc.) result from learned rather than intuitive dualism. The prevalence of these beliefs is due to the social transmission advantage that stems from being (minimally) counterintuitive (cf. Banerjee et al., 2013; Boyer, 1994).

Indeed, various empirical patterns suggest that dualistic reasoning is largely culturally acquired. First, several studies found that the tendency to distinguish between body and mind *increased* rather than decreased with age (Astuti & Harris, 2008; Bering, Hernández-Blasi, et al., 2005; Bering & Bjorklund, 2004; Harris & Giménez, 2005; Watson-Jones et al., 2017). Second, many of the intuitive dualism arguments are based on observations among young children, but even 5-year-olds have been exposed to considerable cultural discourse. As mentioned by Harris (2011b, p.37), children are more likely to be told that their dead grandmother or pet is still thinking about them and loves them, than that the emotional connection ceases at death. This might be similar to the cultural idea of the heart as being the place of love, which was demonstrated by children's belief that kindness would be transferred upon heart transplantation (Johnson, 1990). Still, based on this it would be

mistaken to argue that the notion of the heart as the place of love is innate, in the sense of developing without substantial cultural guidance. Third, it has been found that the framing (religious vs. secular) of a narrative influences the likelihood of stating that mental processes continue after death (Astuti & Harris, 2008; Bek & Lock, 2011; Harris & Giménez, 2005; Watson-Jones et al., 2017), again emphasizing the sensitivity of implicit afterlife beliefs and dualistic reasoning to cultural cues. Fourth, while mind-body dualism has been observed across various cultures (e.g., in the US, Madagascar, Brazil, Ecuador, Ukraine, Vanuatu, China; Astuti & Harris, 2008; Chudek et al., 2013; Cohen et al., 2011; Huang et al., 2013), substantial cultural differences in the categorization of different states have been documented (Huang et al., 2013; Weisman et al., 2021). A recent study, for instance, reported cross-cultural universality in reasoning about biological and cognitive states, but cultural variation in socio-emotional 'heart-like' states (Weisman et al., 2021). Additionally, following Bering's (2002) original 'dead person experiment', Huang et al. (2013) replicated the continuity of mental states and the cessation of psychobiological states in a Chinese sample (both immediately after and 2 days after the passing). However, in this study participants judged that auditory and visual perceptual states would continue, while they did not in the original study, indicating cross-cultural variation in these beliefs.

There are also systematic individual differences in the extent to which people reason dualistically. Perhaps most obvious is the link between religious beliefs and mind-body dualism; most religions involve some form of an afterlife that typically emphasizes continuity of the soul/spirit/mind of the deceased. Indeed, the assumed naturalness of mind-body dualism has been used as an argument to explain why religious beliefs are widespread and intuitive (Bering, 2006; Bloom, 2007). Empirical evidence also supports the link between religiosity and folk dualism, such that religious individuals are more likely to explicitly hold dualistic beliefs and make more continuity judgments about deceased people (i.e., display implicit afterlife beliefs; Riekki et al., 2013). Notably, religious individuals have been found to be even more likely to attribute mental capacities to deceased individuals than to living individuals in a vegetative state (K. Gray et al., 2011). At the same time, some studies have found that continuity judgments are even prevalent among atheists. For instance, over 50% of extinctivists (i.e., individuals who do not believe in an afterlife) judged high-level mental processes such as emotional and epistemic states to continue after death (Bering, 2002). In addition, atheists have also been found to hold explicit dualistic

beliefs, albeit to a lesser degree than religious believers (Nelson et al., 2020). Finally, experimental manipulations aimed at investigating the role of culture and setting in folk dualism also capitalized on the relevance of religion; Astuti and Harris (2008) and Harris and Giménez (2005), for instance, found that continuity judgments occurred more often in response to a narrative involving religious burial rites than a narrative focused on a corpse. In addition, Watson-Jones et al. (2017) found that while in the US, religious framing enhanced continuity for both biological and psychological processes, in Vanuatu, an island nation in the South Pacific, religious framing mostly enhanced continuity judgments for biological processes specifically.

In sum, in the literature there is some evidence for the cross-cultural universality of implicit afterlife beliefs, the relation with an individual's religious beliefs (or the lack thereof) and the role of the framing of the narrative. In the current preregistered study, we aimed to replicate previous findings that (1) mental states are more likely to be judged to continue than bodily states ($\mathcal{H}_1$), that (2) individual religiosity is associated with increased continuity judgments ($\mathcal{H}_2$), and that (3) a framing manipulation emphasizing religious practices increases continuity judgments ($\mathcal{H}_3$). While there is preliminary evidence for these main effects, replication seems crucial, especially since previous studies were non-preregistered and only based on small samples (ranging from 46 to 260 adults)[2] and a few cultures (Hoogeveen & van Elk, 2021; Lindsay, 2015; Schmidt, 2009). Moreover, it is unclear how exactly religion as an individual difference factor or as a contextual manipulation is related to mind-body dualism (i.e., a state-by-religiosity interaction effect; $\mathcal{H}_4$ and a state-by-framing interaction effect; $\mathcal{H}_5$). That is, using the vignette approach by asking participants to make continuity judgments for both mental and physical states, religiosity might be associated with more continuity judgments uniformly across both mental and bodily states (cf. Harris & Giménez, 2005), relatively more continuity of mental states (vs. bodily states; increased dualism; cf. H. C. Barrett et al., 2021) or relatively more continuity of bodily states (i.e., reduced or no dualism; cf. Watson-Jones et al., 2017).

In addition, five complementary preregistered hypotheses were tested. First, we expected explicit afterlife beliefs to be positively related to implicit afterlife beliefs (i.e., overall continuity ratings; $\mathcal{H}_6$) and to mind-body dualism (i.e, a state-by-afterlife

[2]Previous studies assessing afterlife continuity among adults included 84 (Bering, 2002), 46 (Astuti & Harris, 2008), 79 (Watson-Jones et al., 2017), and 260 participants (H. C. Barrett et al., 2021).

beliefs interaction; $\mathcal{H}_7$). Second, based on the work by Forstmann et al. (2012), we assessed mind-body dualism with a pictorial self-rating item showing two circles representing the mind and the body that are separate or overlapping to various degrees. We expected participants' ratings on this item to be positively related to mind-body dualism measured as the difference between continuity of mental and bodily states in the vignette ($\mathcal{H}_8$). Finally, while we expect some universality in the presence of folk dualism, the size of the mind-body difference might very well differ substantially across countries. Specifically, mirroring the religiosity effect at the individual level, we expected that the level of cultural religiosity within a country would be positively related to overall continuity beliefs ($\mathcal{H}_9$) and to the size of the state effect (i.e., the mental states vs. bodily states difference) in that respective country ($\mathcal{H}_{10}$).

We presented participants with a vignette describing a woman who had recently died. In a between-subjects manipulation, the death was either framed in religious terms featuring a religious authority (e.g., a priest) and references to an afterlife ('now that she's with God...') or in secular terms featuring a medical doctor and no further references ('now that she's dead...'; Harris and Giménez, 2005). Then we asked participants to judge the continuity of six states, three of which we classified as *bodily states* –feeling hungry, having an active brain, hearing– and three of which we classified as *mental states* –wanting, knowing, loving. We note that the literature is somewhat ambiguous about the categorization and evaluated continuity of perceptual states such as seeing and hearing. For instance, Bering (2002) found that perceptual states were judged to cease, while in later work perceptions were among the cognitive states that were judged to continue in contrast to psychobiological states (Bering & Bjorklund, 2004). Using a more bottom-up approach based on interviews about continuity in hypothetical disembodiment scenarios, Cohen et al. (2011) suggested a categorization of body-dependent and body-independent processes, where perception is considered body-independent. This also fits with the findings of Huang et al. (2013), who found that perceptual states were judged to continue in a Chinese sample. Finally, Weisman et al. (2017), Weisman et al. (2021) proposed three categories of lay concepts of the mind: 'body-like', 'heart-like', and 'mind-like', which correspond to bodily versus social and emotional versus perceptual and cognitive states. An exploratory factor analysis showed that hearing mostly clustered with mind-like states, although not universally (Weisman et al., 2021). In our main analysis, we followed our preregistration based on the original distinction where perceptual states

are considered bodily states (Bering, 2002). In addition, given the ambiguity in the literature, we conducted an exploratory analysis investigating the clustering of the six different states and ran a robustness check with the hearing item categorized as a mental state.

Disclosures

Data, materials, and preregistration

The current study was preregistered on the Open Science Framework; readers can access the preregistration, as well as all materials for the study, the anonymized raw and processed data (including relevant documentation), and the R code to conduct all analyses (including all figures), on the OSF https://osf.io/3p78n/. Any deviations from the preregistration are highlighted in this manuscript.

Reporting

We report how we determined our sample size, all data exclusions, and all manipulations in the study. As this study is part of a larger cross-cultural data collection project (see Appendix for details about the project and see Hoogeveen, Haaf, et al., 2022; Hoogeveen, Sarafoglou, et al., 2022), we only describe measures relevant to the mind-body dualism sub-project.

Ethical approval

The study was approved by the local ethics committee at the Psychology Department of the University of Amsterdam (Project #2018-SP-9713). Additional approval was obtained from local IRBs at the Adolfo Ibáñez University (Chile), the Babes-Bolyai University (Romania), James Cook University (Singapore), Royal Holloway, University of London (UK), the University of Connecticut (US), and the Max Planck Society, as well as the Senate Department for Education, Youth and Family from the Ministry of Education in Berlin (Germany). All participants were treated in accordance with the Declaration of Helsinki.

Methods

Participants

In total, 10,535 participants completed the online experiment. Of these, 340 participants (3.23%) were excluded because they failed the attention check, leaving an analytic sample of $N = 10,195$ participants from 24 countries. Participants were recruited from university student samples, from personal networks, and from representative samples accessed by panel agencies and online platforms (MTurk, Kieskompas, Sojump, TurkPrime, Lancers, Qualtrics panels, Crowdpanel, and Prolific). Participants were compensated for participation by a financial remuneration, the possibility for a reward through a raffle, course credits, or received no compensation. There were no a priori exclusion criteria; everyone over 18 years old could participate. Participants were forced to answer all multiple choice questions, hence there was no missing data. The countries were convenience-sampled (i.e., through personal networks), but were selected to cover 6 continents and include different ethnic majorities and religious majorities (Christian, Muslim, Hindu, Jewish, Eastern religions, as well as highly secular societies). See Table 1 for the descriptive statistics, method of recruitment and compensation per country and Table 2 for a breakdown of religious affiliations per country.

Sampling Plan

We preregistered a target sample size of $n = 400$ per country and 20-25 target countries. The preregistered sample size and composition allowed us to look at overall effects, effects within countries, and between countries. As we applied a Bayesian statistical framework, we needed a minimum of 20 countries to have sufficient data for accurate estimation in cross-country comparisons (Hox et al., 2012). However, we were mainly interested in overall effects - rather than effects for individual countries. With approximately 8,800 participants, we would have sufficient data to reliably estimate overall effects, especially since the state effect (mind vs. body) is within-subjects. We planned to terminate data collection on November 30th, 2019, but retained data from ten participants who completed the survey after this termination date.

Table 1

Descriptive Statistics per Country

Country	N	Age (SD)	Women	Religiosity	Sample	Compensation
Australia	463	48.3 (16.0)	48.4%	0.52	online panel	money
Belgium	320	34.6 (13.1)	55.6%	0.24	mixed	raffle
Brazil	402	28.8 (10.4)	73.1%	0.51	mixed	none; credits
Canada	351	33.2 (10.5)	52.4%	0.28	online panel	money
Chile	308	30.8 (9.9)	59.1%	0.33	mixed	raffle
China	390	32.1 (8.4)	55.9%	0.32	online panel	money
Croatia	309	28.0 (6.9)	78.3%	0.41	mixed	raffle
Denmark	415	27.9 (10.3)	71.3%	0.26	mixed	raffle
France	405	40.6 (12.8)	64.2%	0.29	online panel	money
Germany	1,287	27.5 (9.0)	62.2%	0.32	mixed	raffle
India	394	30.4 (6.5)	36.3%	0.73	online panel	money
Ireland	434	42.6 (15.0)	51.8%	0.48	online panel	money
Israel	501	27.9 (10.1)	73.5%	0.37	students	credits
Italy	342	27.2 (8.2)	50.9%	0.26	mixed	none; money
Japan	424	40.6 (10.0)	43.9%	0.29	online panel	money
Lithuania	291	24.1 (7.0)	83.2%	0.35	students	none
Morocco	329	32.1 (11.8)	16.1%	0.70	online panel	money
Netherlands	482	57.6 (14.7)	25.3%	0.28	online panel	money
Romania	539	24.4 (7.4)	85.2%	0.55	mixed	raffle
Singapore	308	22.2 (3.4)	62.0%	0.45	students	credits
Spain	337	41.9 (13.9)	31.2%	0.21	online panel	money
Turkey	362	39.2 (11.1)	24.6%	0.33	online panel	money
UK	400	36.2 (12.7)	65.8%	0.23	online panel	money
US	402	35.8 (14.4)	51.0%	0.45	mixed	none; money
Total	10,195	33.8 (13.8)	55.9%	0.38	-	-

Note. Religiosity refers tot he self-reported level of individual religiosity based on 9 items, transformed on a 0-1 scale. Sample indicates the sample composition based on the method of recruitment per site.

Table 2

Religious Denomination per Country

	Religious group						
Country	Christian	Muslim	Hindu	Buddhist	Jewish	Other	None
Australia	44.3%	5.4%	0.2%	0.9%	0.4%	1.9%	46.9%
Belgium	28.4%	2.5%	0.0%	0.6%	0.3%	0.6%	67.5%
Brazil	30.1%	0.0%	0.0%	1.0%	0.2%	14.4%	54.2%
Canada	26.5%	1.1%	0.9%	1.1%	2.0%	1.4%	67.0%
Chile	25.6%	0.0%	0.6%	1.6%	3.2%	2.3%	66.6%
China	3.6%	0.0%	0.0%	10.5%	0.0%	1.0%	84.9%
Croatia	54.4%	0.3%	0.0%	0.6%	0.3%	0.6%	43.7%
Denmark	35.7%	2.2%	0.0%	0.0%	0.0%	0.0%	62.2%
France	38.8%	6.2%	0.0%	0.2%	0.0%	1.2%	53.6%
Germany	54.4%	3.3%	0.1%	0.1%	0.3%	1.2%	40.7%
India	13.2%	3.6%	60.4%	0.3%	0.3%	0.8%	21.6%
Ireland	54.4%	1.6%	0.2%	0.0%	0.2%	0.9%	42.6%
Israel	2.2%	3.2%	0.0%	0.0%	11.6%	2.0%	81.0%
Italy	17.5%	0.0%	0.0%	0.9%	0.0%	0.0%	81.6%
Japan	0.9%	0.2%	0.0%	15.3%	0.0%	1.2%	82.3%
Lithuania	39.2%	0.0%	0.3%	0.0%	0.0%	0.7%	59.8%
Morocco	0.3%	78.1%	0.0%	0.0%	0.0%	1.5%	20.1%
Netherlands	27.0%	0.0%	0.0%	0.0%	0.6%	3.1%	69.3%
Romania	77.2%	0.2%	0.0%	0.2%	0.2%	2.2%	20.0%
Singapore	20.5%	4.9%	3.9%	20.5%	0.0%	5.2%	45.1%
Spain	39.8%	0.0%	0.0%	0.0%	0.0%	1.2%	59.1%
Turkey	0.0%	42.5%	0.0%	0.0%	0.3%	2.5%	54.7%
UK	22.2%	0.5%	0.8%	0.5%	0.8%	1.0%	74.2%
US	44.0%	1.2%	0.5%	0.2%	3.2%	3.0%	47.8%
Total	32.0%	5.7%	2.6%	2.0%	1.0%	2.0%	54.6%

Note. Percentage of people indicating membership of the respective religious groups. Note that the response options were particularized per country. Here we show the 5 most prevalent groups.

Materials

The key variables of interest are as follows: individual religiosity, target state category (mental state vs. bodily state), the manipulated framing of the narrative (secular vs. religious) and the binary continuity judgments for each state. Participant religiosity was measured using standardized items taken from the World Values Survey (WVS; World Values Survey, 2010), covering religious behaviours (institutionalized such as church attendance and private such as prayer/meditation), beliefs, identification, values, and denomination. Besides having high face-validity, these measures have been applied cross-culturally in other studies (Lindeman et al., 2015; Lun and Bond, 2013; Stavrova, 2015; see also Hoogeveen, Haaf, et al., 2022). A Bayesian reliability analysis using the `Bayesrel` package (Pfadt & van den Bergh, 2020) indicated good internal consistency of the religiosity measure, McDonald omega = 0.930 [0.927, 0.931] (all item-rest correlations > 0.61). All individual religiosity items were transformed on a 0-1 scale (to make each item contribute equally to the scale), tallied to create a religiosity score per participant, and grand-mean standardized for the analyses. The experimental stimuli consisted of a short narrative about a young person whose grandmother dies (see Figure 1). The framing was manipulated (between-subjects) by either introducing a priest (or comparable religious authority) or a doctor to mention the grandmother's death and stating that she is either *with God now* or *dead now*, respectively. Participants then indicated whether they thought that the grandmother was still capable of (1) *being hungry*, (2) *hearing voices*, still had (3) *a functioning brain*, still could (4) *know things*, (5) *love*, and (6) *want things*. The first three processes were classified as bodily states (psychobiological/perceptual) and the last three as mental states (emotional/cognitive). The narratives and process items were based on the materials used by Harris and Giménez (2005). The name of the target person and the specific religious authority were adjusted to the language and cultural context of each country (e.g., a priest, a rabbi, an imam).

For the complementary hypotheses we additionally used the item on afterlife beliefs from the religiosity scale ('To what extent do you believe in a life after death?'), a pictorial dualism self-rating item, and two items assessing cultural norms of religiosity in one's country. The pictorial dualism item was taken from Forstmann et al. (2012), which was adjusted from the self-other inclusion scale by Aron et al. (1992). The self-rating item had seven response options, showing two circles representing the mind and the body that are separate or overlapping to various degrees. The cultural

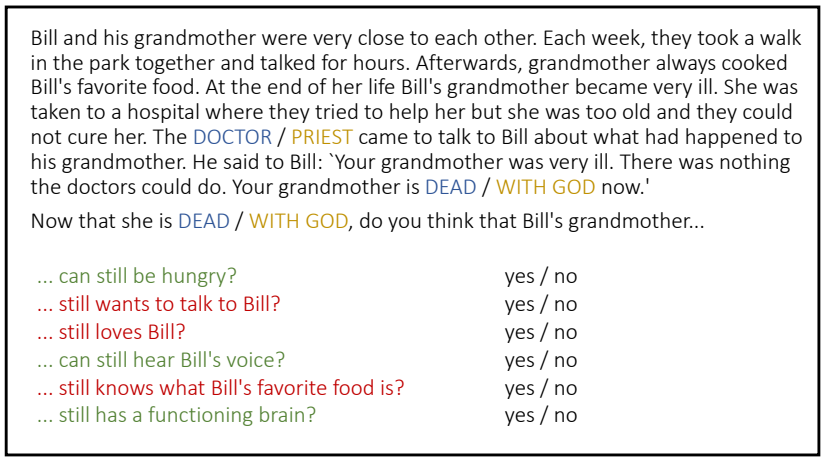

Figure 1

The mind-body dualism narrative as used in the present study. The framing (religious framing indicated in yellow, secular framing in blue) was varied between participants. The states (mental states indicated in red, physical states indicated in green) were presented in randomized order. The name of the target person and the specific religious authority were adjusted to the language and cultural context of each country.

norms items assessed participants' perception of the importance of religious beliefs and behaviors for the average citizen in their country. See the Appendix for the full materials, including the pictorial dualism item.

Procedure

Participants received a link to the Qualtrics survey, either by email, social media or through an online platform. After reading the instructions and providing informed consent, they first completed items for a separate study about religiosity and trustworthiness and source credibility for spirituality and science (see Hoogeveen, Haaf, et al., 2022)[3]. Subsequently, they were presented with the short narrative in either the religious or secular context (between-subjects), provided continuity judgments for the six process items, and completed the manipulation check to validate

[3]We acknowledge that these preceding items may have affected participants in their response to the current vignettes. However, we consider it unlikely that religion was strongly primed by these items, as they solely involved subtle cues of religion (i.e., an image of a woman wearing a necklace with a religious symbol and a statement by a spiritual guru). Any questions probing participants' religiosity directly were presented after the mind-body dualism task

that they recalled the type of authority (religious vs. medical). Finally, they provided demographics, a quality of life scale, the religiosity items, and were given the opportunity to provide comments. It took about 10 minutes to complete the entire survey (median completion time was 11.4 minutes).

Data Analysis

Analyses were carried out in R[4]. The models were built using the package `brms`(Bürkner, 2017), which relies on the Stan language (Carpenter et al., 2017). The `bridgesampling` package (Gronau et al., 2020) was used to estimate the log marginal likelihood of the models of interest and calculate Bayes factors. The multilevel Bayesian modelling approach allows us to systematically evaluate the evidence in the data under different models: (i) in every country the effect is truly zero; (ii) all countries share a common nonzero effect; (iii) countries differ, but all effects are in the same (predicted) direction; and (iv) in some countries the effect is positive whereas in others the effect is negative (Haaf & Rouder, 2017; Rouder et al., 2019). The models differ in the extent to which they constrain their predictions, from the most constrained (i) to completely unconstrained (iv). We refer to these models as the null model, the common effect model, the positive effects model, and the unconstrained model, respectively. Note that while the predictions from model (iii) are less constrained than those from model (ii), it is more difficult to obtain evidence for small effects under model (iii) because it assumes that the effect is present in every country, rather than only in the aggregate sample. When applied to our hypothesis for the mental versus physical state effect, evidence for (i) would indicate that people from

[4]For all analyses, we used R (Version 4.0.2; R Core Team, 2020) and the R-packages *BayesFactor* (Version 0.9.12.4.2; Morey & Rouder, 2018), *bayesplot* (Version 1.8.0; Gabry, Simpson, Vehtari, Betancourt, & Gelman, 2019), *brms* (Version 2.14.4; Bürkner, 2017, 2018), *cmdstanr* (Version 0.3.0.9000; Gabry & Češnovar, 2020), *coda* (Version 0.19.4; Plummer, Best, Cowles, & Vines, 2006), *corrplot2017* (Wei & Simko, 2017), *curl* (Version 4.3; Ooms, 2019), *digest* (Version 0.6.27; Antoine Lucas et al., 2020), *dplyr* (Version 1.0.5; Wickham, François, Henry, & Müller, 2021), *ggplot2* (Version 3.3.3; Wickham, 2016), *gridExtra* (Version 2.3; Auguie, 2017), *invgamma* (Version 1.1; Kahle & Stamey, 2017), *MASS* (Version 7.3.53; Venables & Ripley, 2002), *Matrix* (Version 1.3.2; Bates & Maechler, 2021), *MCMCpack* (Version 1.5.0; Martin, Quinn, & Park, 2011), *msm* (Version 1.6.8; Jackson, 2011), *mvtnorm* (Version 1.1.1; Genz & Bretz, 2009), *papaja* (Version 0.1.0.9997; Aust & Barth, 2020), *posterior* (Version 0.1.3; Vehtari, Gelman, Simpson, Carpenter, & Bürkner, 2020), *Rcpp* (Version 1.0.6; Eddelbuettel & François, 2011; Eddelbuettel & Balamuta, 2018), *rethinking* (Version 2.13; McElreath, 2020), *rstan* (Version 2.21.3; Stan Development Team, 2020a), *scales* (Version 1.1.1; Wickham & Seidel, 2020), *StanHeaders* (Version 2.21.0.7; Stan Development Team, 2020b), *tidyr* (Version 1.1.3; Wickham, 2020), *tinylabels* (Version 0.1.0; Barth, 2020), and *wesanderson* (Version 0.3.6; Ram & Wickham, 2018).

these 24 countries do not differentially evaluate continuity of physical and mental states after death, evidence for (ii) would indicate that on average people from these 24 countries consider mental states more likely to continue than physical states (or vice versa), evidence for (iii) would indicate that in all of the 24 countries, people consider mental states more likely to continue than physical states (or vice versa), but there is cultural variation in the size of this effect, and evidence for (iv) would indicate that in some countries people consider mental states more likely to continue than physical states, and in other countries people consider physical states more likely to continue than mental states, indicating cultural variation in the direction (and size) of the effect.

For the full model including all main effects and relevant interaction effects, we specified the following unconstrained model. Let Y denote the continuity responses per participant aggregated over the three binary items per state, where 0 indicates discontinuity and 1 indicates continuity and $Y = 0, \ldots, 3$. Further, let Y_{ijkl} be the continuity judgment for the ith participant, $i = 1, \ldots, N$, in the jth country, $j = 1, \ldots, 24$, for the kth state category, $k = 1, 2$ (physical or mental states, respectively), and the lth framing condition, $l = 1, 2$ (secular or religious framing, respectively). The responses Y_{ijkl} are modeled using an aggregated binomial model with a logit link to transform probabilities into real numbers $\in (-\infty, \infty)$:

$$Y_{ijkl} \overset{ind}{\sim} \text{Binomial}(3, p_{ijkl}),$$

$$\text{logit}(p_{ijkl}) = \alpha_j + x_k\beta_j + u_i\delta_j + c_l\gamma_j + v_{ki}\theta_j + w_{kl}\zeta_j.$$

where $\text{logit}(p_{ijkl})$ is the combined effect of observations, countries, and state categories on the tendency to indicate 'continues.' Note that $\text{logit}(p_{ijkl}) = 0$ reflects a probability of 0.5 of indicating continuity. The term α_j serves as the baseline continuity intercept for the jth country. The indicator $x_k = -0.5, 0.5$ if $k = 1, 2$, respectively, where $k = 1$ indicates the physical state condition and $k = 2$ indicates the mental state condition. The term β_j is the jth country's main effect of state category on continuity judgments. The variable u_i gives the ith participant's standardized religiosity score and δ_j is the jth country's main effect of religiosity. The indicator $c_l = -0.5, 0.5$ if $l = 1, 2$, respectively, where $l = 1$ indicates the secular framing condition and $l = 2$ indicates the religious framing condition. The term γ_j is then the jth country's main effect of framing. The indicator v_{ki} gives the state-by-religiosity interaction term and θ_j is

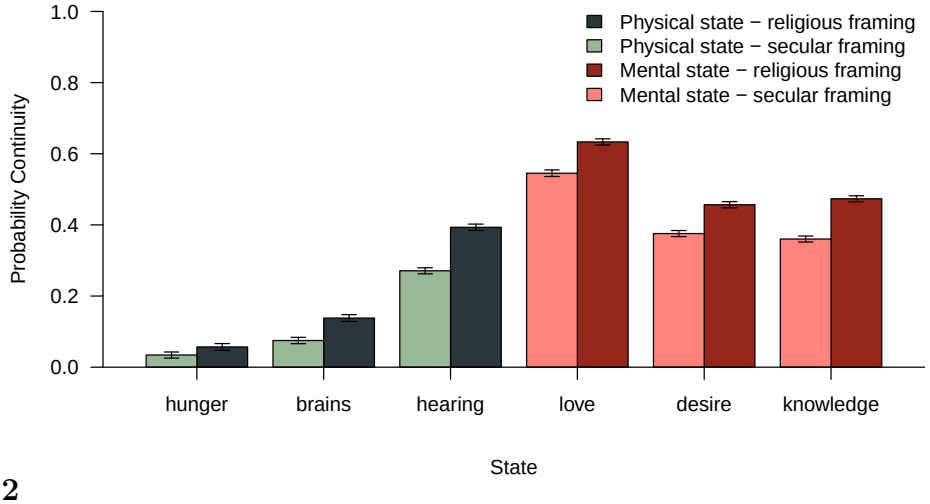

Figure 2

Descriptive pattern per state. Probability of continuity judgment per item, displayed per framing condition. The states were measured within-subjects and the framing was manipulated between-subjects. Error bars reflect the 95% confidence interval.

the corresponding interaction effect for the jth country. Finally, indicator w_{kl} gives the state-by-framing interaction term and ζ_j is the corresponding interaction effect for the jth country.

Results

Descriptive results

On average, people made continuity judgments for 31.76% of the states, with 16.13% for physical states and 47.39% for mental states. In Figure 4a these observed rates are further unpacked per framing condition and level of religiosity. Additionally, 60.95% of participants judged at least one state to continue after death, while 2.01% reported all six states to continue.

At the same time, the modal response across most countries is complete cessation rather than continuity: in only 5 out of 24 countries, the modal sum score across the six items was either 3 or 4, in all other countries it was 0 (see Figure 5). Specifically, only in China, India, Japan, Romania, and Singapore were participants more likely to indicate continuity of some states than complete cessation of all states. Across the aggregated sample, the mode is also complete cessation.

In addition, the proportion of people that display implicit afterlife beliefs (i.e., rated continuity of states after death) in the absence of explicit afterlife beliefs (i.e.,

self-reported belief in life after death) is much smaller than the proportion of people endorsing explicit afterlife beliefs but implicitly rejecting continuity in an afterlife. That is, most people in the sample indicate that they at least somewhat believe in an afterlife (i.e., score > 1 on the 7-point Likert scale) and rate at least one state to continue in the narrative task (55.2%). Additionally, 19.6% of participants both explicitly and implicitly reject the possibility of an afterlife. Then there are 19.4% who explicitly state that they somewhat believe in an afterlife, but implicitly reject continuity of any states. Yet only 5.8% of participants explicitly reject an afterlife but implicitly allow for states to continue after death.

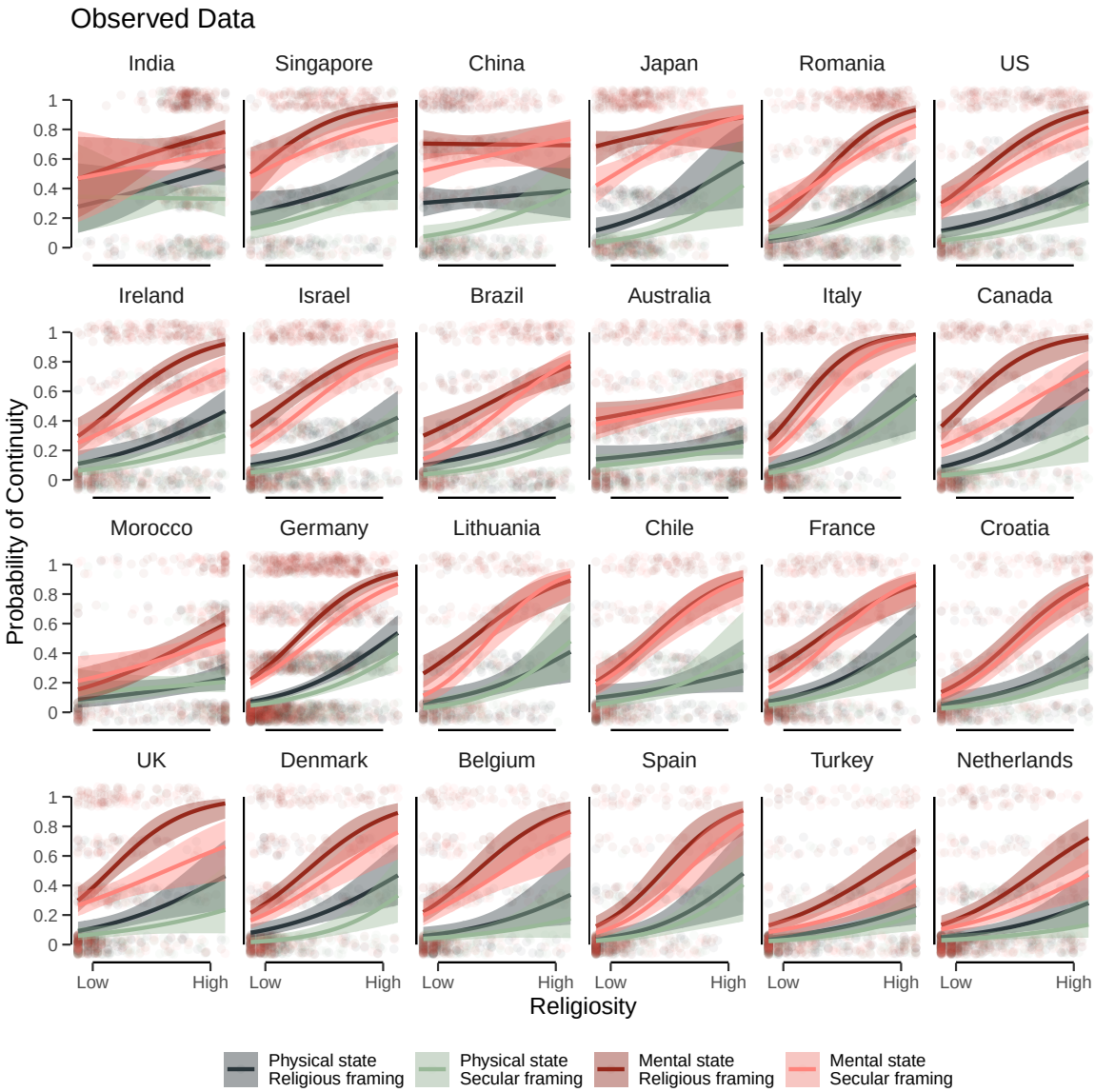

Figure 3

Descriptive pattern of results per country. Countries are ordered by the overall probability of making a continuity judgment (from left to right, top to bottom). Dark red lines denote probabilities for mental states in the religious framing condition, orange lines denote probabilities for mental states in the secular framing condition, dark blue lines denote probabilities for the physical states in the religious framing condition, and green lines denote probabilities for physical states in the secular framing condition. The shaded bands around the lines denote the 95% confidence interval. Data points are jittered to enhance visibility. Probabilities are averaged over the three items per state category.

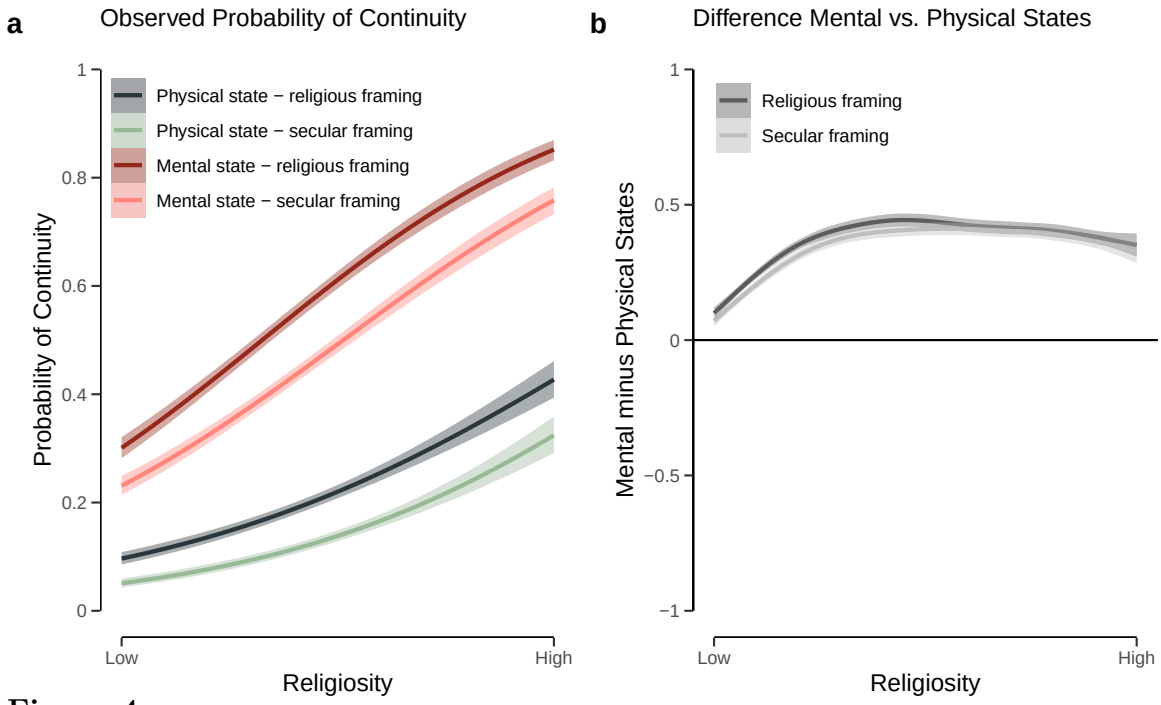

Figure 4

Descriptive pattern of results. Panel ***a.*** *displays the probability of making a continuity judgment per state category (physical vs. mental), framing (secular vs. religious) and individual level of religiosity. Panel* ***b.*** *shows the observed difference in probability of mental vs. physical processes (state effect) for each level of religiosity and framing conditions. That is, a positive score on the y-axis indicates higher continuity attributed to mental states compared to physical states. At all levels of religiosity, continuity is more likely to be attributed to mental states than physical states, though the difference increases with higher religiosity. The shaded bands around the lines denote the 95% confidence interval.*

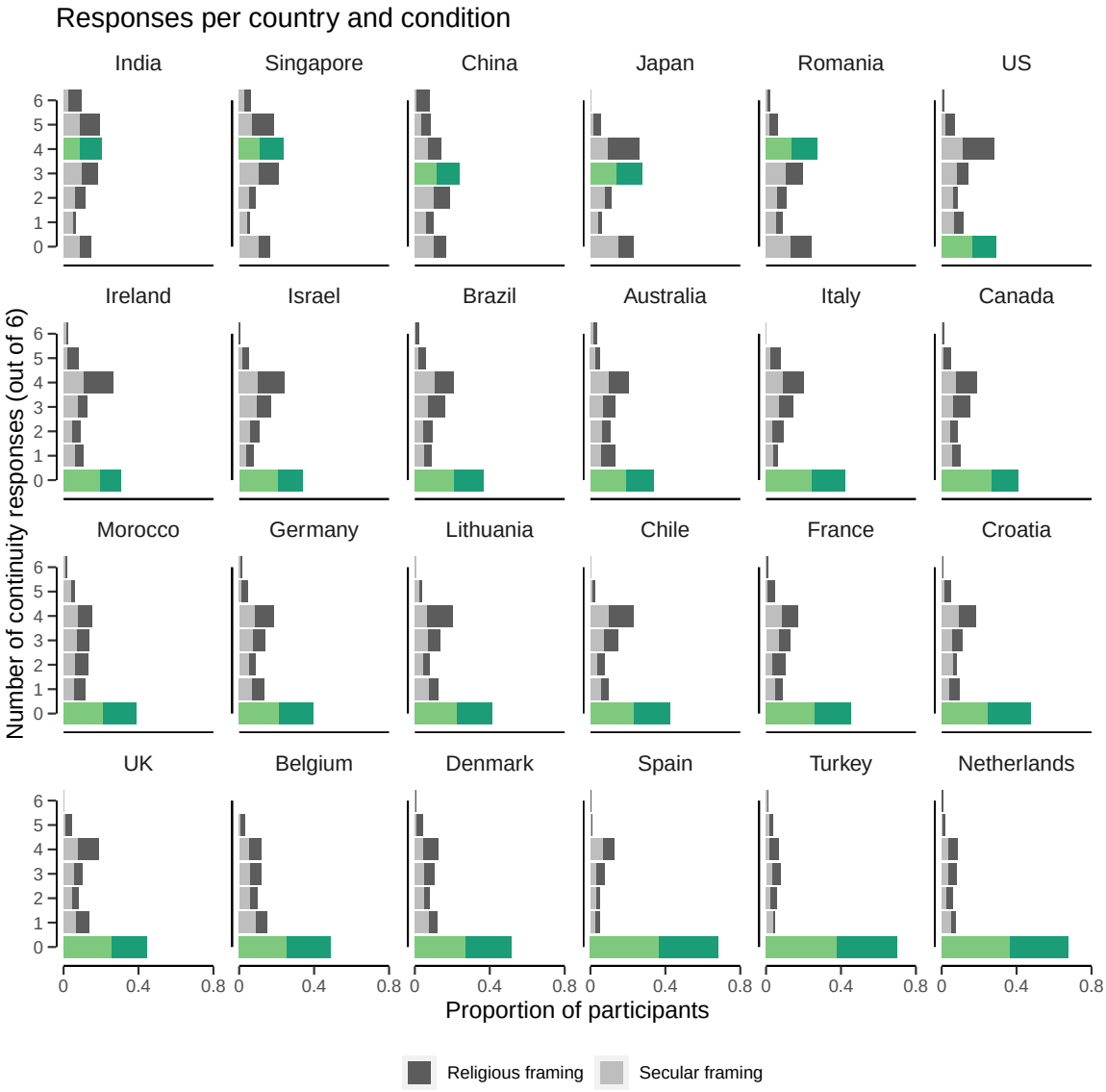

Figure 5

Proportion of participants and number of continuity responses per country. Countries are ordered by the overall probability of making a continuity judgment (from left to right, top to bottom). Dark grey bars reflect responses for the religious framing condition and light grey bars reflect responses for the secular framing condition. The modal number of continuity responses per country is indicated in green. Continuity responses were out of 6 states.

Confirmatory results

As can be seen in Table 3, we found substantial evidence in favor of our hypotheses for the state effect ($\mathcal{H}_1$), the religiosity effect ($\mathcal{H}_2$), the framing effect ($\mathcal{H}_3$), and the state-by-religiosity interaction effect ($\mathcal{H}_4$), yet strong evidence against the state-by-framing effect ($\mathcal{H}_5$).

First, regarding the state effect, mental processes are judged as more likely to continue after death than psychobiological processes, to a varying degree across countries: $\text{BF}_{+0} = \infty$; $\text{BF}_{+1} = 10^{26}$, $\mu_\beta = 1.71$ [1.55, 1.86], $\sigma_\beta = 0.35$ [0.25, 0.50]. This effect translates into an increase of 0.326 [0.129, 0.513] on the probability scale. Second, religiosity is positively associated with continuity judgments, to a varying degree across countries: $\text{BF}_{+0} = \infty$; $\text{BF}_{+1} = 10^{87}$, $\mu_\delta = 0.84$ [0.71, 0.96], $\sigma_\delta = 0.28$ [0.21, 0.39]. In other words, the most religious participants are 46.5% [13.9%, 72.0%] more likely to make continuity judgments than the least religious participants. Third, people are more likely to make continuity judgments when framed in a religious context than in a secular (medical) context, to a varying degree across countries: $\text{BF}_{+0} = 10^{146}$; $\text{BF}_{+1} = 10^{11}$, $\mu_\gamma = 0.52$ [0.41, 0.61], $\sigma_\gamma = 0.22$ [0.15, 0.32]. That is, people are 9.8% [0.9%, 21.4%] more likely to make continuity judgments in the religious framing condition than in the secular framing condition. Fourth, the difference in continuity judgments between mental and physical states becomes larger with increased religios-

Table 3

Bayes factor model comparison and parameter estimates for the key effects

	Bayes factors				Parameter estimates	
Effect	$\mathcal{M}_0$	$\mathcal{M}_1$	$\mathcal{M}_+$	$\mathcal{M}_u$	μ	σ
State Effect	0.00	0.00	**1.00**	0.09	1.71 [1.55, 1.86]	0.35 [0.25, 0.50]
Religiosity Effect	0.00	0.00	**1.00**	0.08	0.84 [0.71, 0.96]	0.28 [0.21, 0.39]
Framing Effect	0.00	0.00	**1.00**	0.09	0.52 [0.41, 0.61]	0.22 [0.15, 0.32]
State-by-Religiosity Effect	0.00	0.00	0.84	**1.00**	0.24 [0.14, 0.33]	0.18 [0.11, 0.28]
State-by-Framing Effect	**1.00**	0.02	0.00	0.11	-0.09 [-0.19, 0.00]	0.08 [0.00, 0.22]

Note. The preferred model for each effect is assigned value 1.00 and displayed in bold. The remaining values are the Bayes factors for the respective model relative to this preferred model. Subscripts reflect constraints on the critical parameter; $_0$ indicates no effect, $_1$ indicates a common (positive) effect, $_+$ indicates a varying positive effect, and $_u$ indicates an unconstrained effect. Parameter estimates (median and 95% credible interval) are taken from the unconstrained model for $\mathcal{H}_5$. σ reflects the between-country variation in the respective effect.

ity, to a varying degree across countries: $BF_{10} = 10^{16}$; $BF_{+1} = 3143$, $\mu_\theta = 0.24$ [0.14, 0.33], $\sigma_\theta = 0.18$ [0.11, 0.28]. That is, overall, the most religious participants make an estimated 43.4% [23.2%, 57.8%] more continuity judgments about mental processes than about physical processes, while this difference is only 17.2% [3.9%, 41.8%] for the least religious participants. Note, however, that while the model comparison indicated substantial evidence for the interaction effect, the unconstrained model slightly outperforms the positive-effects model: $BF_{u+} = 1.19$. This is due to the fact that when looking at the countries separately, for 7 of them, the credible interval of the interaction effect includes zero (see Figure 6). Fifth, the difference in continuity judgments between mental and physical states is not larger in a religiously-framed than in a secularly-framed context: $BF_{01} = 40.34$, μ_ζ = -0.09 [-0.19, 0.00], $\sigma_\zeta = 0.08$ [0.00, 0.22].[5]

[5]In the Appendix, we additionally report exploratory analyses on the religiosity-by-framing interaction and the three-way state-by-religiosity-by-framing interaction effects. However, the data do not indicate substantial evidence for either of these interaction effects.

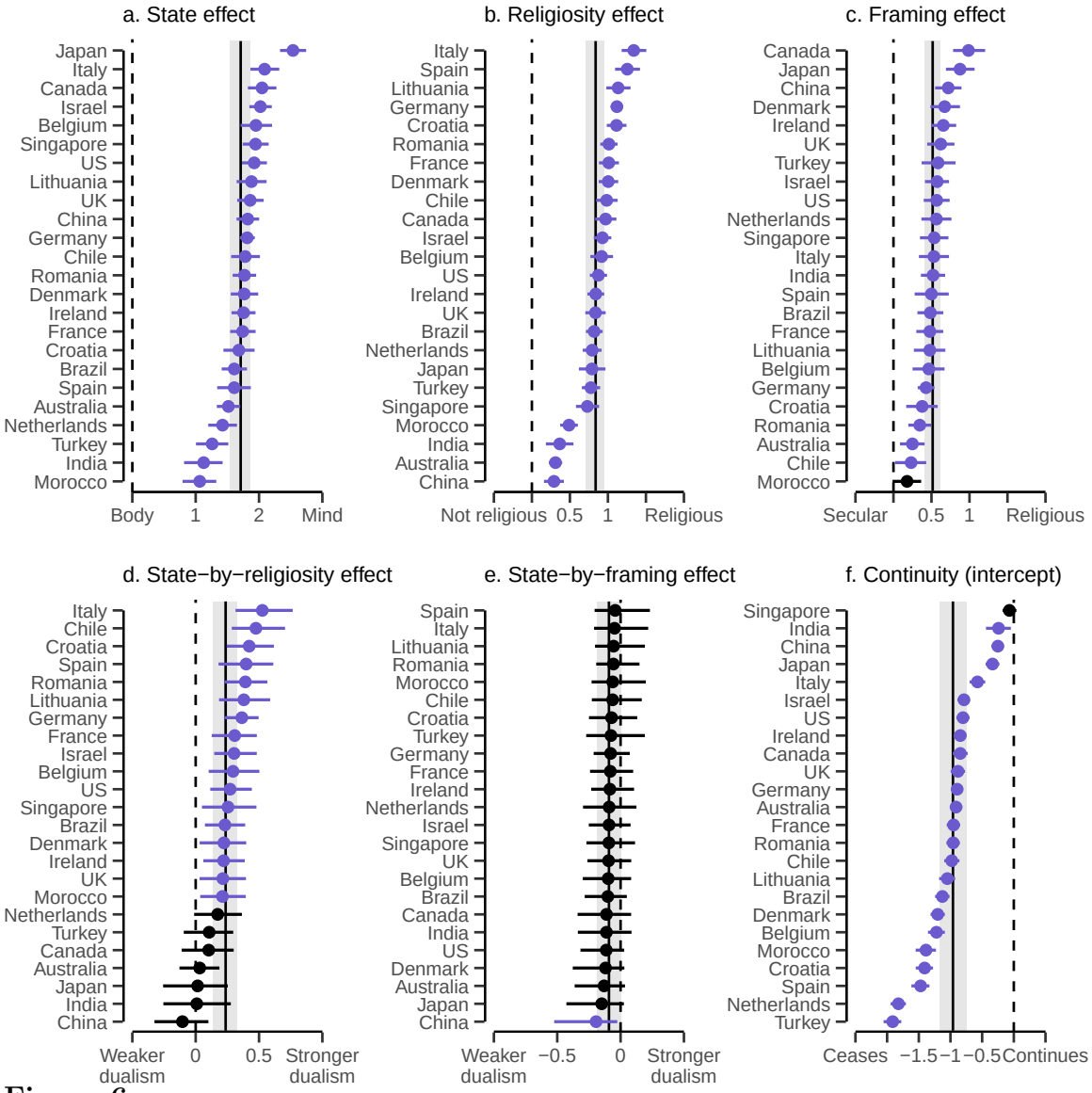

Figure 6

Estimated country-level effects (posterior medians) in increasing order. a. state contrast effects. b. religiosity effects. c. framing effects. d. state-by-religiosity interaction effects. e. state-by-framing interaction effects. f. intercepts. Each dot represents a country. Estimates with credible intervals colored in purple exclude zero and estimates with credible intervals colored in black include zero. The errorbars give the 95% credible interval for each country. The vertical lines denote the posterior median of the overall mean of the respective effect with the 95% credible interval in the shaded bands. The dashed lines indicates zero.

Explicit afterlife beliefs

To test the hypothesis that explicit afterlife beliefs are related to both overall continuity judgments (i.e., implicit afterlife beliefs) and mind-body dualism, we constructed the models used to test $\mathcal{H}_2$ with the item on afterlife beliefs as the predictor. The Bayes factor analysis provided strong evidence for $\mathcal{H}_6$ that explicit afterlife beliefs are positively related to the overall probability of making continuity judgments, to a varying degree across countries ($BF_{+0} = \infty$; $BF_{+1} = 10^{96}$, $\mu_\delta = 0.90$ [0.78, 1.01], $\sigma_\delta =$ 0.28 [0.21, 0.39]). In addition, afterlife beliefs were also related to the tendency to differentiate between mental and physical states (i.e, $\mathcal{H}_7$), to a varying degree across countries ($BF_{+0} = 10^{12}$; $BF_{+1} = 3.01$, $\mu_\theta = 0.19$ [0.13, 0.26], $\sigma_\theta = 0.10$ [0.03, 0.18])

Pictorial dualism item

As preregistered, we also assessed whether a pictorial dualism self-rating item predicted overall continuity ratings and mind-body dualism. The Bayes factor model comparison gave evidence against the pictorial item predicting mind-body dualism operationalized as the difference in continuity between mental and physical states: $BF_{10} = 0.07$; $BF_{01} = 13.76$, $\mu_\theta = 0.02$ [-0.03, 0.07], $\sigma_\theta = 0.06$ [0.00, 0.12]).

Country-level cultural norms

Mirroring the religiosity effect at the individual level, we expected a positive relation between both the overall continuity judgments and cultural norms of religion and between mind-body dualism operationalized as the state effect and cultural norms of religion. To investigate this effect, we correlated cultural norms aggregated at the country-level with country-level estimates of the intercepts (α_j) and state-effects (β_j) in the models. First, we find some weak evidence against a positive correlation between the country-level overall probability of continuity and cultural norms of religion: $BF_{+0} = 0.32$; $BF_{0+} = 3.09$. Second, we obtained moderate evidence against a positive correlation between country-level estimates of dualism (i.e., the state effect) and cultural norms of religiosity aggregated at the country-level: $BF_{+0} = 0.13$; $BF_{0+} =$ 7.66 (see Figure 7). In fact, if anything, the correlation appears to be negative, rather than positive; the estimated size of the correlation coefficient is -0.48 [-0.71, -0.13].[6]. This suggests that participants from countries where religion is more normative are

[6]If we release the directional constraint, we get strong evidence in favor of a correlation: BF_{10}= 15.69.

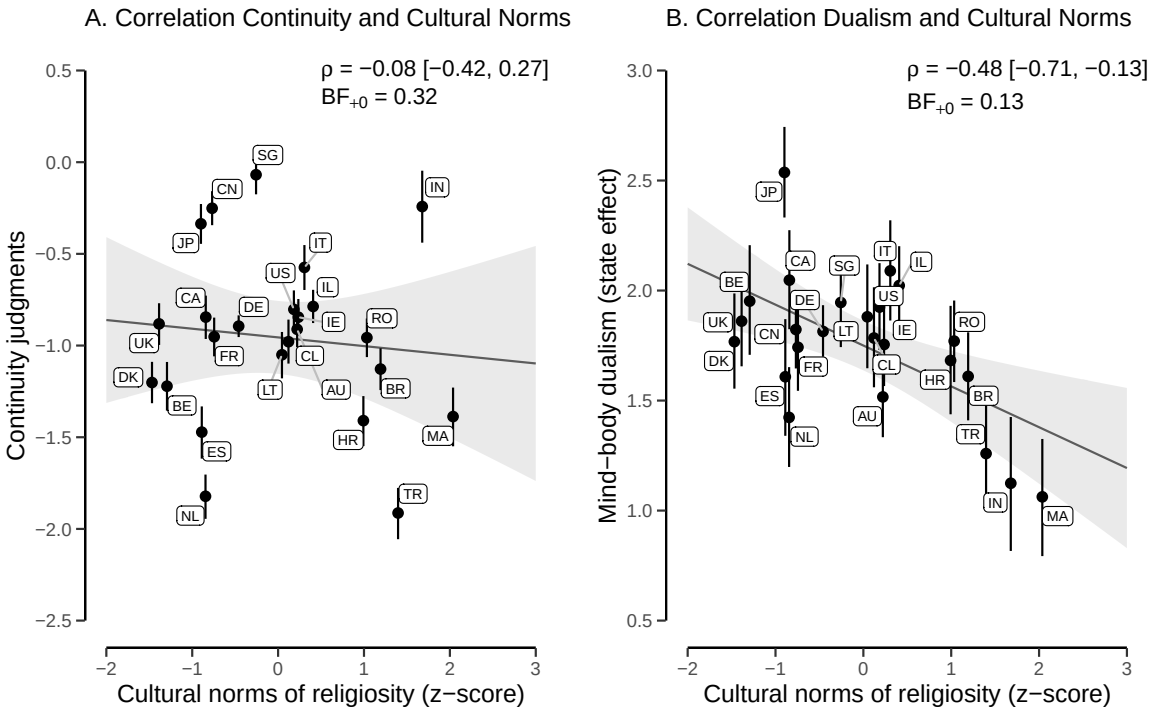

Figure 7

Correlation between country-level cultural norms of religion and continuity judgments (panel A.) and mind-body dualism (i.e., state effects; panel B.).

not more likely to make continuity judgments or reason dualistically. Instead, in more religious countries, people may be less likely to distinguish between physical and mental states.

Robustness checks

Here, we report the results of five alternative analysis choices that the results should be robust against. First, based on the ambiguity in the literature and the results of the exploratory factor analysis (see exploratory results below), we classified 'hearing' as a mental state rather than a bodily state. Second, we reran the analyses excluding participants who failed to correctly identify a target figure mentioned in the narrative (i.e., a priest or a doctor). Third, we included measured demographics (i.e., level of education, age, self-reported socioeconomic status and gender) as covariates in the analyses, which were identified as potential confounding variables that warranted inclusion in the statistical models (see 'Causal Identification' in the Appendix). Fourth, we preregistered a lower limit of 300 participants per country and

hence reran the analyses while excluding data from Lithuania since $n = 291$. Fifth, we conducted an additional check with the (suboptimal) preregistered prior settings. That is, in the preregistration, we specified half-cauchy priors on the standard deviation. However, the prior predictive checks showed that the fat tails of the cauchy distribution resulted in implausible predictions on the probability scale (see the Appendix for details). Following recommendations by McElreath (2020) and Betancourt et al. (2015), we used the half-normal(0,1) prior on the country-level standard deviation instead. This resulted in more reasonable prior predictions (see Appendix). As shown in Table 4, the results are qualitatively equal across the different robustness checks: we obtained strong support for a varying positive effect of state ($\mathcal{H}_1$), religiosity ($\mathcal{H}_2$), framing ($\mathcal{H}_3$), and a state-by-religiosity interaction ($\mathcal{H}_4$), but strong evidence against a state-by-framing interaction ($\mathcal{H}_5$).

Table 4

Bayes factor of different models for robustness checks.

Robustness set	μ [95% CI]	BF_{10}	BF_{+1}	Preferred
State Effect				
Main analysis	1.71 [1.55, 1.86]	∞	10^{26}	$\mathcal{M}_+$
Hearing as mental state	1.16 [1.04, 1.27]	∞	10^{11}	$\mathcal{M}_+$
Excluding manipulation check failures	1.75 [1.59, 1.88]	∞	10^{20}	$\mathcal{M}_+$
Education, age, gender, SES as covariates	1.73 [1.57, 1.88]	∞	10^{26}	$\mathcal{M}_+$
Excluding Lithuania[a]	1.70 [1.54, 1.85]	∞	10^{26}	$\mathcal{M}_+$
Cauchy$^+$(0,2) prior on SD[a]	1.71 [1.54, 1.86]	∞	10^{25}	$\mathcal{M}_+$
Religiosity Effect				
Main analysis	0.84 [0.71, 0.96]	∞	10^{87}	$\mathcal{M}_+$
Hearing as mental state	0.88 [0.75, 1.01]	∞	10^{116}	$\mathcal{M}_+$
Excluding manipulation check failures	0.85 [0.72, 0.96]	∞	10^{75}	$\mathcal{M}_+$
Education, age, gender, SES as covariates	0.85 [0.73, 0.97]	∞	10^{78}	$\mathcal{M}_+$
Excluding Lithuania[a]	0.83 [0.70, 0.94]	∞	10^{85}	$\mathcal{M}_+$
Cauchy$^+$(0,2) prior on SD[a]	0.84 [0.71, 0.96]	∞	10^{87}	$\mathcal{M}_+$
Framing Effect				
Main analysis	0.52 [0.41, 0.61]	10^{135}	10^{11}	$\mathcal{M}_+$
Hearing as mental state	0.56 [0.45, 0.66]	10^{174}	10^{16}	$\mathcal{M}_+$
Excluding manipulation check failures	0.52 [0.41, 0.63]	10^{127}	10^{14}	$\mathcal{M}_+$
Education, age, gender, SES as covariates	0.51 [0.41, 0.61]	10^{134}	10^{11}	$\mathcal{M}_+$
Excluding Lithuania[a]	0.52 [0.41, 0.62]	10^{132}	10^{11}	$\mathcal{M}_+$
Cauchy$^+$(0,2) prior on SD[a]	0.51 [0.41, 0.62]	10^{135}	10^{10}	$\mathcal{M}_+$
State-by-Religiosity Effect				
Main analysis	0.24 [0.14, 0.33]	10^{16}	3127	$\mathcal{M}_u$
Hearing as mental state	0.14 [0.05, 0.22]	10^5	7.66	$\mathcal{M}_u$
Excluding manipulation check failures	0.24 [0.14, 0.33]	10^{15}	180	$\mathcal{M}_+$
Education, age, gender, SES as covariates	0.24 [0.14, 0.33]	10^{15}	2817	$\mathcal{M}_u$
Excluding Lithuania[a]	0.23 [0.13, 0.33]	10^{15}	2593	$\mathcal{M}_u$
Cauchy$^+$(0,2) prior on SD[a]	0.24 [0.14, 0.33]	10^{16}	1160	$\mathcal{M}_u$
State-by-Framing Effect				
Main analysis	-0.09 [-0.19, 0.00]	0.02	0.04	$\mathcal{M}_0$
Hearing as mental state	-0.11 [-0.20, -0.02]	0.02	0.03	$\mathcal{M}_0$
Excluding manipulation check failures	-0.07 [-0.17, 0.02]	0.03	0.03	$\mathcal{M}_0$
Education, age, gender, SES as covariates	-0.09 [-0.18, 0.01]	0.03	0.03	$\mathcal{M}_0$
Excluding Lithuania[a]	-0.10 [-0.19, -0.01]	0.02	0.03	$\mathcal{M}_0$
Cauchy$^+$(0,2) prior on SD[a]	-0.09 [-0.18, 0.01]	0.03	0.01	$\mathcal{M}_0$

Note: Across all five sets of robustness checks, the results are qualitatively equal to those of the main analyses; the data indicate (a) strong state, religiosity, and framing effects that vary between countries but are consistently positive (mind > body; religious > non-religious; religious framing > secular framing), (b) a varying state-by-religiosity interaction effect (though sometimes the unconstrained model is preferred), and (c) no state-by-framing effect. Subscripts reflect parameter constraints; $_0$ indicates the null model, $_+$ indicates a varying positive effect, and $_1$ indicates a common effect.

[a] These options followed from strict adherence to the preregistration.

Exploratory Results

Atheist extinctivists

In addition to the overall effects, we also investigated continuity judgments among self-reported atheists who explicitly state 'not at all' to believe in life after death (n = 1513). As expected, for atheist extinctivists, the estimated intercept is considerably lower than for the overall sample: -2.92 (5.11%) vs. -0.96 (27.67%), respectively, as is the effect of mental versus physical state: 1.63 (i.e., an increase of 8.2% on the probability scale) vs. 1.71 (i.e., an increase of 32.9% on the probability scale). This is also displayed in the Figure 8. We note that the credible intervals for the estimates are quite wide for some countries where few people identify as atheists and deny an afterlife (e.g., India and Singapore). In general, the same pattern of results is observed for the atheist extinctivists as for the overall sample; the Bayes factor model comparison indicates most evidence for a varying positive effect of *state* ($BF_{+0} = 10^{67}$; $BF_{+1} = 16.93$) and of *framing* ($BF_{+0} = 10^{15}$; $BF_{+1} = 29.17$). Again, there is no evidence that the religious framing manipulation results in relatively stronger continuity judgments for mental states compared to physical states (i.e., state-by-framing interaction; $BF_{01} = 7.67$; $BF_{0+} = 37.90$).

Table 5

Bayes factor model comparison and parameter estimates for the key effects for atheists extinctivists only

	Bayes factors				Parameter estimates	
Effect	$\mathcal{M}_0$	$\mathcal{M}_1$	$\mathcal{M}_+$	$\mathcal{M}_u$	μ	σ
State Effect	0.00	0.06	**1.00**	0.09	1.63 [1.30, 1.93]	0.44 [0.12, 0.85]
Framing Effect	0.00	0.03	**1.00**	0.45	0.78 [0.44, 1.10]	0.56 [0.23, 0.96]
State-by-Framing Effect	0.69	0.09	0.02	**1.00**	-0.39 [-0.85, 0.07]	0.28 [0.01, 0.89]

Note. The preferred model for each effect is assigned value 1.00 and displayed in bold. The remaining values are the Bayes factors for the respective model relative to this preferred model. Subscripts reflect constraints on the critical parameter; $_0$ indicates no effect, $_1$ indicates a common (positive) effect, $_+$ indicates a varying positive effect, and $_u$ indicates an unconstrained effect. Parameter estimates (median and 95% credible interval) are taken from the unconstrained model for $\mathcal{H}_5$. σ reflects the between-country variation in the respective effect.

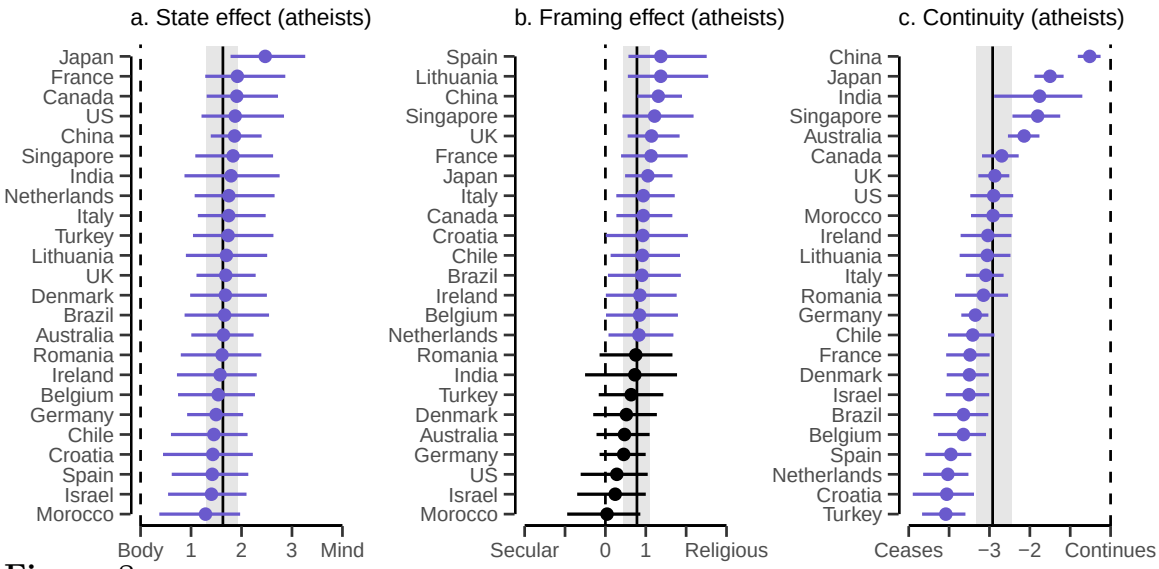

Figure 8

Estimated country-level effects (posterior medians) in increasing order for atheist extinctivists only. a. state contrast effects. b. framing effects. c. intercepts. Each dot represents a country. Estimates with credible intervals colored in purple exclude zero and estimates with credible intervals colored in black include zero. The errorbars give the 95% credible interval for each country. The vertical lines denote the posterior median of the overall mean of the respective effect with the 95% credible interval in the shaded bands. The dashed lines indicates zero.

Exploratory factor analysis

Based on the ambiguity in the literature on the classification of perceptual states as either bodily states or mental states (Bering, 2002; Huang et al., 2013), we conducted a multilevel exploratory factor analysis to investigate the clustering of the 'hearing' item. We followed Weisman et al. (2021) in conducting an exploratory factor analysis across different samples. Specifically, for each country, we extracted the number of factors using parallel analysis with the `fa.parallel()` function from the `psych` package and then conducted EFA using ordinary least squares as implemented in the `fa()` function from the same package. As our data consisted of binary responses, we used tetrachoric correlations and oblique transformation. In order to maximize robustness, we ran the factor analysis procedure 100 times and report the median number of factors and factor loadings. The resulting factor loadings are vi-

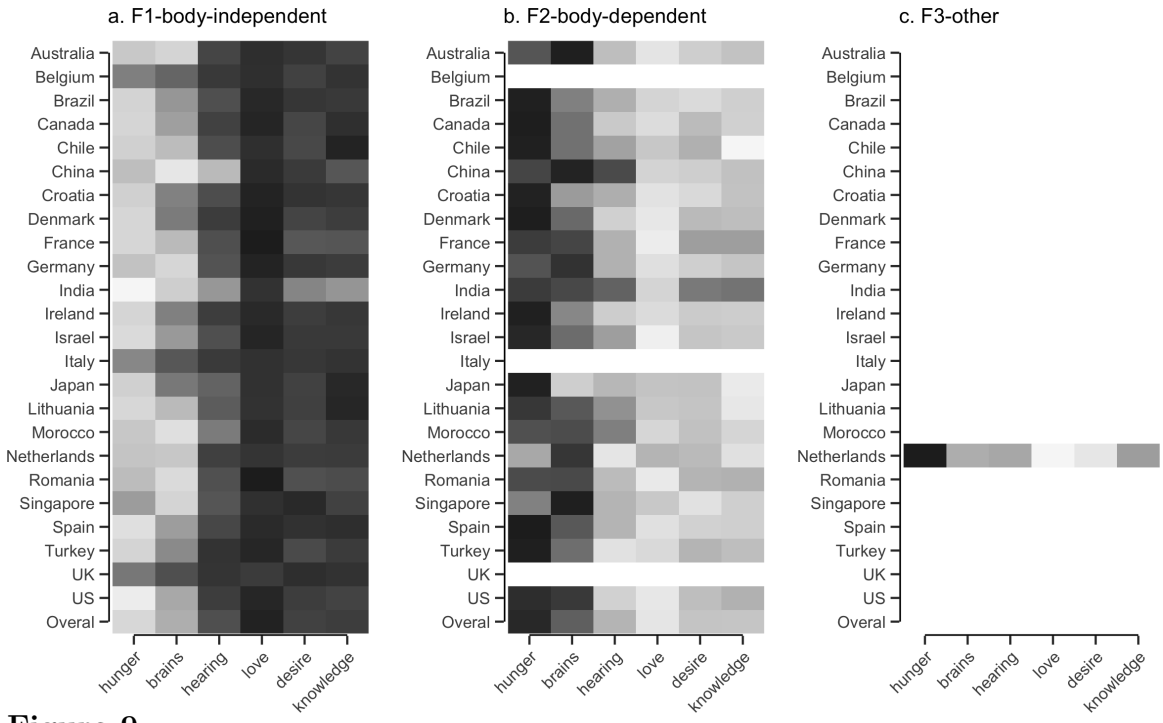

Figure 9

Factor loadings from EFAs per country. a. represents body-independent or mind-like factors, b. represents body-dependent or body-like factors and c. represents other factors. The shades of grey reflect the loading, with darker shades indicated stronger loading on the respective factor. Factors were extracted using tetrachoric correlations.

sualized in Figure 9. As shown in the figure, across all countries except China[7] and India, the hearing item loaded most strongly on the mind-like or body-independent factor (though note that in Belgium, Italy, and the UK only one factor was extracted).

Discussion

In the current cross-cultural study, we replicated previous work showing that laypeople sometimes tend to reason dualistically about the continuity of states after death: across all 24 countries, the evaluated probability that mental states such as love and knowledge continue after death was higher than the evaluated probability for bodily states such as hunger or a working brain. In addition to this robust mind-body dualism effect, we also found that individual religiosity is consistently associated with

[7]Given the findings by Huang et al. (2013), it is noteworthy that China was one of the exceptions where the hearing item loaded most strongly on the body-dependent factor.

increased implicit afterlife beliefs (i.e., overall continuity judgments for both mental and physical states). In all but one country –Morocco– a framing manipulation emphasizing religion also increased overall continuity judgments.

Even though these findings may appear straightforward at first sight, caution is warranted, because we should carefully distinguish between continuity judgments overall (which relate to implicit afterlife beliefs and may reflect that people believe both the mind and the body will continue to exist in some form) and the difference between continuity judgments for mental and physical states (which provides a proxy for people's dualistic thinking). One could argue that the mere continuation of any state might reflect dualistic reasoning as even the experience of post-mortem hunger implies a dissociation from pure bodily processes that are assumed to stop at death (e.g., inactivity of the stomach). In the current study, however, we followed previous work and characterized mind-body dualism as the difference in continuity judgments between physical/perceptual and mental/cognitive states.

In addition to these main effects, we investigated the relationship between religion and mind-body dualism: is religion associated with an increased tendency to distinguish between the continuity of mental and bodily states? In contrast to the main effect, we found that religiosity and a religious framing manipulation were not universally associated with increased mind-body dualism. Specifically, across 18 out of 24 countries, individual religiosity of the rater was related to more continuity judgments for mental states relative to physical states. In the remaining 6 countries, there was no such religiosity-by-state interaction effect. For the experimental framing manipulation, we did not find evidence that emphasis on religion increased mind-body dualism. On the contrary, in China, the effect went slightly into the opposite direction; the religious framing increased the relative continuity for physical compared to mental states. In all other countries, there was no state-by-framing interaction effect, nor was there a common effect in the aggregated sample.

While individual religiosity was consistently associated with a higher tendency for continuity judgments and –albeit somewhat less consistently– with more mind-body dualism, this association was not present at the country-level; the perceived normativity of religion within a country was not related to implicit afterlife beliefs, and, if anything, negatively related to mind-body dualism.[8] Overall continuity judg-

[8]In the Appendix we report an additional analysis in which we correlated the country-level estimates for continuity judgments and mind-body dualism with census data on religion included

ments were most prevalent in Asian countries (Singapore, China, India, and Japan). With the exception of India, these countries are not perceived as particularly religious based on the current data. However, cultural traditions related to immortality of the soul may exist outside of religious traditions. In China, for instance, less than 20% of the population is religiously affiliated (Grim, 2008), yet over 70% engages in ancestor worship, including venerating the spirits of deceased relatives (Hu, 2016). Indeed, many Chinese people indicate that the soul would persist after biological death, either in the afterlife or after reincarnation (Gut et al., 2021). So while implicit afterlife beliefs and religion are clearly linked, there are also other cultural traditions outside religion that may affect people's implicit afterlife beliefs.

In sum, our results suggest that the tendency to reason dualistically about people's capabilities after death is universal; across all 24 countries, we found robust evidence that mental states are judged as more likely to continue than bodily states. Even among atheist extinctivists who explicitly deny the existence of the afterlife, 16.9% of participants judged at least one state to continue after death and again in each of the 24 countries a state effect emerged, reflecting the tendency to attribute a higher likelihood of continuity for mental compared to physical states.

At the same time, these findings and their interpretation should be put into perspective. In all but 5 countries, as well as in the aggregated sample, the modal response was complete cessation rather than continuity, and over one third of the total sample (39%) judged none of the states to continue. Notably, if we take continuity beliefs in the narrative task as a measure of implicit afterlife beliefs, we find that more people endorse explicit afterlife beliefs in the absence of implicit afterlife beliefs ($\sim$20%), than the other way around ($\sim$5%). This pattern seems problematic for intuitive dualism accounts, which suggest that especially implicit afterlife beliefs should be prevalent and widespread, more so than explicit and culturally transmitted afterlife beliefs. Overall, we believe that our results are more in line with the 'intuitive materialism' account (H. C. Barrett et al., 2021) than the 'intuitive dualism' account: at least in 19 out of 24 countries the default view seems that physical death ends all mental processes. Following the parallel systems account, which holds that humans can be construed as both intentional agents and as physical bodies, mental capacities are typically only attributed to living people and not to the deceased. In some

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each country. Again, we found (weak) evidence for the absence of a positive correlation. In contrast to the cultural norms analysis, we did not find evidence in favor of a negative correlation either.

cases, however, agency can be perceived in the absence of a physical body, allowing for afterlife beliefs about disembodied minds, spirits, and supernatural entities.

The question remains what mechanism underlies continuity beliefs and what determines which states are most likely to be judged to cease and to continue. Instead of a specialized cognitive mechanism for afterlife beliefs (cf. Bering, 2002; Bloom, 2005), a general mechanism for person continuity may provide a more parsimonious account. One option would be a form of psychological essentialism applied to individuals (Blok et al., 2001; Blok et al., 2005). On this account, we track individuals through perceived causal connectivity in time and space, and through radical transformations, such as a brain transplantation (Liittschwager, 1994; Rips et al., 2006). Continuation of certain states in the afterlife, thus, may be a reflection and natural consequence of the everyday strategies used for tracking individuals (Newman et al., 2006). The exact elements that are relevant and salient for what counts as marks of the same individual (e.g., their memories, their emotions, their body parts or special marks), both in everyday life and in the afterlife, may be culture-specific. In other words, what matters is a perception of a continued individual (their essence or perhaps 'soul'), while which specific sort of mental or bodily states is emphasized in the afterlife could vary across cultures. For instance, it could be the case that those cultures that emphasize individuals' psychological dispositions over their social relation (as many Western cultures do; see Henrich, 2020) would tend to conceptualize afterlife in term of psychological continuity (at least among religious individuals). Likewise, those cultures that emphasize individuals' social relations might be conceptualizing afterlife in terms of social embodiment (as Hodge, 2011a suggested). Furthermore, different iconography and depictions of afterlife across cultures might stress slightly different bodily aspects of the individuals in the afterlife. Finally, across various Asian cultures people use different methods to determine someone's reincarnation. Besides alleged memories of the past life, for instance, some Mongolian Buddhists mark their deceased with coal or chalk, and inspect their newborns for birth marks in the same bodily area as a recently deceased person (see also White, 2015).

Our findings show that the tendency to make continuity judgements depends on the framing; participants who read a narrative featuring religious or spiritual elements (e.g., a priest, God) were $\sim$10% more likely to make continuity judgments than participants who read a narrative without these elements. Notably, the religious versus secular framing manipulation also covaried with a focus on medical versus

spiritual features; a doctor announcing death versus a priest announcing an afterlife. This difference in emphasis might also explain why the framing effect even emerged among atheist extinctivists, who explicitly do not believe in the existence of God or an afterlife; while the framing manipulation did not 'prime' their religious beliefs, it may have emphasized a more metaphysical vs. a medical conception of a dead body. In addition, the difference in wording between conditions might also have contributed to the observed framing effect: compared to 'grandmother is dead now', 'grandmother is with God now' may already imply continuity. Based on the anthropomorphic God concepts that people employ (J. L. Barrett & Keil, 1996), it could well be that participants visualize the grandmother literally and physically at a different location - which results in an overall increase in endorsement of continuity for both physical and mental states. Alternatively, the 'is with God now' wording may have amplified continuity responses as a result of the tendency to 'play-along' with the scenario.

As observed by Harris (2011a), many children and adults alike subscribe to both a biological and a religious conception of death. Depending on the framing, each of these conceptions may dominate attitudes and behaviors regarding afterlife processes. According to Van Leeuwen (2014), these framing-sensitive afterlife beliefs are an example of what he calls 'religious credence': they are not factual beliefs, but attitudes that are only relevant in certain contexts–such as a burial ritual. However, the context sensitivity of these beliefs may not be unique for religious beliefs (Levy, 2017). Instead, it is the intuitiveness of representations, whether religious or mundane, that guides people's responses, which is why even atheists who do not believe in an afterlife sometimes indicate that love continues after death and why people who deny the existence of a soul are unwilling to 'sell' their soul to an experimenter (Haidt et al., 2000).

Indeed, the exact nature of the continuity beliefs observed in our experiment remains unclear: do people truly believe that the deceased person has an independent mind maintaining these capacities, or does it rather reflect some sort of persistence of positive associations or feelings that the person had before they died (e.g., a loving person can still feel love)? That is, do people believe that the deceased grandmother can literally hear her grandson, or is this 'hearing' a metaphorical idea of a sustained connection between grandmother and grandson? Even though one assumes that all (mental) functioning stops at death, one might still prefer to hold on to social relations and emotions that were present before the passing. In that sense, perhaps the notion

of persistent love is intuitive because the alternative that she does not love him anymore feels uncomfortable. Future research could possibly address the nature of these continuity beliefs by manipulating the valence and relevance of the states. If people are more likely to indicate that love and kindness continue than anger and jealousy, this might suggest that some idealization of the deceased plays a role (e.g., Allison et al., 2009; Bering, McLeod, et al., 2005; Eylon & Allison, 2005). This 'death positivity bias' may serve the purpose of giving comfort when losing a loved one (Attig, 1996). Similarly, a difference in continuity judgments covarying with the mundaneness of the emotion (e.g., loving his wife versus loving to watch Netflix) might also signal a bias in how we remember the dead, which spills over to the capacities attributed to them.

In addition, the validity of the deceased grandmother vignette as a measure of implicit afterlife beliefs could be questioned, as has the general validity of vignette designs in experimental research (e.g., Argyris, 1975; Collett & Childs, 2011). On the one hand, there are clear benefits of using narratives to measure certain beliefs, attitudes, and intentions, including experimental control and the accessibility of ethically or practically difficult to manipulate scenarios (Aguinis & Bradley, 2014), such as someone dying. On the other hand, drawbacks include limited external validity and generalizability. First, responses might be influenced by social desirability (Gould, 1996). This issue seems most problematic in the context of vignettes targeting personal experiences ('imagine that you are...') as opposed to the type of third-person scenario used in the present study (Collett & Childs, 2011). Still, a form of demand characteristics could have played a role, resulting in an overestimation of implicit afterlife beliefs. Perhaps participants did not literally believe that the dead grandmother could still feel love, but simply responded within the context of the story, as if immersing themselves in a fairy-tale. This might explain why even atheists exhibited some implicit afterlife beliefs in the narrative task; rather than their continuity responses reflecting a divergence between explicit and implicit beliefs and hence a contraction in their beliefs, they may simply have 'played along' with the task. Second, responses to the vignette might reflect unintended peculiarities of the specific narrative (Gould, 1996). That is, the observed pattern could be idiosyncratic to the presented narrative and underestimate true implicit afterlife beliefs; perhaps people think that deceased individuals are in principle capable of feeling love and having knowledge, but that this does not hold for the grandmother in the narrative for some

reason. However, we consider this explanation rather unlikely, as we see no obvious reason for participants to assume that this particular grandmother would not love her grandson anymore if she is indeed still capable of feeling love.

Another consideration concerns the clustering of mental and physical states. The exploratory factor analysis indicated that the perceptual state ('hearing') is mostly perceived as a mental rather than a bodily state. In some Asian countries (India, China), however, this does not seem to be the case. The clustering of perceptual states might also depend on the object of the state (i.e., to which the specific state is directed). Here we asked about the grandmother hearing her grandson's voice; results might be different for 'hearing the equipment in the hospital room' or 'hearing the traffic outside'.

While our study has demonstrated a robust and universal pattern, it leaves many questions open for future research. First, how are explicit and implicit afterlife beliefs related? Our results suggests that they often converge, but that explicit afterlife beliefs might actually be more prevalent than implicit ones. Still, the causal relation between both implicit and explicit afterlife beliefs remains unclear. On the one hand, religious or spiritual beliefs could make people more receptive to the possibility of continuation of (mental) states (cf. H. C. Barrett et al., 2021). On the other hand, it could also be that the intuitiveness of mental continuation serves as an evolutionary explanation for the appeal of religion (e.g., Bering, 2002; Bloom, 2007). Second, while we observed cross-cultural variation in overall continuity beliefs, as well as mind-body dualism, our data do not permit a fine-grained analysis of cultural differences in participants' conception of these beliefs. The exploratory factor analysis suggests that across most countries, people distinguish between body-dependent (hunger, brains) and body-independent (hearing, love, desire, knowledge) processes, yet some difference between countries emerged. Third, in addition to the valence of the states, attitudes toward the target person might also affect continuity evaluations. Are people more likely to make continuity judgments for likable individuals and relatives compared to "bad guys" and strangers? Fourth, future research might investigate what individual differences besides religiosity predict implicit afterlife beliefs. For instance, what is the role of scientific training on these beliefs? Does a neuroscientific view of the brain and mind preclude continuity beliefs or can they coexist? Fifth, what, if any, are the behavioural consequences of these mind-body dualism beliefs? Forstmann et al. (2012), for instance, found that mind-body dualism

was negatively associated with health behaviors, following the rationale that viewing the body as a mere container leads to taking less care of it.[9] It thus remains to be demonstrated how afterlife beliefs have down-stream effects on our behavior. Sixth, how do the different conceptions of 'intuitiveness' relate to one another? Levy (2020) distinguishes between intuitive dualism as a cultural universal - acquired without significant cultural scaffolding - and intuitive dualism as exerting influence over implicit cognition. Our findings clearly indicate that dualism is not intuitive in the second sense for all participants, but do not speak directly to the first. That is, afterlife beliefs do not seem to automatically govern all behavior; outside of contexts where religion is salient, a biological conception of death is the default for most people. At the same time, the explicit belief in an afterlife might be intuitive in the sense that the concept is cognitively attractive, easily acquired and transmitted across people (Levy, 2020).

In conclusion, our results suggest both universality and cross-cultural variation in reasoning about mental processes after biological death. Using a large sample from 24 different countries, we replicated previous findings that people tend to reason dualistically as they consider mental states more likely to continue after death than bodily states and that a framing manipulation emphasizing a religious conception of death increases overall continuity judgments, though not mind-body dualism. In addition, we showed that individual religiosity in general, and explicit afterlife beliefs in particular, are predictive of both overall implicit afterlife beliefs and mind-body dualism. At the same time, the pattern of the data does not imply universal intuitive dualism. Specifically, the modal response across the majority of countries and the aggregated sample was complete cessation of all states and explicit afterlife beliefs were more prevalent than implicit afterlife beliefs. Based on these data, an intuitive materialism account, assuming a default conception that all mental activity ends at physical death, yet allowing for culturally acquired explicit afterlife beliefs, appears more plausible than an intuitive dualism account.

[9] We note that these were social priming studies, the reliability of which in general has been called into question (e.g. Cesario, 2014; Doyen et al., 2012; Gilder & Heerey, 2018; Pashler et al., 2013; Shanks et al., 2013).

Author Contributions

Contributorship was documented with CRediT taxonomy using tenzing Holcombe et al., 2020.
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Data curation: S.H.
Formal analysis: S.H., J.A.B., and J.M.H.
Funding acquisition: S.A., N.L., R.M., R.M.R., and M.v.E.
Investigation: S.H., S.A., T.B., R.B., A.C., C.G., R.G., K.H., C.K., R.M., A.N., L.Q., A.R., J.E.R., R.M.R., H.T., R.W., and D.X.
Methodology: S.H.
Project administration: S.H. and M.v.E.
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Visualization: S.H.
Writing - original draft: S.H.
Writing - review & editing: S.A., T.B., R.B., J.A.B., A.C., C.G., R.G., J.M.H., K.H., C.K., N.L., R.M., A.N., L.Q., A.R., J.E.R., R.M.R., H.T., R.W., D.X., and M.v.E.

Conflicts of Interest

The authors declare that there were no conflicts of interest with respect to the authorship or the publication of this article.

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Appendix A: Prior predictive checks

In order to systematically and thoroughly assess the adequacy of the priors, we should look at some settings for both the priors on the intercepts, the effects, the variability between countries and the correlation matrix. We can use previous studies to inform our options.

We will consider the following:

- intercept:

1. normal(0,1)
2. normal(0,5)
3. student-t(3,0,2.5): brms default

- effect:

1. normal(0,5)
2. normal(0,1)
3. normal(0,0.5)
4. normal(0,1000): approximation of the brms default of a flat prior

- standard deviation between countries:

1. exponential(1): as suggested by McElreath (2020).
2. inverse-gamma(3,0.5): assuming a standard deviation below 0.5
3. cauchy(0,2): as preregistered
4. normal(0,1)
5. student-t(3,0,2.5): brms default

- correlation matrix:

1. lkj(1): flat distribution for the correlation matrix
2. lkj(2): putting slightly less mass on extreme correlation values (i.e., -1 and 1)

What do we know?

Based on data from previous studies that have been conducted across different cultures, we can get an idea of the expected intercepts and size of the effects. The mean state effect –the difference in the probability of continuity responses for mental vs. bodily states– across these 12 sites, taken from 4 previous studies is 0.16, so 16% with a standard deviation of 0.16 (15.70%). For the 10 framing effects in the previous studies, the mean difference between a theistic/spiritual prime and the neutral/control condition is 0.10 (10.20%) with a standard deviation of 0.17 (17.50%). Based on these data, we would expect experimental effects of about 10-20% and a standard deviation between studies/countries of about 15-20%.

What do we want?

In the simulation, we draw samples from the prior distributions and look whether the distributions of the country-level intercept (i.e., the overall probability of saying that a given state will continue) and the predictions on the country-level experimental state effect (i.e., difference in probability of saying 'continues' between mental and physical states) make sense. If priors are too vague the distributions become bimodal, suggesting that all participants in a given country either judge all states to cease or continue. We aim to find prior distributions that are relatively uninformative while still allowing making sensible predictions.

What do we conclude?

We found that the LKJ settings do not have a strong influence on the chosen parameters. We therefore show only the LKJ(2) parameter case, as we think correlations between country-level effects of -1 or 1 are less likely than more modest correlation values a priori.

First, the normal(0,5) prior on the intercept translates into extreme predictions on the probability scale, resulting in a unrealistic bimodal distribution with most mass close to 0 and 1. The normal distribution with standard deviation 1, on the other hand, seems to make reasonable predictions about the overall probability of continuity, allowing for all values between 0 and 1 with most mass around 0.5. Second, based on visual inspection, is seems both the exponential(1) and the half-normal(0,1) prior for the between-country variation make sensible predictions. The inverse-gamma(3,0.5)

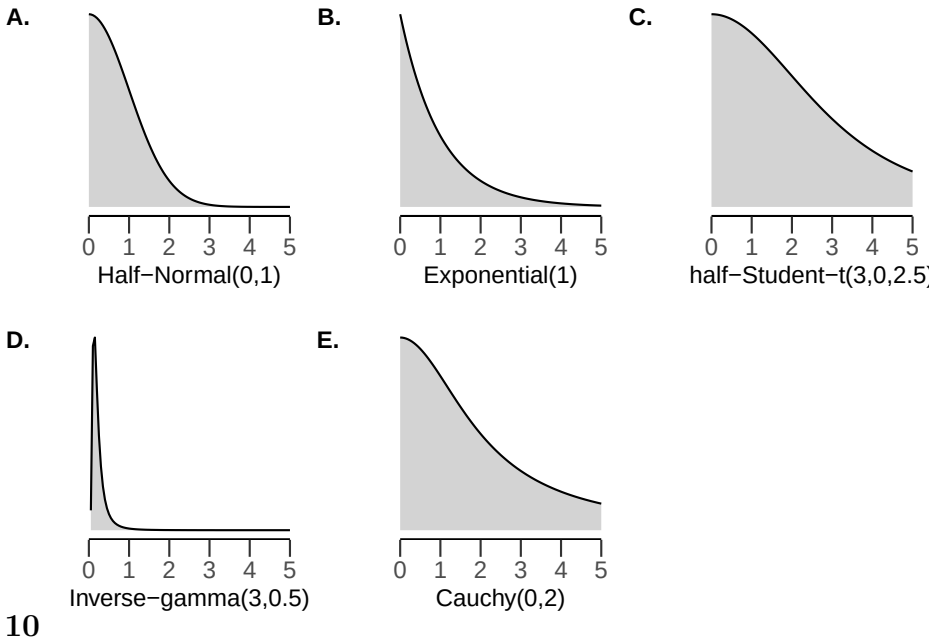


Figure 10

Different prior settings for the between-country variation in the effects of interest.

seems a bit too strict and the preregistered cauchy(0,2) and the brms-default student-t(3,0,2.5) are too wide to translate into reasonable predictions on the probability scale. Finally, a normal distribution with a standard deviation of 1 seems to make the best predictions for the experimental state effect, putting most mass on smaller differences, but still allowing for effects up to 75% (as observed in one previous study). Based on these prior predictions, we decided to use the normal(0,1) prior for the intercept and the effect, the half-normal(0,1) for the variation between countries, and the LKJ(2) for the correlation matrix.

As becomes evident in Figure 14, predictions from both our preregistered prior settings and the brms default settings are completely unrealistic; both predict that all responses with be either complete cessation or continuity. The brms default priors are much too wide, resulting in predicting an unlikely difference of 100% between conditions. The preregistered priors, on the other hand, predict a modest effect, but due to the wide prior on the variation between countries, this results in a very strong prediction of observing no effect. Note, however, that in this case, because we have so much data, the data will always outweigh the priors, resulting in a reasonable posterior distribution, regardless of the exact prior specifications (see robustness checks).

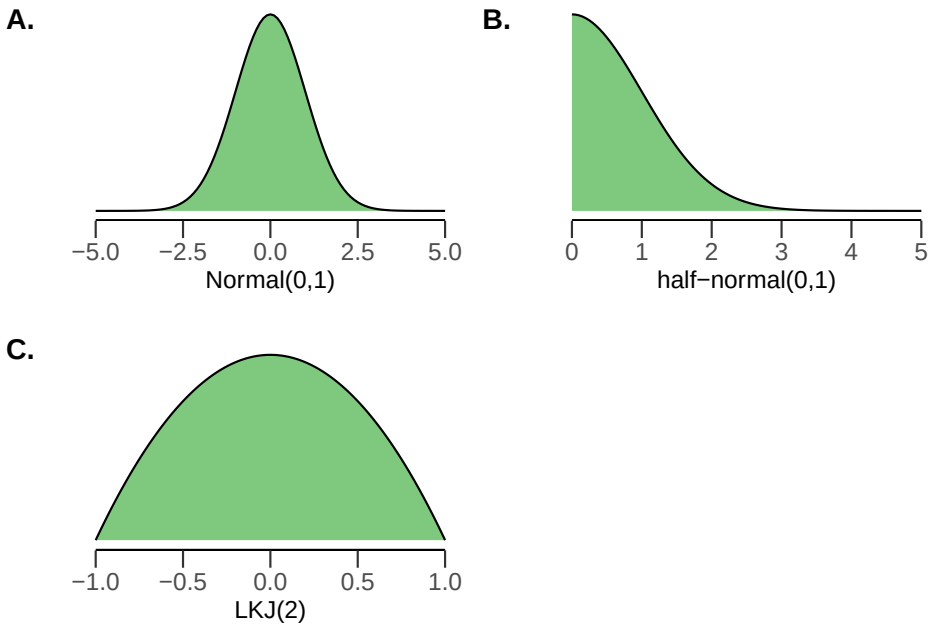


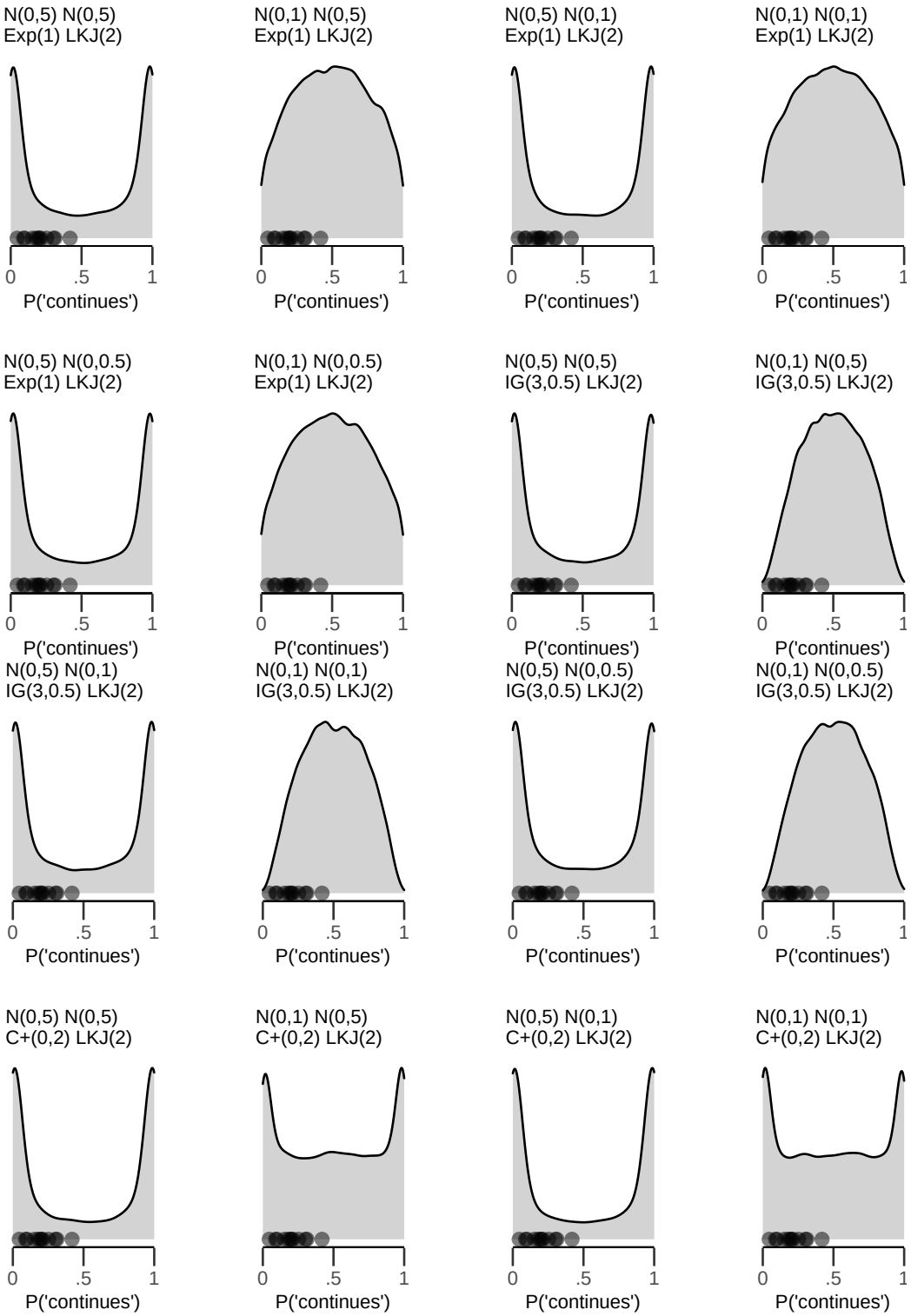
Figure 11

Chosen prior settings for the main analysis. A. shows the prior on the intercept and the effect, B. shows the prior on the variability between countries, and C. shows the prior on the correlation matrix.

Appendix B: MCMC Diagnostics

To investigate convergence of the MCMC chains, we extracted the $\hat{R}$ values for all model parameters. The smallest and largest $\hat{R}$ values were 1.00 for the correlation between the slope of the state effect and the state-by-framing effect and 1.00 for the individual level religiosity effect, respectively. The traceplots for these smallest and largest $\hat{R}$ values are shown in Figure 15a and b.

The ratio of effective samples versus total samples $\hat{N}_{\text{eff}}/N$ was calculated per parameter to assess to what extent autocorrelation in the chains reduces the certainty of the posterior estimates (Geyer, 2011). Ideally, $\hat{N}_{\text{eff}}$ is as large as possible (Vehtari et al., 2021). The $\hat{N}_{\text{eff}}/N$ for each of the 315 estimated parameters is displayed in Figure 15c. Note that $\hat{N}_{\text{eff}}$ can be larger than the the total number of iterations (in this case: $N = 20000$) when the samples are anti-correlated or antithetical (Carpenter, 2018). The smallest $\hat{N}_{\text{eff}} = 3016$ for the overall intercept. For many parameters, $\hat{N}_{\text{eff}}$ is at least half of the number of iterations, although for some parameters the ratio is rather low, indicating that there is some autocorrelation in the chains. Nevertheless, since brms uses the NUTS sampler (Hoffman & Gelman, 2014), even for complex models


N(0,5) N(0,5)
Exp(1) LKJ(2)
N(0,1) N(0,5)
Exp(1) LKJ(2)
N(0,5) N(0,1)
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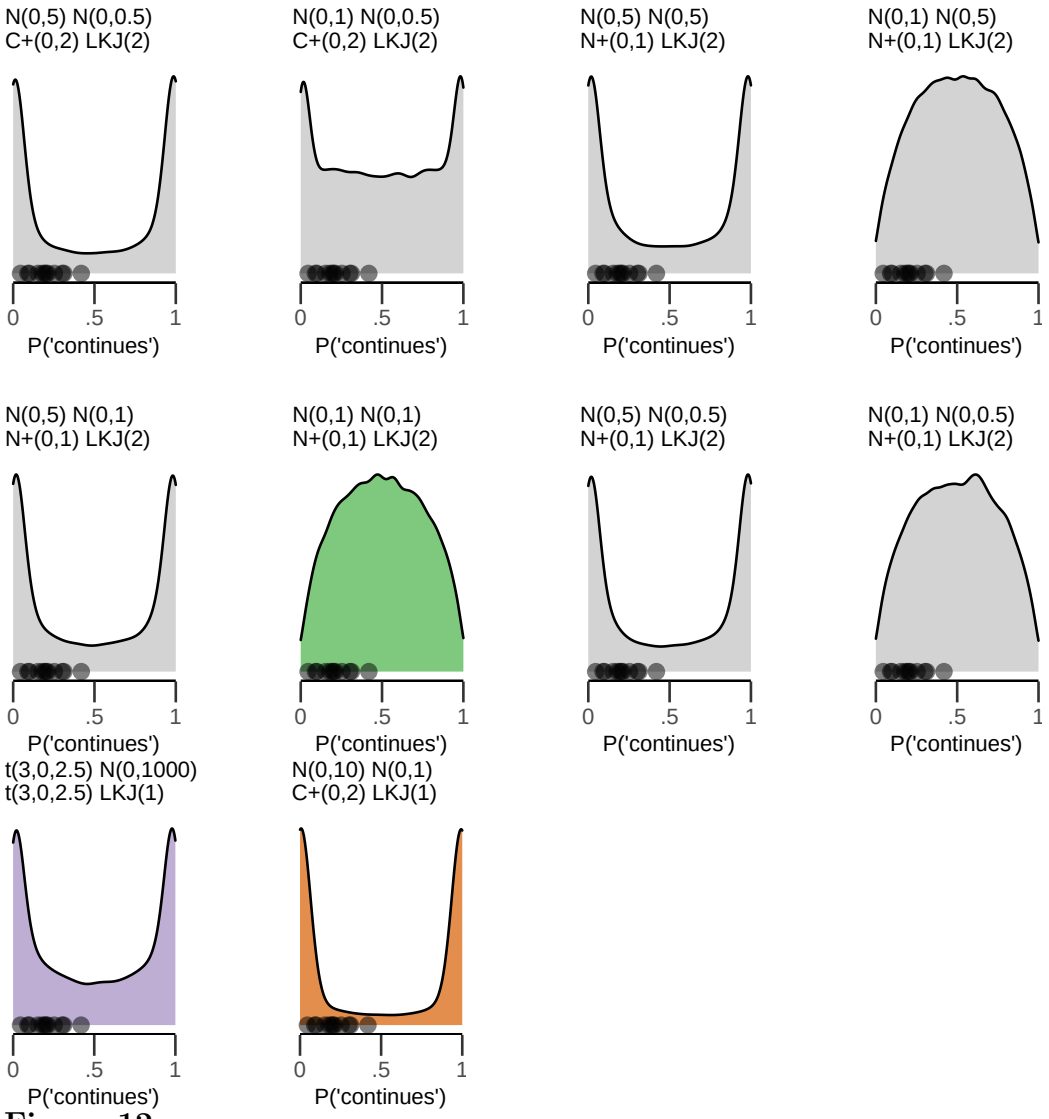
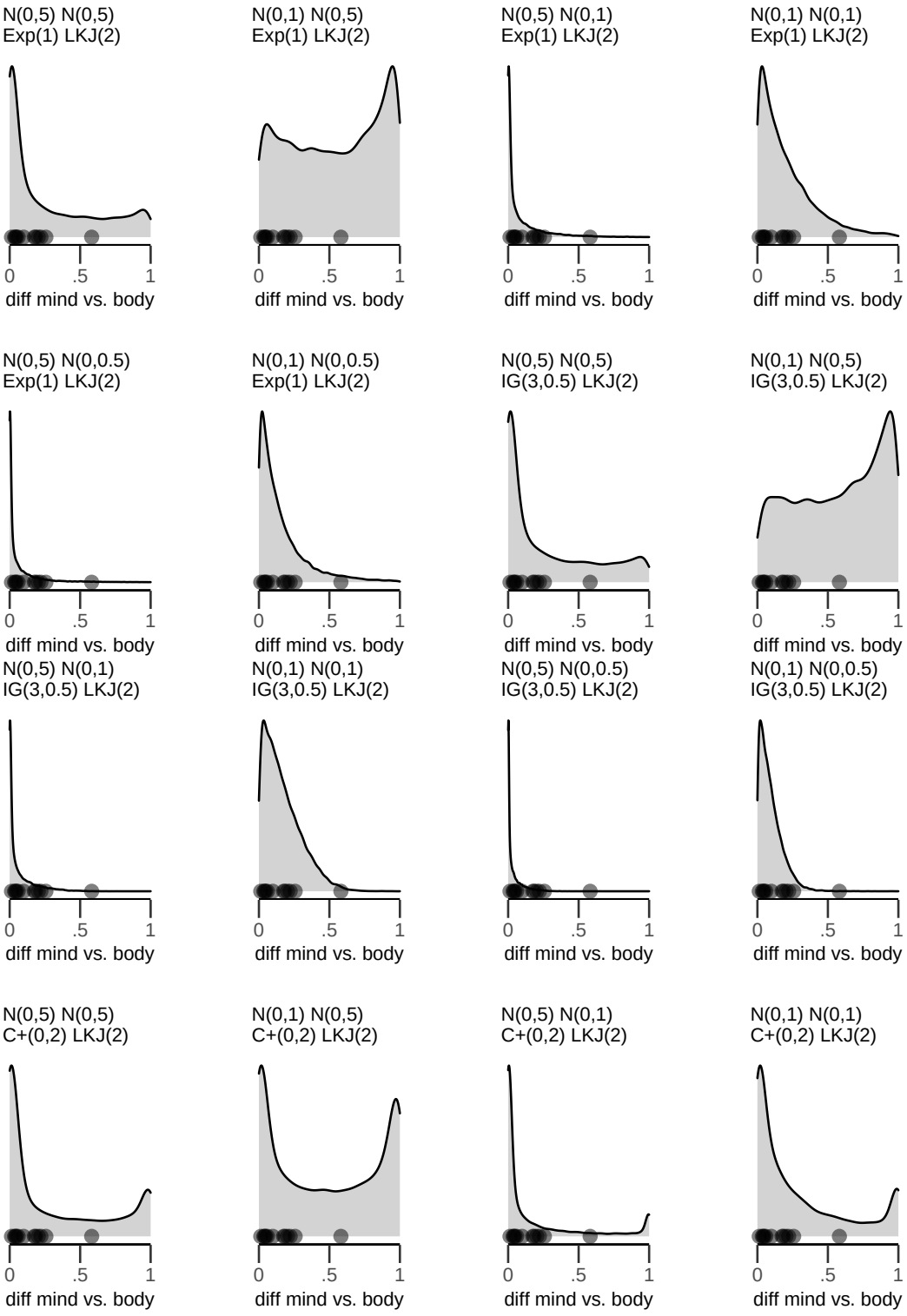


Figure 12

Prior predictive distributions for the overall probability of continuity (i.e., the intercept) under all considered prior settings on the intercept, effect, and between-country variation. The points on the x-axis reflect the observed continuity in previous studies. The distribution for the chosen prior settings is displayed in green, for the brms default settings in purple, and for the preregistered settings in orange. The distributions are denoted as follows: N = normal, N+ = the half-normal, Exp = exponential, IG = inverse gamma, C+ = half-cauchy, t = Student t, and LKJ = Lewandowski-Kurowicka-Joe.


N(0,5) N(0,5)
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Exp(1) LKJ(2)
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diff mind vs. body

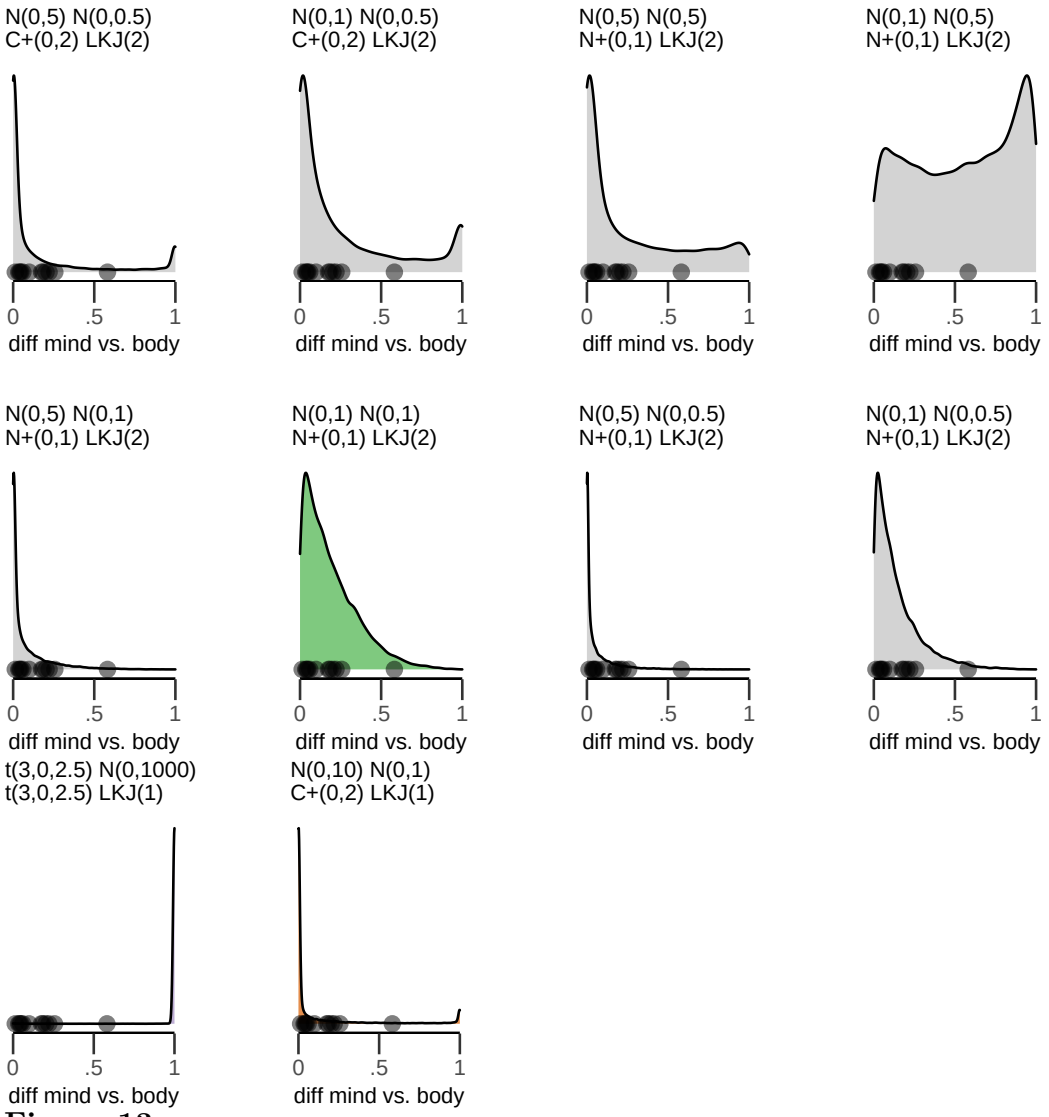


Figure 13

Prior predictive distributions for the difference between experimental conditions (i.e., mental vs. bodily states or religious vs. secular framing) under all considered prior settings on the intercept, effect, and between-country variation. The points on the x-axis reflect the observed effect in previous studies. The distribution for the chosen prior settings is displayed in green, for the brms default settings in purple, and for the preregistered settings in orange. The distributions are denoted as follows: N = normal, N+ = the half-normal, Exp = exponential, IG = inverse gamma, C+ = half-cauchy, t = Student t, and LKJ = Lewandowski-Kurowicka-Joe.

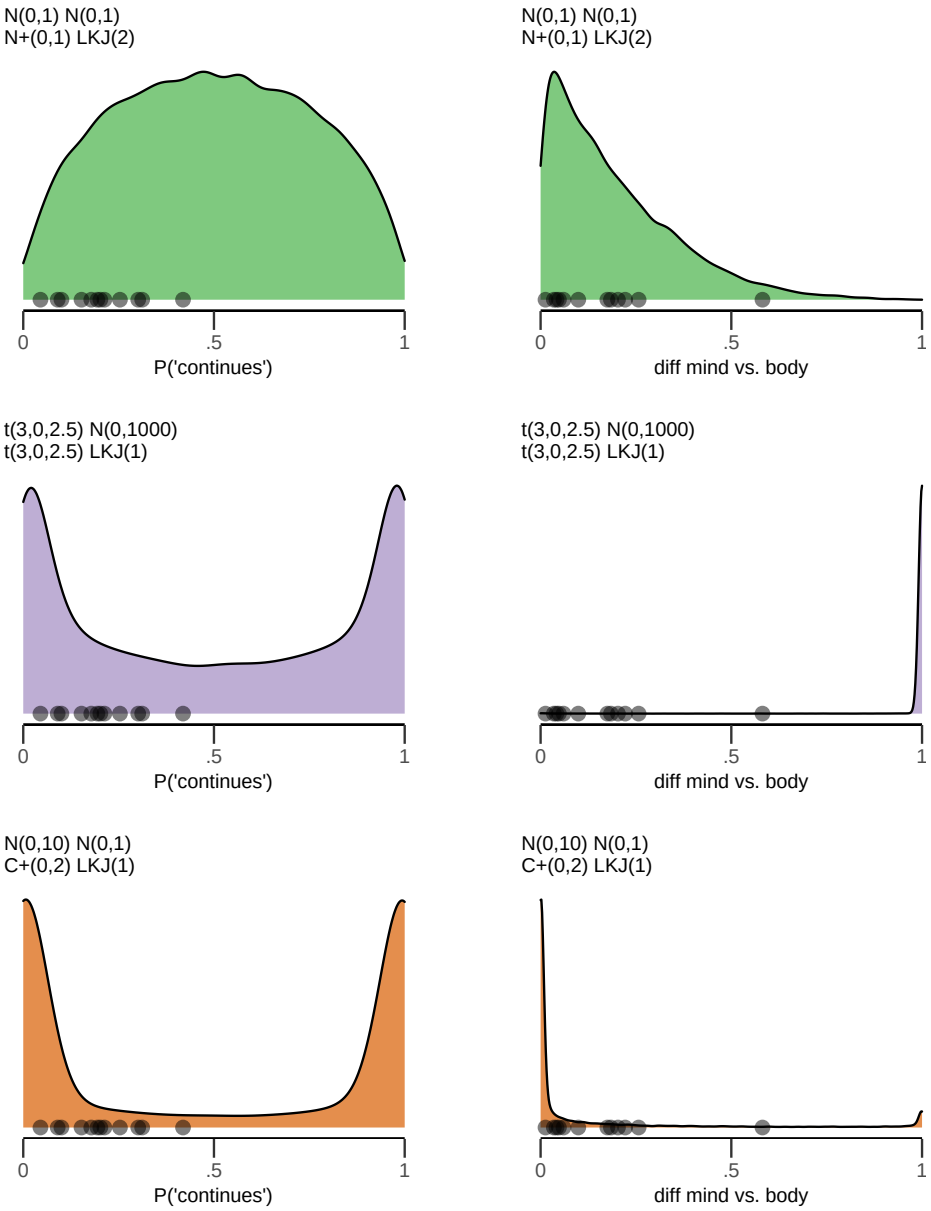


Figure 14

Prior predictions for the chosen prior settings (in green), the brms default settings (in purple), and the preregistered settings (in orange). The distributions are denoted as follows: N = normal, N+ = the half-normal, C+ = half-cauchy, t = Student t, and LKJ = Lewandowski-Kurowicka-Joe.

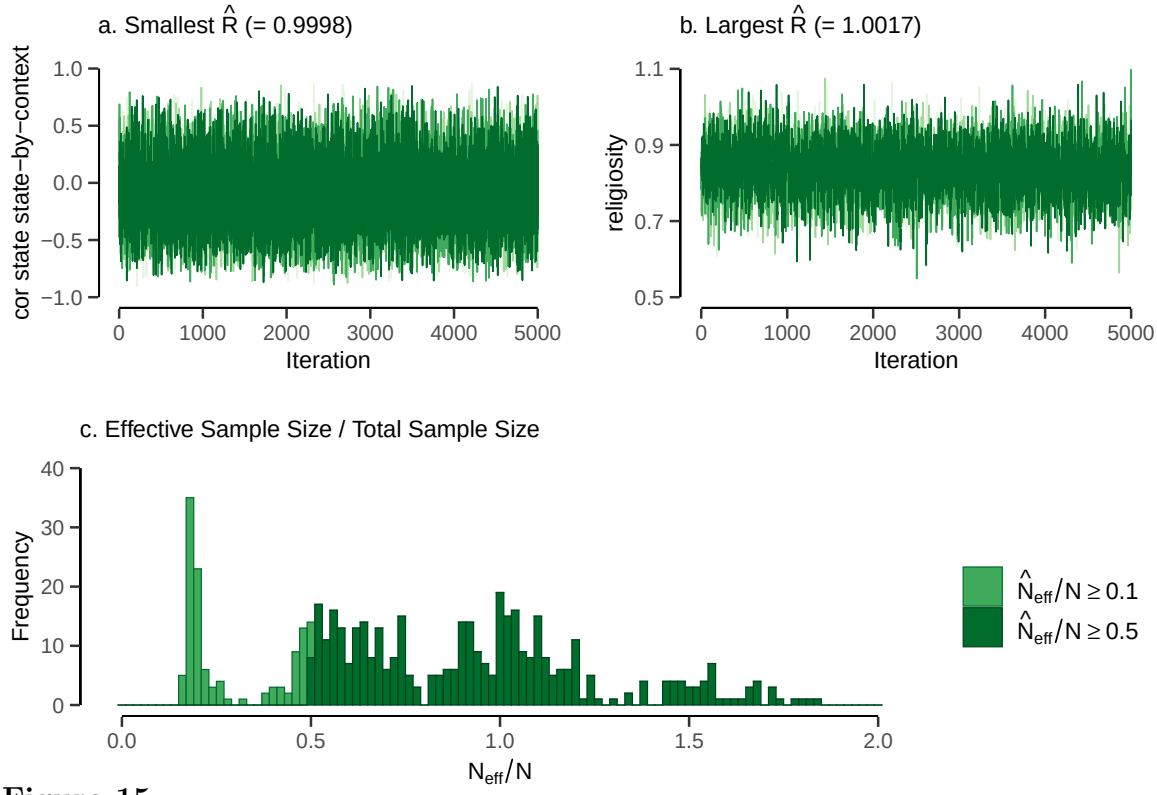


Figure 15

MCMC diagnostics. a. Chains for parameters with the smallest (correlation between the slope for the state effect and the state-by-framing interaction effect) and b. largest (individual level religiosity effect) rhat values. c. Ratio of the number of effective samples versus the total samples for each parameter in the full model.

'a few thousand' samples generally suffice for stable results (Bürkner, 2017). We therefore concluded that the effective sample size is sufficient for valid interpretation of the estimates and inference.

Appendix C: Materials

Religiosity items

The following religiosity items were used to create a composite measure of religiosity:

1. Apart from weddings and funerals, about how often do you attend religious services these days? [Never, practically never – more than once a week] (7-pt)
2. How often do you pray/meditate? [Never, practically never – several times a day] (8-pt)

3. Independently of whether you attend religious services or not, would you say you are: [A religious person / not a religious person / an atheist]
4. Do you belong to a religion or religious denomination? If so, which one? [Yes / No, *options tailored to respective country*]
5. To what extent do you believe in God? [Not at all – very much] (7-pt)
6. To what extent do you believe in life after death? [Not at all – very much] (7-pt)
7. In your life, how important is a religious lifestyle? [Not at all important – extremely important] (5-pt)
8. In your life, how important is belief in God? [Not at all important – extremely important] (5-pt)

For the cultural norms of religiosity measure, the following two items were used:

1. For an average US[10] citizen, how important would you say is a religious lifestyle? [Not at all important – extremely important] (5-pt)
2. For an average US[10] citizen, how important would you say is belief in God? [Not at all important – extremely important] (5-pt)

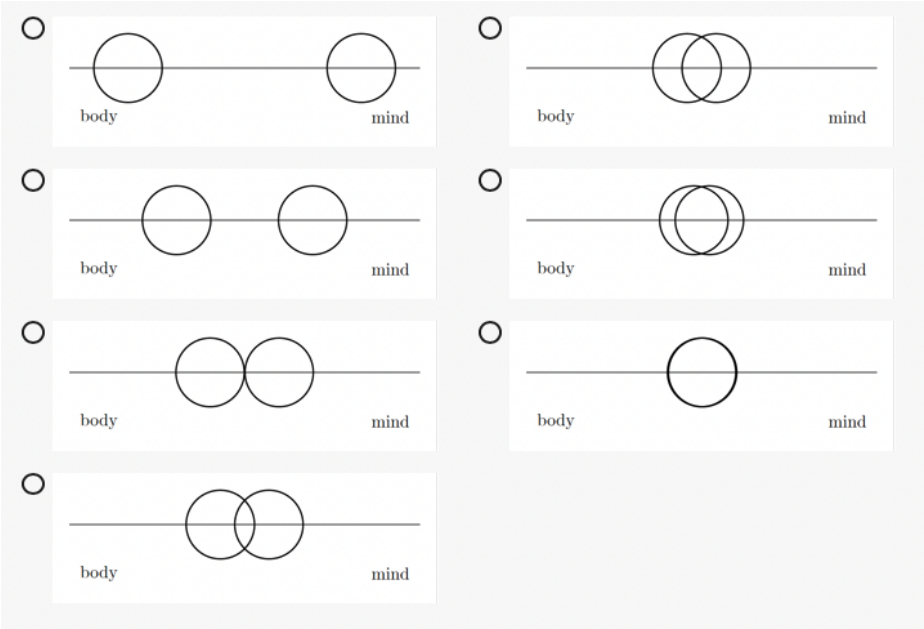
Pictorial item

The pictorial mind-body dualism item (Forstmann et al., 2012) was introduced and depicted as follows:

"People have different views on how the human body and the mind are connected. Some think 'body' and 'mind' are completely separate entities, some think they overlap, and some think they are exactly the same.

Please use the pictograms below to indicate how you think your body and mind are related to each other."

[10] Adjusted to the nationality of each country.



Appendix D: Additional Analyses

We explored whether the data provide evidence for an interaction between religiosity and context, such that the religious framing effect on continuity judgments is enhanced for religious participants in particular. The Bayes factor model comparison provided most evidence for the unconstrained model: $BF_{u0} = 334$. As shown in Figure 16a, the unconstrained model is favored because in some countries the effect is positive, whereas in others it is negative. However, in only four countries (UK, Romania, Germany, and China) do the credible intervals exclude zero. Overall, there is no evidence in favor of a religiosity-by-framing interaction effect assuming that the framing effect on continuity is larger for religious participants: $BF_{10} = 0.87$; $BF_{01} = 1.15$ (this counts as basically no evidence either way).

Finally, we tested the evidence for a three-way interaction between state, religiosity and framing, such that mind-body dualism increases with religiosity, and particularly when framed in religious terms. The Bayes factor model comparison indicated some evidence in favor of a common three-way interaction: $BF_{10} = 17.96$. However, as shown in Figure 4b in the main text, it appears that compared to the secular framing, the religious framing slightly increases mind-body dualism for low religiosity in particular, but not for high religiosity. Based on the unclear pattern, the relatively small Bayes factor given the amount of data, and the fact that the

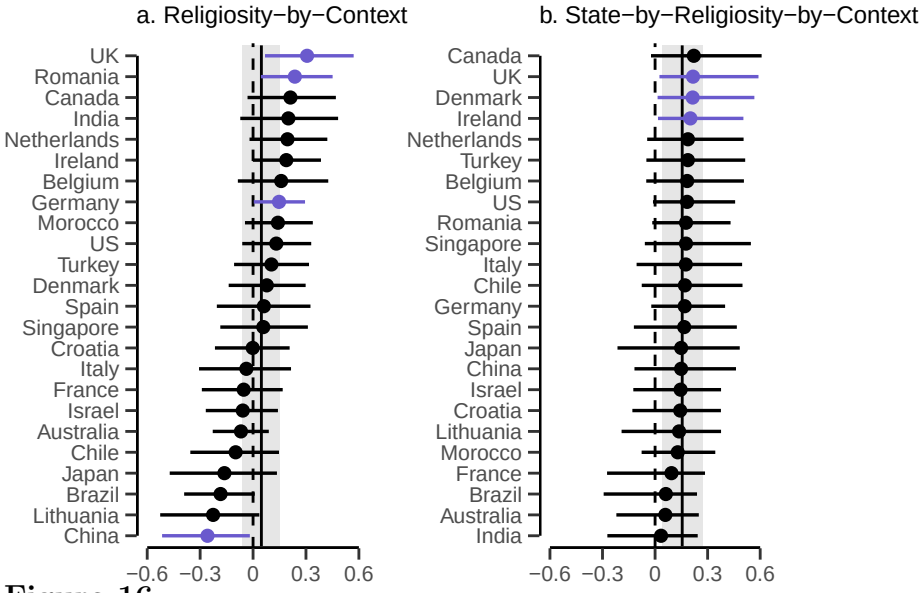


Figure 16

Estimated country-level effects (posterior medians) in increasing order. a. Religion-by-context interaction effects, where positive values indicate more continuity judgments for religious individuals in the religious framing condition. b. State-by-religiosity-by-context three-way interaction effects, where positive values indicate stronger mind-body dualism for religious individuals in the religious framing context. Each dot represents a country. Estimates with credible intervals colored in purple exclude zero and estimates with credible intervals colored in black include zero. The errorbars give the 95% credible interval for each country. The vertical lines denote the posterior median of the overall mean of the respective effect with the 95% credible interval in the shaded bands. The dashed lines indicates zero.

three-way interaction only appears in 3 out of the 24 countries (see Figure 16b), we do not consider this effect of relevance.

In addition to the country-level cultural norms measured in the survey, we also used external census data on religiosity to investigate if national levels of religiosity based on representative sample might be related to continuity judgments and mind-body dualism. The reason for adding this analysis is that perhaps people's perception of religiosity in their country does not correspond well to the actual levels of religiosity in their country. Therefore, we used data on global religious adherence from the Association of Religion Data Archives (ARDA; Brown & James, 2019) to complement the cultural norms correlational analysis.

We correlated country-level religious adherence (in percentage; from 2015)

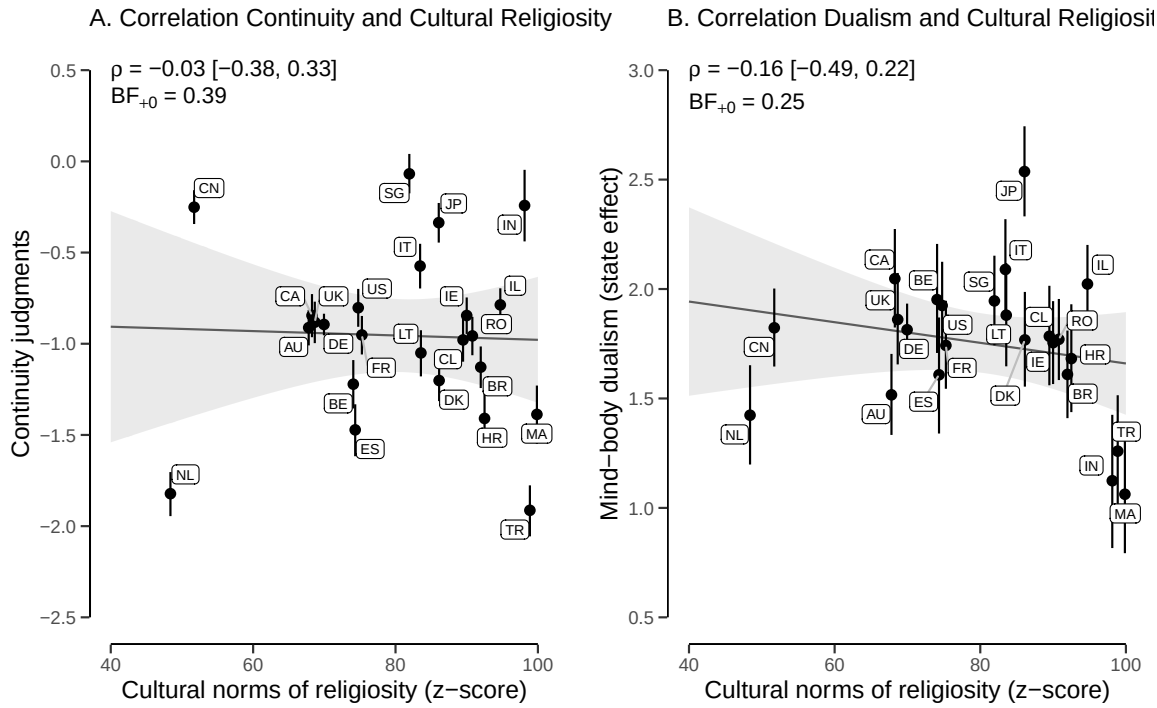


Figure 17

Census data on religion and continuity judgments (panel A.) and mind-body dualism (i.e., state effects; panel B.).

with country-level estimates of the intercepts (α_j) and state-effects (β_j) in the models. First, similar to the cultural norms analysis, we found some weak evidence against a positive correlation between the country-level overall probability of continuity and cultural religiosity: $\text{BF}_{+0} = 0.39$; $\text{BF}_{0+} = 2.55$. Second, we also obtained weak to moderate evidence against a positive correlation between country-level estimates of dualism (i.e., the state effect) and cultural religiosity: $\text{BF}_{+0} = 0.25$; $\text{BF}_{0+} = 3.97$ (see Figure 17). Contrary to the cultural norms analysis, we do not find evidence in favor of a negative relation either; the data indicate no correlation in either direction.

Appendix E: Causal Identification

We are interested consistently in the joint causal effects of religious framing E and personal religiosity R on physical PS and mental state attributions MS. Furthermore, we are interested in the modification of these causal effects by cultural setting C. For simplicity, we group the two types of states attributions $\{PS, MS\} \in$

$\boldsymbol{Y}$. Let Y_e denote the counterfactual outcome Y when the experimental intervention E is, possibly contrary to fact, set to level e. Let Y_r denote the counterfactual outcome Y when the person's level of religiosity R set is set to r, again, possibly contrary to fact. Our experimental manipulation E has two levels e_0, e_1. R is a continuous variable. We may contrast any two or more levels with R. Here, for simplicity, we will assume R to take two levels r_0, r_1. Let Y_{er} denote the joint effects of E and R on Y. Following VanderWeele (2009), we say there is interaction for the effects of E and R on the causal difference scale, conditional on cultural setting C, if the following causal contrasts hold:

$$E(Y_{e1r1}|C = c) - E(Y_{e0r1}|C = c) \neq E(Y_{e1r0}|C = c) - E(Y_{e0r0}|C = c)$$

How might we obtain these counterfactual contrasts from statistical associations in our data? Three assumptions required for casual inference are positivity (non-deterministic exposures), consistency (exposure variation irrelevance) and exchangeability (independence of the counterfactual outcome from the exposures; Hernán and Robins, 2020). The positivity assumption holds as there is variability in the exposures (this is true by design for the experiment). Consistency requires variation in treatments is irrelevant and an individual's observed outcome is equivalent to their counterfactual outcome. We assume, but cannot prove, consistency holds. (We discuss these assumptions in the setting of cross-cultural research elsewhere; Bulbulia, 2022.) To satisfy the exchangeability we must include a sufficiently rich set of confounders to block all backdoor paths between the non-randomised exposure (religiosity) and the outcome.

Figure18 presents a directed acyclic graph that qualitatively describes the important features of our causal identification strategy. Y denotes the outcome (state attributions); E denotes the experimental manipulation (randomised). R denotes individual level religiosity (not-randomised). C denotes country-level cultural variation. L denotes the set of measured confounders that may affect both individual-level religiosity and the outcome Y (state attributions). These measured confounders were gender, level of education, perceived socioeconomic status, and age and they are included in the robustness checks (see Table 4 in the main text). Boxes on C and L indicate conditioning. To consistently estimate the joint effects of E and R on

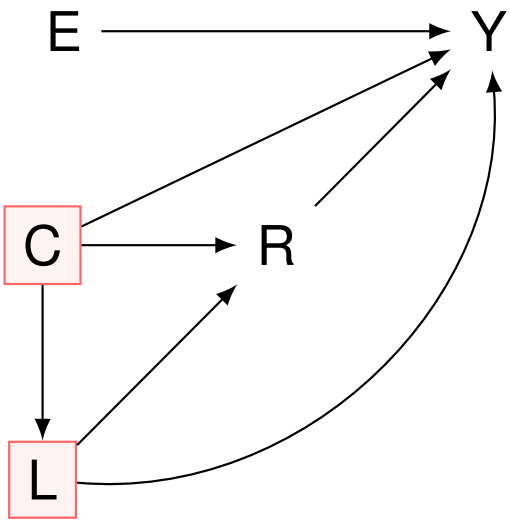


Figure 18

Figure presents a directed acyclic graph (DAG) that clarifies potential sources of bias. Y denotes the outcome (state attributions); E denotes the experimental manipulation (randomised). R denotes individual-level religiosity (not-randomised). C denotes country-level cultural variation. L denotes the set of measured confounders that may affect both individual-level religiosity and the outcome Y (state attributions). Boxes on C and L denote conditioning. We assume that we may consistently estimate the joint effects of E and R on Y by conditioning on C and L. We are interested in the conditional effects of religiosity within levels of C. Note that R is a mediator along the path from C to Y. Including R in our statistical model partially blocks the causal effects of C on Y. We therefore caution readings against interpreting the statistical association of C on Y in any model that includes R as a total causal effect.

Y we must condition on C and L. As noted in our graph, our model assumes no unmeasured confounders.

Note that for the primary results, we are interested in the main effects of E and R, rather than their interaction. The main effect of E is causal by design, as the exposure (context manipulation) is varied randomly. For the conditional effect of R we assess whether:

$$E(Y|R = r_0, C = c, L = l) \neq E(Y|R = r_1, C = c, L = l),$$

whereby the consistency theorem we assume a person's counterfactual outcome under some level of R is equal to their observed outcome under that same level of R:

$$E(Y_r|C = c, L = l) = E(Y|R = r, C = c, L = l).$$