Belief in Luck and Precognition around the World

Harris, E. A.[1]*, Milfont, T. L.[2], Hornsey, M. J.[3]

[1]Melbourne School of Psychological Sciences, University of Melbourne, Parkville, VIC, 3010, Australia

[2]Business School, University of Queensland, Brisbane 4072, Australia

[3]School of Psychology, University of Waikato, New Zealand

*Corresponding author: harrise1@unimelb.edu.au

Abstract

Although magical beliefs (such as belief in luck and precognition) are presumably universal, the extent to which such beliefs are embraced likely varies across cultures. We assessed the effect of culture on luck and precognition beliefs in two large-scale multinational studies (Study 1: $k = 16$, $N = 17,664$; Study 2: $k = 25$, $N = 4,024$). Over and above the effects of demographic factors, culture was a significant predictor of luck and precognition beliefs in both studies. Indeed, when culture was added to demographic models, the variance accounted for in luck and precognition beliefs approximately doubled. Belief in luck and precognition was highest in Latvia and Russia (Study 1) and South Asia (Study 2), and lowest in Protestant Europe (Studies 1 and 2). Thus, beyond the effects of age, gender, education, and religiosity, culture is a significant factor in explaining variance in people's belief in luck and precognition. Follow-up analyses found a relatively consistent effect of socio-economic development, such that belief in luck and precognition were more prevalent in countries with lower scores on the Human Development Index. There was also some evidence that these beliefs were stronger in more collectivist cultures, but this effect was inconsistent. We discuss the possibility that there are culturally specific historical factors that contribute to relative openness to such beliefs in Russia, Latvia, and South Asia.

Keywords: magical beliefs, luck, precognition, cross-cultural, multi-national

Belief in Luck and Precognition around the World

Luck refers to the idea that objects, actions, thoughts, experiences, and people can bring about good and bad future outcomes (e.g., Thompson & Prendergast, 2013; Vyse, 2013). "Good luck," "sending positive vibes," and "fingers crossed" are sentiments describing a process whereby 'luck' and 'vibes' are shared between people telepathically. These statements are ubiquitous in the West and are a way of saying "I want you to do well." The sentiment of good luck can also be shared via objects, with money gifted in red envelopes to signify prosperity and happiness in China. In Spanish speaking countries, people might avoid bad luck through their behavior – on Tuesday the 13th, or *mala suerte*, travel is ill-advised because it is believed to be a day of bad luck. Similarly, in Japan, many public and private events are organized around a calendar system that assigns a day to be *butsumetsu* (the unluckiest day of the year) and *taian* (the luckiest day of the year). This convention is so widely spread that weddings are rarely held on a butsumetsu (De Mente, 2011).

Belief in precognition also underlies a number of cultural practices. Precognition refers to the supposed ability of psychics, fortune-tellers, astrologers, mediums, and tarot card readers to forecast the future (Tobacyk & Milford, 1983). According to a 2017 Pew survey, 41% of US citizens believe in psychics and 29% believe in astrology (Gecewicz, 2018). Italy alone has a six to eight-billion dollar a year industry devoted to psychic abilities, with Italians subscribing to fortune-tellers via online, in person, and telephone contact (Radaelli, 2012; Squires, 2017). The economic success of the psychic industry in Italy is mirrored in countries such as Russia (Smirnova, 2015), Korea (Kim, 2002), and Taiwan (Shein et al., 2014).

Belief in luck and precognition can influence the kinds of investments we make, the home we purchase, the color of our underpants, whom we date, as well as what, when and how we eat (e.g., de Castella, 2014; He et al., 2020; Nyakupfuka, 2012; Rogers & Soule, 2009;

Venturinelli, 2021; Walsh, 2013). Such beliefs are present across cultures and historical contexts and are thought to reflect a universal human tendency to hold magical beliefs (Nemeroff & Rozin, 2000). We use 'magical beliefs' as an umbrella term to refer to ideas about the world that extend beyond what is scientifically plausible (Lindeman & Aarnio, 2007; Subbotsky, 2014). Belief in luck and precognition are two examples of magical beliefs.

While belief in luck and precognition are pervasive, the extent to which these beliefs are embraced likely varies cross-culturally. Culture not only shapes how we navigate the world, including how we learn and process information about our environment (e.g., see Nisbett & Norenzayan, 2002), but also shapes the types of magical beliefs we are likely to hold (Vyse, 2013). Given the role culture plays in our basic thinking patterns, and in creating normative content of magical beliefs, it is also likely to shape the strength of our magical beliefs.

Research from sociology, business, marketing, and psychology suggests a degree of cultural variability in the extent to which people believe in luck and precognition (e.g., Brown et al., 2002; Chang & Lii, 2008; McElroy, 2020; Nemeroff & Rozin, 1994; Subbotsky & Quinteros, 2002). Most previous studies have compared belief in luck and precognition across two or three countries from different cultural contexts, supporting the assumption that they are culturally variant (e.g., Burger & Lynn, 2005; Rogers & Soule, 2009; Subbotsky & Quinteros, 2002). These studies allow for a close-up look at belief in luck and precognition between nations and nuanced accounts of why there may be differences across countries. However, it is unclear, based on two and three nation studies, whether differences are attributable to idiosyncratic, between-country differences or more systematic cultural differences.

The aim of the present study is to (a) report a large-scale test of the assumption that belief in luck and precognition vary cross-culturally, and (b) to investigate cultural factors that might

explain any differences that emerge. We extend previous work by testing cultural variation in belief in luck and precognition with data from 35 countries and nine cultural regions. We quantify the extent to which culture predicts belief in luck and precognition relative to established demographic factors, including age, gender, and education. One main goal of this study is thus descriptive: to map the extent to which belief in luck and precognition vary across cultural groups. A second goal of this study is to explore why belief in luck and precognition may be more prominent in some cultures than others.

Below, we review the existing literature on cultural differences in belief in luck and precognition. We then draw on existing theory to frame a series of predictions about how and why culture might influence belief in luck and precognition.

Culture and Luck Belief

There is some preliminary evidence for cultural differences in the extent to which people attribute their outcomes to luck or personal skills. An early study by Chandler et al. (1981) assessed causal attributions for achievements among 684 participants from India, Japan, South Africa, USA, and Yugoslavia. While no formal statistical comparisons were reported, mean levels of luck attribution were lowest among US participants and highest among Japanese participants. Interestingly, a more recent study by Burger and Lynn (2005) found the opposite effect. In a study comparing baseballers, US players were *more* likely to engage in 'lucky' behaviors than Japanese participants. These inconsistent findings may be a function of different measures of luck beliefs. Chandler et al. (1981) assessed attributions of luck after a positive event, which may be conflated with humility or willingness to focus on personal skills, whereas Burger and Lynn's (2005) study measured the frequency of lucky behaviors. However, neither study provides compelling evidence for a clear cross-national difference in luck beliefs.

Research on social axioms, or general beliefs people endorse and use to guide their daily behaviors, provide additional support for cross-cultural variability in luck beliefs. The five-dimensional structure of social axioms identified across cultural groups contains the "Fate Control" dimension with items representing "a belief that life events are predetermined *and* that there are some ways for people to influence these outcomes" (Leung & Bond, 2004, p. 134, emphasis in original). A reliable indicator of Fate Control is the item "Good luck follows if one survives a disaster" and a recent study confirmed high variability in this luck belief item across participants from 33 countries (Stankov & Saucier, 2015). The observed intraclass correlation coefficient, indicating proportion of total variance due to between-countries differences, was the second highest for this item (ICC = .175), only below that for a religiosity item which is expected to be a highly culture-differentiating indicator ("Religious faith contributes to good mental health", ICC = .200). Another luck belief item had far less variability: "There are certain ways to help us improve our luck and avoid unlucky things" (ICC = .093). These findings indicate that about 9-18% of the variability in luck beliefs are due to cultural differences.

Culture and Precognition Belief

Precognition implies that the future can be predicted. Precognition also assumes that outcomes are, to some extent, outside of an individual's control and determined by external forces. As such, individualistic cultures, such as the West, may be less likely to engage in precognition since it contradicts a belief in self-determination (Mueller & Thomas, 2001). This idea has received some preliminary support. In a study of probabilistic thinking in British and Asian students, Wright et al. (1978) pointed to anecdotal evidence that astrology is particularly popular and pervasive in Asia. Referencing observations from Wilson (1970), they note that "astrology is taken very seriously in many parts of Asia" and that the Indonesian president at the

time – President Suharto – was thought to consult gurus about the timing of major events (Wright et al., 1978, p. 286). The study found that British students displayed more probabilistic thinking relative to Asian students, and the authors suggest that this may be due to cultural differences in fate orientation. However, this study did not directly compare British and Asian students' beliefs in astrology, fate, or other precognition beliefs.

Returning to social axioms research, one Fate Control item is a proxy indicator of precognition beliefs: "There are many ways for people to predict what will happen in the future." Unsurprisingly, Fate Control showed positive correlations with supernatural beliefs and beliefs in precognition (Leung & Bond, 2004). This precognition item had the highest loadings and was thus the main Fate Control indicator in adult and student samples from 40 national/cultural groups (Leung & Bond, 2004), and it was a somewhat high culture-differentiating item across 33 nations (ICC = .103; Stankov & Saucier, 2015). When examining variability of Fate Control across 9 world regions, Stankov and Saucier (2015) observed it was highest in South East Asia, sub-Saharan Africa, South Asia, and East Asia regions, with Ethiopia the country scoring the highest and Peru the lowest. However, the study did not conduct measurement invariance testing across all regions, limiting the ability to make meaningful between-group comparisons.

To our knowledge, only one study was explicitly designed to quantitatively examine precognition and luck beliefs cross-culturally. Torgler (2007) analyzed data from the 1998 International Social Survey Program (ISSP – Religion II) to assess the psychological determinants of magical beliefs, including beliefs in astrology, fortune-tellers, and good luck charms. Torgler (2007) tested a model including demographic variables and country, which was a dummy-coded variable with magical belief in West Germany compared with magical belief in other nations. Relative to West Germany, people in formerly communist countries such as

Bulgaria, Latvia and Slovakia were more likely to believe in lucky charms, fortune-tellers, and astrology. Torgler (2007) suggests that the relatively high levels of magical beliefs in former Communist countries may be the result of the ban on organized religion during Soviet rule since it contradicted Communist "quasi-religion" (Barro & McCleary, 2005).

Torgler's (2007) study provides evidence for variation in belief in luck and precognition across numerous cultures. The study was, however, limited in its analyses – it relied on a single-level analysis and country dummy-codes. As such, the analysis did not account for the hierarchical nature of the data, and there was no comparison of cultural groups. Further, the large number of comparisons between countries reduced the statistical power to detect significant differences between countries. Finally, the study did not include any African countries, and included only one Asian country, the Philippines, which is predominantly a Catholic country and so may not be representative of other Asian nations.

We argue that the cultural mapping of luck and precognition beliefs requires additional data. At the same time, the studies reviewed above provide evidence that belief in luck and precognition vary between countries. The reason why belief in luck and precognition vary between countries has received less empirical and theoretical attention. One theory, termed 'the uncertainty hypothesis', suggests that magical beliefs may vary as a function of personal and national uncertainty. A second possibility, suggested by Burger and Lynn (2005), is that magical beliefs vary as a function of Individualism-Collectivism. Below, we review the literature on magical beliefs as a function of nation-level uncertainty and Individualism-Collectivism.

Why Might Belief in Luck and Precognition Vary Around the World?

The Uncertainty Hypothesis

Theory and research suggest that magical beliefs, such as belief in luck and precognition, serve psychological functions. According to the 'uncertainty hypothesis,' magical beliefs can satisfy the psychological need for control and certainty (Case et al., 2004; Greenaway et al., 2013). When perceived control is low, people perceive the world as more chaotic and unpredictable. Magical beliefs, such as a belief in precognition, may provide an antidote to feelings of uncertainty by providing a vision of the future and restoring a sense of certainty. Consistent with the uncertainty hypothesis, when people think that they have low personal control, they are more likely to believe in precognition (Greenaway et al., 2013).

At a national level, periods of global and economic uncertainty have been associated with a rise in magical beliefs and (theistic) belief in God. Padgett and Jorgenson (1982) analyzed historical data from Germany between 1918 and 1940 and noted that astrology and mysticism became more popular during periods of economic uncertainty. These findings have been mirrored in recent studies examining variation in belief in God. Barber (2011) analyzed data from 137 countries and found that belief in God was higher in countries with lower economic development, income security, and health security. In four studies, Kay et al. (2010) found that people were more likely to believe in God during periods of perceived government instability, such as election periods. Similarly, Sibley and Bulbulia (2012) found that when people experience a natural disaster, generally associated with pragmatic and psychological uncertainty, their belief in God increased. This effect has also been observed by journalists. Phelan (2020), a New York Times journalist, noted that interest in astrology rose during the COVID-19 pandemic, despite many astrologers predicting that 2020 would be a happy and prosperous year. These findings lend consistent support for the uncertainty hypothesis, whereby belief in precognition and belief in God increase when people perceive low levels of control and stability.

The studies highlighted above examined the effects of perceived personal uncertainty (e.g., I have no control) and national indicators of uncertainty (e.g., my environment is uncertain) on magical beliefs. Another relevant indicator of uncertainty is Hofstede's (2011) cultural dimension of Uncertainty Avoidance. The Uncertainty Avoidance Index measures the extent to which people in a given country are comfortable with uncertainty. Nations high in Uncertainty Avoidance are motivated to control the future and are more likely to adhere to rigid rules. The uncertainty hypothesis suggests that people in nations high in Uncertainty Avoidance may be more likely to hold magical beliefs to manage the psychological discomfort associated with uncertainty. If magical beliefs can be described as exemplars of "revealed knowledge of the unknown", then these beliefs help people to "cope with the inherent uncertainty of living on the blink of an uncertain future" (Hofstede, 2001, p. 146). To our knowledge, the link between belief in luck and precognition and national uncertainty tolerance has not been explicitly tested.

Individualism-Collectivism

Individualism-Collectivism refers to the extent to which people in a culture focus on individual actions and outcomes or those of the group (Hofstede, 2011). People in individualistic cultures are more likely to perceive themselves as independent agents that interact with the world, rather than as existing as part of a broader group or environment (Kashima et al., 1995). Informed by previous work by Burger and Lynn (2005), we consider two theoretical links between Individualism-Collectivism and belief in luck and precognition.

First, there may be a positive association between Individualism and belief in luck and precognition. People who believe in personal agency may be more motivated to maximize their successes and focus on their future outcomes. This in turn may motivate people to believe in luck and precognition. Controlling one's luck is consistent with controlling one's outcomes. And,

focusing on one's future, as predicted by a fortune-teller or astrologist, places a spotlight on the individual and their future. Thus, people in collectivistic cultures may be less likely to believe in luck and precognition if they emphasize individual outcomes and narratives. Consistent with this hypothesis, Burger and Lynn (2005) suggested that US baseball players were more motivated by personal success than Japanese players, and therefore engaged in more lucky behaviors.

Second, we propose an alternative hypothesis suggesting that there may be a negative association between Individualism and belief in luck and precognition. To the extent that people ascribe to an individualistic worldview, they may be more likely to view the world through a lens of personal agency (Kashima et al., 1995). As such, they may be more likely to believe that their outcomes are determined by their skills, knowledge, and effort, rather than external factors, including chance or predetermination. On the other hand, people in collectivistic cultures may be more likely to believe that outcomes are determined by a multitude of internal and external factors (Imada, 2012). As such, they may be more open to believing in luck and precognition. Thus, according to this account, Individualism may be negatively associated with belief in luck and precognition because these beliefs may undermine a sense of personal agency.

The Present Study

The primary aim of the present study is to quantitatively examine cross-cultural variation in belief in luck and precognition. To do this, we selected measures that were meaningful across cultures. We avoided reference to culturally specific beliefs, such as certain objects being considered 'lucky,' and instead focused on the concepts of 'luck' and the possibility of future forecasting (i.e., precognition). In Study 1, we analyze data from the Religion III International Social Survey Program, which measured belief in luck, fortune-tellers, and horoscopes in 16 regions between 2007 and 2010. The aim of Study 1 is to replicate Torgler's (2007) findings

with a more recent sample using multilevel modelling and cultural groups as our unit of analysis. In Study 2, we extend Torgler's (2007) study by reporting original data that used multi-item measures of belief in luck and precognition in 25 countries, including eight countries in Asia and one country in Africa. We model belief in luck and precognition as a function of culture. We controlled for age, gender, and religiosity, which were significant predictors of luck and precognition in Torgler's (2007) analysis, and education, which has historically been considered a possible explanation for cultural differences in magical beliefs (e.g., Luria, 1971, 1976).

We grouped regions into cultural categories using the Inglehart–Welzel cultural map of the world (World Values Survey, 2020). The Inglehart–Welzel map uses data from the World Values Survey to group countries based on two dimensions. The first dimension is *traditional versus secular*. Traditional societies are more likely to adopt collective belief systems such as religion and societal rules, whereas secular societies are more likely to adopt more flexible social systems. The second dimension is *survival versus self-expression* values. Societies that are high in survival values tend to focus on "economic and physical security," whereas societies high in self-expression values tend to focus on social and economic equality and sustainability.

An analysis of cultural groups, as defined by the Inglehart-Welzel cultural map, has several strengths. First, the groupings are empirically derived based on representative samples and are updated regularly by teams of cross-cultural researchers operating across 120 societies (World Values Survey, 2020). This approach contrasts with groupings of nations as 'east' or 'west', for example, which rely largely on geographical location to group countries into cultures. It also contrasts with comparisons of individual countries. A country-comparison approach provides a fine-grained picture of between-country differences. However, this approach has less statistical power to conduct pairwise comparisons, and explicitly models differences as a

function of country, rather than *cultural* values that may be driving between-country differences. Finally, a cultural comparison approach allows us to model between-country, within-country, and between-culture variance. In doing so, we gain more precise estimates of the effect of culture on belief in luck and precognition, accounting for between-country variability.

In addition to quantitatively mapping luck and precognition beliefs, we tested whether belief in luck and precognition may vary systematically across dimensions of cultural variability. We tested two cultural dimensions theorized to be associated with belief in luck and precognition reviewed above: Uncertainty Avoidance and Individualism-Collectivism (Hofstede, 2011).

Study 1

Method

Sampling and Procedure

We sourced data for Study 1 from the International Social Survey Program's (ISSP) Religion III survey (ISSP Research Group, 2018). Data were collected from 42 countries[1] between November 2007 and July 2010. Surveys were provided in the predominant language(s) of the country sampled and were translated from English by members of the research team, a translation bureau, or specially trained translators (see International Social Survey Programme Study Monitoring 2008, 2010, for details). Of the countries sampled, sixteen reported measures relevant to our analysis: Austria, Czech Republic, Denmark, France, Germany East, Germany West, Ireland, Latvia, Netherlands, New Zealand, Norway, Philippines, Russia, Slovakia, Slovenia, and Switzerland. Surveys were conducted face to face with the following exceptions: participants in Denmark, France, Netherlands, New Zealand, and Norway completed self-administered questionnaires via mail; and participants in Germany and Russia completed self-

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[1]We use 'country' rather than 'region' to avoid confusion with cultural regions. However, note that East and West Germany were analyzed separately.

administered questionnaires with some interviewer involvement. The data collection method for the Philippines was not reported. The pooled sample size of these 16 countries was 17,664, with individual country sample sizes ranging from 458 (East Germany) to 1,887 (France).

We measured belief in luck by assessing participants agreement with the statement, "Good luck charms sometimes do bring good luck." We measured belief in precognition based on agreement with two items, "Some fortune-tellers really can foresee the future" and "A person's star sign at birth, or horoscope, can affect the course of their future" ($r = .58$). Response options ranged from 1 = Definitely true to 4 = Definitely false. Responses were reverse coded so that higher scores represented stronger beliefs that the statements were true.

Measured predictors of interest were age, sex (1 = Male , 2 = Female), education (0 = No formal qualification, 1 = Lowest formal qualification, 2 = Above lowest qualification, 3 = Higher secondary completed, 4 = Above higher secondary level, 5 = University degree completed), and religiosity (1 = Extremely religious, 2 = Very religious, 3 = Somewhat religious, 4 = Neither religious nor non-religious, 5 = Somewhat non-religious, 6 = Very non-religious, 7 = Extremely non-religious). Religiosity was reverse coded so that higher scores represented stronger adherence to religion. Summary statistics for age, % female, education, religiosity, and our two dependent measures are reported in Table 1. See Table S1 for summary statistics by country.

Analytic Strategy

We conceptualized the data as multilevel, such that individual responses were nested within country. To assess the proportion of between-country variance to total variance in items measuring distinct forms of magical beliefs, we first calculated intra-class correlations (ICCs). ICCs for belief in luck and precognition indicated that 10% of the variability in scores was due to country-level variability. We grouped countries into cultural categories using the 2010-2014

Inglehart–Welzel cultural map of the world (World Values Survey, 2020). We used the 2010-2014 map to correspond with the date of data collection for this study (2007-2010).

Accordingly, Ireland and New Zealand were categorized as 'English speaking', Austria, Czech Republic, France, Slovakia, and Slovenia as 'Catholic Europe', and Denmark, Germany East, Germany West, Netherlands, Norway, and Switzerland as 'Protestant Europe.' Since Latvia, the Philippines, and Russia were the only countries sampled from their cultural groupings ('Baltic,' 'Latin America,' and 'Orthodox', respectively), we included them as individual countries in our analysis rather than cultural regions.[2] For a comparison of the correlations between belief in luck and precognition across the six cultural regions, see Figure S1 in the Supplementary Materials.

Cultural regions were dummy-coded such that the culture with the highest score on the outcome variable was the reference category. We conducted multi-level modelling in R using the 'lme4' package (Bates et al., 2015). All predictor variables were group-mean centered and we report standardized estimates for each fixed effect. We tested our models with and without controlling for sampling method (i.e., whether data were collected face-to-face or self-administered questionnaires), and results did not change. Below, we report results without controlling for sampling method.

Cultural Predictors of Luck and Precognition. We conducted additional analyses to probe why cultures may vary in belief in luck and precognition. We model cultural dimensions, estimated at the country-level, as predictors of belief in luck and precognition. We measured uncertainty tolerance using Hofstede's (2011) Uncertainty Avoidance dimension. According to Hofstede, this dimension addresses the question, "should we try to control the future or just let it

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[2] In Studies 1 and 2, we refer to 'cultures' and 'cultural regions' in our analyses to describe between-group differences.

happen?" Higher scores on Uncertainty-Avoidance reflect a stronger desire to control the future.

Second, we analyzed Hofstede's (2011) Individualism-Collectivism dimension. Higher scores on

Individualism-Collectivism reflect a tendency to focus on the self ("I") rather than groups and

communities people belong to ("we"; Hofstede, 2011). We control for levels of socio-economic

development which tends to be highly correlated with dimensions of cultural variability such as

Individualism-Collectivism (e.g., see Basabe, 2005). We used the Human Development Index

(HDI; UNDP, 2010), since it captures multiple dimensions of development, including adult

literacy rate, school enrolment, gross domestic product per capita, and life expectancy. Again, we

used HDI data that corresponded with the date of data collection for this study (2007-2010).

Results

Main Analysis

For each analysis, we first tested a demographic model to assess the variance accounted

for by age, gender, education, and religiosity. Second, we tested a demographic + culture model

in which we added the fixed effect of culture. This step-wise approach allowed us to examine the

extent to which culture accounted for variance in the outcome over and above demographic

factors. Latvia scored the highest on belief in luck ($M = 2.72$) and precognition ($M = 2.59$) and

was coded as the reference category. Mean levels of belief in luck and precognition for each

cultural group are displayed in Figure 1.

Belief in Luck. In the demographic model, all four demographic variables were

significantly associated with belief in luck. Older people ($\gamma = -.18$, $SE = .01$, $p < .001$), men ($\gamma

=.20$, $SE = .01$, $p < .001$), highly educated people ($\gamma = -.10$, $SE = .01$, $p < .001$), and non-religious

Table 1

Study 1 Summary Statistics by Culture

Cultural Group	*n*	% Female	Age	Education	Religiosity	Belief in Luck	Belief in precognition
Latvia	944	61.65	43.79 (16.83)	3.12 (1.23)	3.89 (1.31)	2.72 (0.84)	2.59 (0.73)
Catholic Europe	5791	54.50	48.79 (16.92)	2.79 (1.33)	3.67 (1.58)	2.07 (0.92)	2.10 (0.85)
English Speaking	2631	55.11	46.45 (17.51)	3.05 (1.38)	4.34 (1.33)	2.08 (0.94)	1.97 (0.82)
Philippines	1142	50.61	41.31 (15.51)	2.61 (1.60)	5.14 (0.91)	2.00 (1.06)	2.01 (0.87)
Russia	541	62.85	44.17 (18.37)	3.54 (1.16)	4.15 (1.60)	2.48 (1.00)	2.59 (0.88)
Protestant Europe	6615	51.04	49.07 (16.77)	2.89 (1.41)	3.67 (1.62)	1.84 (0.88)	1.81 (0.77)

Note. Means are reported with the standard deviations in brackets.

people (γ = .14, *SE* = .01, *p* < .001) were less likely to believe in luck. The combined effects of

the predictors (marginal R^2) accounted for 6% of the total variance in luck belief. When culture

was added to the model, the variance accounted for increased to 11%. A statistical comparison of

the demographic model and the demographic + culture model confirmed that the latter accounted

for significantly more variance in luck belief, $\chi^2(5)$ = 16.55, *p* = .005. Latvia scored significantly

higher on luck belief compared to Catholic Europe (γ = -.61, *SE* = .25, *p* = .034), English

speaking countries (γ = -.69, *SE* = .28, *p* = .033), the Philippines (γ = -.74, *SE* = .32, *p* = .045)

and Protestant Europe (γ = -.90, *SE* = .25, *p* = .004). There was no significant difference between

Latvia and Russia on belief in luck (*p* = .424).

Belief in Precognition. As above, we first tested a demographic model. Older people (γ

= -.14, *SE* = .01, *p* < .001), men (γ = .29, *SE* = .01, *p* < .001), highly educated people (γ = -.07,

SE = .01, *p* < .001), and non-religious people (γ = .16, *SE* = .01, *p* < .001) were less likely to

believe in precognition. The demographic model accounted for 7% of the variance in belief in

precognition. When culture was added to the model, the variance accounted for increased to

13%, significantly more variance than the demographic model, $\chi2(5)$ = 20.86, *p* < .001. Latvia

scored significantly higher in belief in precognition compared to Protestant Europe (γ = -.92, *SE*

= .24, *p* = .003), and English speaking countries (γ = -.69, *SE* = .27, *p* = .029). All other culture

comparisons were non-significant (*p*s > .054).

National and Cultural Predictors of Belief in Luck and Precognition

We conducted a series of follow-up multilevel regression analyses to test why some

cultural regions vary in luck and precognition beliefs. We tested Uncertainty Avoidance and

Individualism-Collectivism as independent predictors of luck and precognition, controlling for

demographic variables (age, gender, education, religion). We also sought to control for socio-

economic development (HDI) but – as can be seen in Table S2 – this was difficult because of

high intercorrelations between the cultural variables and HDI (e.g., the correlation between HDI

and Individualism-Collectivism was r = .66). When two highly correlated variables are entered

in a regression, it is frequently the case that they both "knock each other out" as they compete for

a small amount of unique variance, and this was the case in the current analyses (for details, see

Supplementary Materials). To avoid such issues of multicollinearity, we included Uncertainty

Avoidance, HDI, and Individualism-Collectivism as predictors in three separate regressions.

Belief in Luck. As above, age, gender, education, and religiosity were significant

predictors of belief in luck (ps < .001). A demographic + Uncertainty model accounted for 7% of

the variance in belief in luck and did not account for significantly more variance than the

demographic model (6%), $\chi2(1)$ = 2.16, p = .142. Uncertainty Avoidance was not a significant

predictor of belief in luck (p = .177). A demographic + Individualism model accounted for 7% of

the variance in belief in luck and did not account for significantly more variance than the

demographic model, $\chi2(1)$ = 2.55, p = .110. Individualism-Collectivism was not a significant
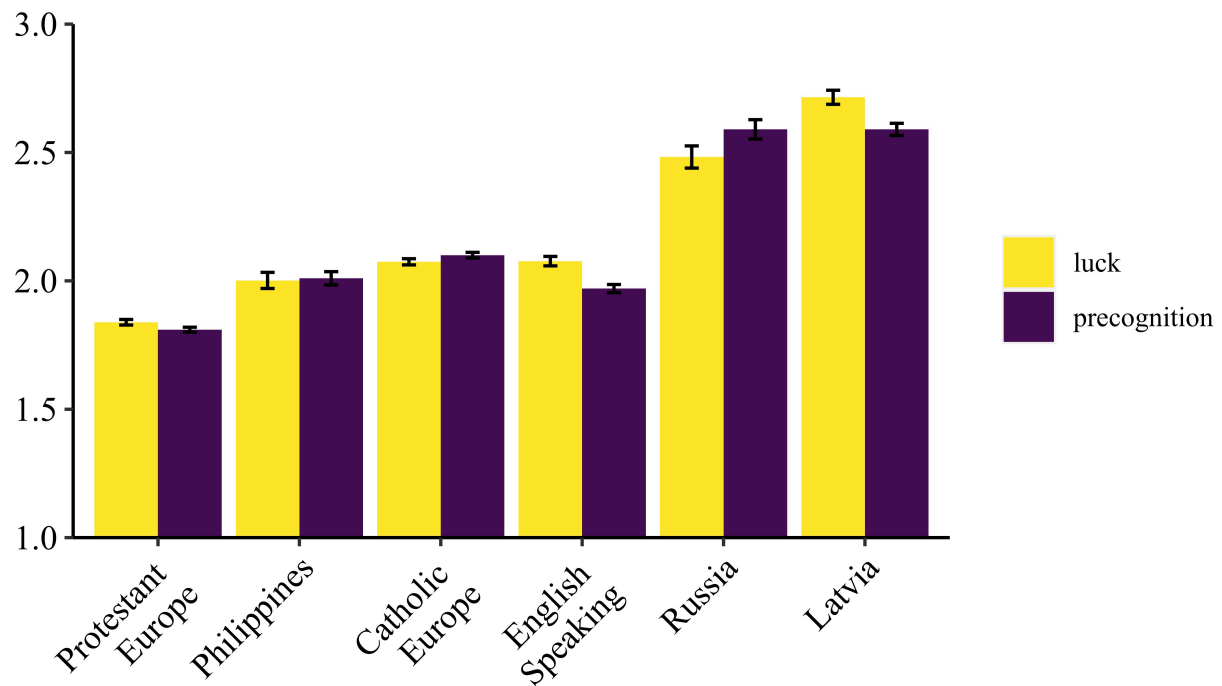
predictor of belief in luck (p = .142).

A demographic + HDI model accounted for 8% of the variance in belief in luck,

significantly more variance than the demographic model, $\chi2(1)$ = 4.87, p = .027. People in

countries with a higher HDI score were significantly less likely to believe in luck compared to

those in countries with a lower HDI score (γ = -.15, SE = .07, p = .043).

Belief in Precognition. We found the same pattern of results for belief in precognition.

All four demographic variables were significant predictors (ps < .001). A demographic +

Uncertainty model accounted for 8% of the variance in belief in precognition and did not account

for significantly more variance than the demographic model (7%), $\chi2(1)$ = 2.21, p = .137.

Figure 1

Study 1 Mean Belief in Luck and Precognition across Six Cultural

Regions

Note. Error bars represent standard error of the mean.

Uncertainty Avoidance was not a significant predictor of belief in precognition (p = .172). A

demographic + Individualism model accounted for 8% of the variance in belief in precognition

and did not account for significantly more variance than the demographic model, $\chi 2(1) = 2.80$, p

= .094. Individualism-Collectivism was not a significant predictor of belief in precognition (p =

.124).

A demographic + HDI model accounted for 10% of the variance in belief in precognition,

significantly more variance than the demographic model, $\chi 2(1) = 6.26$, p = .012. People in

countries with a higher HDI score were significantly less likely to believe in luck compared to those in countries with a lower HDI score ($\gamma = -.18$, $SE = .07$, $p = .022$).

Discussion

Study 1 examined belief in luck and precognition in six cultural regions across 16 countries. Culture was a significant predictor of belief in luck and precognition, over and above the effects of demographic variables (age, gender, religion, and education). Belief in luck and precognition were highest in Latvia and Russia. However, we found no evidence that cultural variation in belief in luck and precognition could be explained by the Uncertainty Avoidance and Individualism-Collectivism dimensions. We found some evidence that people in countries with higher scores on the HDI were less likely to believe in luck and precognition. However, the cultural analysis of luck and precognition beliefs was limited to the regions sampled, which were predominantly Western, European, and Eastern European regions. A broader representation of cultural regions is needed to test cultural variability of luck and precognition.

Study 2

Study 2 differs from Study 1 in three ways. First, we used multi-item measures to create latent variables for belief in luck and belief in precognition. Second, Study 1 relied on publicly available cross-cultural data, whereas Study 2 uses original data. Finally, Study 2 examines a broader sample of countries and cultural regions than those sampled by the ISSP. For example, Study 2 samples East Asian, African, and South American countries.

Method

Sampling and Procedure

Data for Study 2 were collected between March 31 and May 11, 2016, from 25 nations across six continents. Participants were recruited by the online data collection company Survey

Sampling International, who recruit from an existing pool of potential participants and via partnerships and advertising. Surveys were administered online in the local language, and surveys were translated and back-translated by the Australian Multilingual Services company. The first author checked the translations for inconsistencies which were resolved through correspondence with the translators. Participants were paid for their time and the payment varied according to the country to provide equivalent and appropriate compensation across countries.

Before beginning the survey, potential participants were asked: "What country do you live in?" Of the 6,015 participants who clicked on the survey, 692 were screened out of the study because they lived in a nation other than the nation being sampled. In order to ensure that participant responses were accurate, we also applied relatively strict inclusion criteria. Participants were excluded from analysis if they had more than 90% data points missing ($n = 60$), had duplicate identification numbers ($n = 12$), and if they failed an attention check ("To show that you are reading the questions carefully, please select Slightly Disagree here"; $n = 1,287$). This left 4,024 usable participants (51% women; $M_{age} = 43.40$ years), with individual country sample sizes ranging from 137 in India to 182 in Sweden.

Belief in luck was measured using selected five items from the Belief in Superstition Scale (BSS; Fluke et al., 2014). We excluded items assessing culturally specific belief in luck (e.g., "Friday the 13th is unlucky"). Participants were asked to rate the extent to which they agreed with the statements: "A good luck charm can change the outcome of chance events," "I actively seek out good luck," "I don't believe in luck" [reverse scored], "Doing things a certain way can change your luck, for good or bad," and "Trying to change your luck is a waste of time" [reverse scored]. Response options ranged from 1 = Strongly disagree to 9 = Strongly agree. Due to variability in the reliability of the scale across countries, we ran an Exploratory Factor

Analysis (EFA) to test whether items loaded onto more than one factor across the 25-nations in Mplus (as detailed in the Supplementary Material). A two-factor model did not converge, indicating that a single factor is preferable, but the loadings of the negatively worded items were weaker than those of the positively worded items. Since the three-item scale was more stable and explained a larger proportion of variance, we included only the three positively worded items in our scale measuring belief in luck.

Belief in precognition was measured using selected items from the Revised Paranormal Beliefs Scale (Tobacyk, 2004). We asked participants to rate their agreement with four items: "Some people have an unexplained ability to predict the future," "Astrology is a way to accurately predict the future," "The horoscope accurately tells a person's future," and "Some psychics can accurately predict the future." Response options ranged from 1 = Strongly disagree to 7 = Strongly agree. EFA results for the precognition scale for the whole sample confirmed a single factor, and all four items had strong and statistically significant loadings (see Supplementary Material). A Confirmatory Factor Analysis supported this one-factor model across the whole sample: SBχ^2 (N = 3907, df = 1) = 5.003, p = .025; RMSEA = .032 [90% CI = .009, .062]; CFI = .99; SRMR = .003.

To test the convergent validity of our measures of luck and precognition beliefs, we correlated the nation-level means of belief in luck and precognition in our study with the nation-level means of the Fate Control social axiom reported by Stankov and Saucier (2015). We analyzed data from the 19 countries that overlapped between the Stankov and Saucier (2015) sample and our sample. The correlation between Fate Control and luck beliefs was .54 (p = .025), and between Fate Control and precognition beliefs was .47 (p = .054). These correlations

provide support for the validity of our measures of luck and precognition. Summary statistics by cultural region are reported in Table 2. For summary statistics by country, see Table S3.

Analytic Strategy

Our analytic strategy was similar to that reported in Study 1. We calculated the ICC for the two dependent measures with 10% of the variability in belief in luck due to country-level variance and 6% of the variability in belief in precognition due to country-level variance. We then grouped countries into cultural categories, using the 2010-2014 Inglehart–Welzel cultural map of the world (World Values Survey, 2020). Again, we used the 2010-2014 map because it corresponds most closely to the date of data collection for this study. Argentina, Brazil, Chile, Mexico, Philippines, and Poland were categorized as 'Latin America', Australian, Canada, Ireland, New Zealand, UK, and USA as 'English speaking', China, Hong Kong, Japan, and South Korea as 'Confucian', France, Portugal, and Spain as 'Catholic Europe', Germany and Sweden as 'Protestant Europe', and Indonesia, India, and Singapore as 'South Asia.' Since South Africa was the only nation in the African cultural group, we categorized this sample as 'South Africa' rather than a cultural region. Since the categorization of Poland as Latin American appears to be a geographical outlier, we also conducted our analyses excluding Poland. Results were unchanged, so we report the results with Poland included. The culture variable was dummy-coded, such that South Asia was the reference category, which had the highest mean score in both belief in luck ($M = 5.27$) and precognition ($M = 3.45$). We conducted multilevel modelling in R using the 'lme4' package (Bates et al., 2015). All predictor variables were group-mean centered, and we report standardized estimates of each fixed effect.

Importantly, we conducted measurement invariance testing before our main multilevel analyses to confirm participants' responses to scale items were equivalent across all countries

and regions (see Chen, 2008; Milfont & Fischer, 2010). As detailed in the Supplementary

Material, we tested for measurement invariance of the belief in luck and precognition scales with

the samples from all 25 countries and cultural groups using the alignment optimization method in

Mplus (Asparouhov & Muthén, 2014). Results confirmed all belief in luck items had equivalent

loadings and intercepts across all 7 cultural groups and countries; except for Mexico which

yielded untrustworthy standard errors. As detailed in the Supplementary Material, however,

correlations between the latent factor scores with and without the inclusion of the Mexico sample

were extremely high (rs > .99). For this reason, we decided to keep this sample in all analyses.

Moreover, results confirmed belief in precognition items were equivalent across all 7 cultural

groups and 25 countries. Internal reliability was satisfactory for the three items measuring luck

(α = .66) and for the four items measuring precognition (α = .86) across the whole sample.

Belief in luck and belief in precognition were correlated at r = .45 (p < .001), suggesting

that the two constructs were related but distinct. For a comparison of correlations by culture, see

Figure S2 in the Supplementary Material. Results were analyzed using latent factor scores for

belief in luck and belief in precognition obtained from the alignment method for testing

measurement invariance between cultural groupings. Correlations between raw and latent scores

ranged between .93 and .99 for luck belief, and .91 and .96 for precognition beliefs (ps < .001).

National and Cultural Predictors of Belief in Luck and Precognition. As in Study 1,

we conducted exploratory analyses to assess cultural predictors of belief in luck and

precognition. We included Hofstede's (2011) Uncertainty-Avoidance and Individualism-

Collectivism dimensions as predictors, controlling for HDI. In Study 2, we used 2016 HDI

scores which correspond with the year of data collection.

Results

Main Analysis

Belief in Luck. We first tested a demographic model including age, gender, and education. Older participants were less likely to believe in luck, $\gamma = -.05$, $SE = .01$, $p < .001$.

Table 2

Study 2 Summary Statistics by Culture

Cultural Group	*n*	% Female	Age	Education	Belief in Luck	Belief in Precognition
Catholic Europe	507	51	46.27 (16.47)	3.12 (1.04)	0.07 (1.07)	-0.49 (1.08)
Confucian	622	51	42.75 (15.15)	3.45 (0.98)	0.00 (0.76)	0.00 (0.95)
English Speaking	987	53	45.49 (16.15)	3.14 (1.11)	-0.92 (1.49)	-0.38 (1.09)
Latin America	972	51	41.19 (15.23)	3.28 (1.01)	-0.28 (1.22)	-0.28 (1.00)
Protestant Europe	324	49	48.57 (17.42)	2.64 (1.03)	-1.04 (1.46)	-0.72 (1.09)
South Africa	169	51	35.44 (12.38)	2.99 (1.09)	-0.51 (1.34)	-0.12 (1.10)
South Asia	443	49	40.40 (14.28)	3.66 (1.04)	0.34 (1.60)	0.13 (1.13)

Note. Means are reported with standard deviations in brackets. Summary statistics for belief in luck and precognition were calculated using individual scores from the respective latent factors produced by the alignment method when testing for measurement invariance, and reflect relative average differences in luck and precognition beliefs between groups. Confucian functioned as the reference group, with a latent factor mean of 0, for both belief measures because this group had the closest latent mean of 0 in the alignment models. Reported *n*s based on final samples included in analyses.

There were no significant effects of gender or education, $ps > .245$. The demographic model accounted for <1% of the variance in belief in luck. When culture was added to the model the variance accounted for increased to 12%, significantly more than the demographic model, $\chi2(6) = 32.28$, $p < .001$. South Asia was significantly higher in luck belief compared to South Africa ($\gamma = -.63$, $SE = .28$, $p = .039$), English speaking countries ($\gamma = -.93$, $SE = .17$, $p < .001$), Protestant Europe ($\gamma = -.99$, $SE = .22$, $p < .001$), and Latin America ($\gamma = -.45$, $SE = .17$, $p = .018$). There were no other significant differences ($ps > .199$).[3] Mean levels of belief in luck for each cultural group based on raw scores are displayed in Figure 2.

Belief in Precognition. A demographic model accounted for 2% of the variance in belief in precognition. Participants were significantly less likely to believe in precognition if they were older ($\gamma = -.04$, $SE = .16$, $p = .024$) or reported higher levels of education ($\gamma = -.06$, $SE = .15$, $p < .001$). Women were more likely to believe in precognition ($\gamma = -.23$, $SE = .03$, $p < .001$). When culture was included in the model, the total variance accounted for increased to 7%, significantly more than the demographic model, $\chi2(6) = 31.32$, $p < .001$. South Asia was significantly higher in belief in precognition compared to Catholic Europe ($\gamma = -.59$, $SE = .14$, $p < .001$), English speaking countries ($\gamma = -.49$, $SE = .12$, $p < .001$), Latin America ($\gamma = -.39$, $SE = .12$, $p = .005$), and Protestant Europe ($\gamma = -.82$, $SE = .15$, $p < .001$). There were no other significant differences ($ps > .244$). See Figure 2 for mean levels of belief in precognition for each cultural group.

National and Cultural Predictors of Belief in Luck and Precognition

As in Study 1, we conducted follow-up analyses to explore why some cultural regions vary in luck and precognition beliefs. We tested Uncertainty Avoidance and Individualism-Collectivism as predictors of luck and precognition beliefs, controlling for HDI. Because the inter-correlations between HDI and the cultural variables were more modest in Study 2 than

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[3] We tested the final model excluding Mexico and the results were unchanged, further supporting our decision to keep this sample in the analysis.

in Study 1, we were able to run analyses testing each cultural variable while simultaneously

controlling for HDI. We report the results of models testing these predictors independently in

the Supplementary Materials, and their correlations in Table S2.

Belief in Luck. A demographic + Uncertainty + HDI model accounted for 8% of the

variance in beliefs in luck, significantly more than the demographic model (< 1%), $\chi2(2) =$

17.23, $p < .001$. Belief in luck was lower among people in countries with higher scores on

HDI ($\gamma = -.27$, *SE* = .06, $p < .001$). However, Uncertainty Avoidance was not significantly

associated with belief in luck ($p = .200$).

Figure 2

Study 2 Mean Belief in Luck and Precognition across Seven Cultures Calculated using Raw

Scores
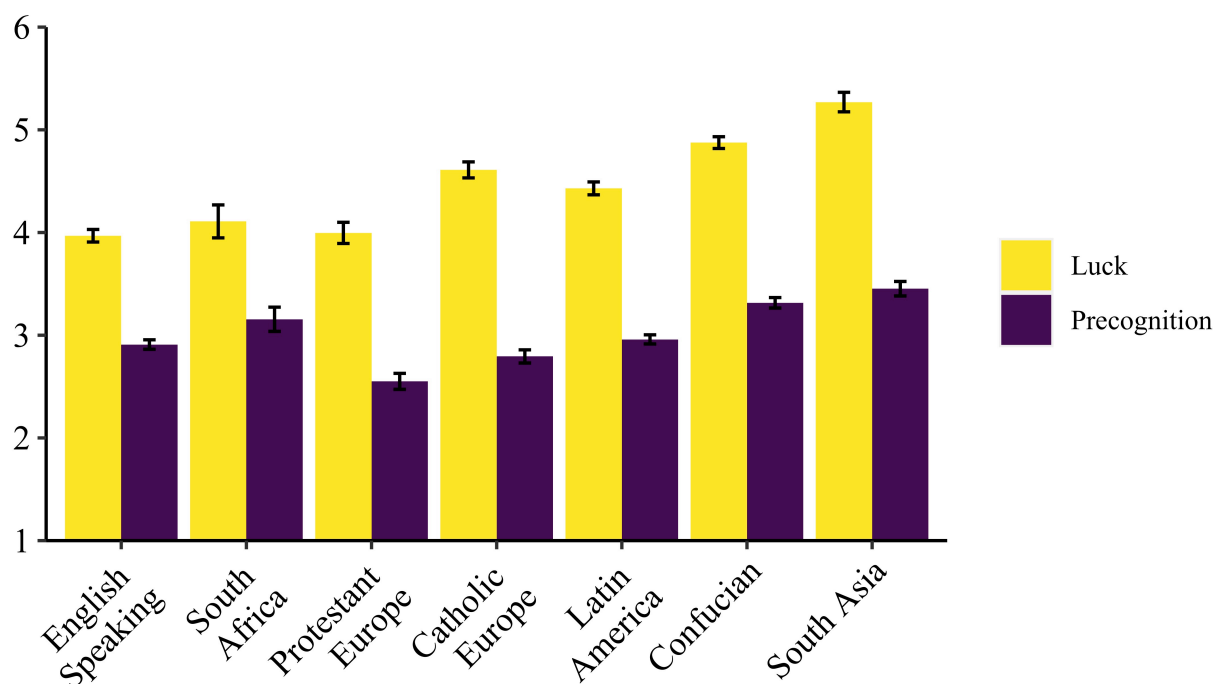
Note. Error bars represent standard error of the mean.

A demographic + Individualism + HDI model accounted for 10% of the variance in

luck beliefs, significantly more than the demographic model, $\chi2(2) = 25.92$, $p < .001$. Higher

scores on Individualism (γ = -.21, *SE* = .06, *p* = .003) and HDI (γ = -.15, *SE* = .06, *p* = .024) were associated with significantly lower scores on belief in luck.

Belief in Precognition. A demographic + Uncertainty + HDI model accounted for 4% of the variance in beliefs in precognition, significantly more than the demographic model (2%), $\chi2(2)$ = 8.97, *p* = .011. Higher scores on HDI were associated with significantly lower scores on belief in precognition (γ = -.12, *SE* = .05, *p* = .023), but Uncertainty Avoidance was not a significant predictor of beliefs in precognition (*p* = .081).

A demographic + Individualism + HDI model accounted for 4% of the variance in beliefs in precognition, significantly more variance than the demographic model, $\chi2(2)$ = 8.86, *p* = .012. Neither Individualism (*p* = .160) nor HDI (*p* = .085) were significantly associated with belief in precognition.

Discussion

Study 2 assessed belief in luck and precognition in seven cultural regions across 25 countries. Cultural region was a consistent predictor of belief in luck and precognition, over and above the effects of demographic variables, including age, gender, and education. Belief in luck and precognition were highest in South Asia and lowest in Protestant Europe. We again found no evidence that this cultural variation could be explained by differences in cultural uncertainty tolerance. In Study 2, Individualism-Collectivism was associated with belief in luck. People in countries that scored highly on Individualism were less likely to believe in luck. This finding is in the opposite direction to that proposed by Burger and Lynn (2005), who proposed that people in more individualistic cultures might be more likely to believe in luck. Instead, we find some support for the second hypothesis, that people in individualistic cultures may be focused on self-determination to the exclusion of belief in luck. However, we found a more consistent effect for HDI; people in countries that scored highly on HDI were less likely to believe in luck and precognition. Thus, we find preliminary

evidence for a socio-economic account of belief in luck and precognition. Using two large-scale multinational samples, Studies 1 and 2 expand our models of how and why belief in luck and precognition vary across cultures.

General Discussion

In two studies, we analyzed data from 21,688 participants from 35 countries to address the extent to which belief in luck and precognition differ across cultures. Culture was a significant predictor of luck and precognition beliefs and explained significantly more variance than age, gender, religiosity, and education. In Study 1, belief in luck and precognition were highest in Latvia and lowest in Protestant Europe (Denmark, Germany East, Germany West, Netherlands, Norway, and Switzerland). In Study 2, belief in luck and precognition was highest in South Asia (Indonesia, India, and Singapore) and lowest in Protestant Europe (Germany and Sweden). Therefore, we find evidence that, while magical beliefs are common across cultures, they are not embraced to the same extent across cultures.

These findings expand on previous work that has emphasized the role of demographic variables in predicting magical beliefs. Early theorizing suggested that education would largely account for differences in magical beliefs, both between individuals and between cultures (e.g., see Luria, 1971, 1976). However, across Studies 1 and 2, education was only weakly associated with belief in precognition and was not reliably associated with belief in luck in Study 2. Consistent with previous work, age and gender were reliably associated with luck and precognition beliefs (Brashier & Multhaup, 2017; Torgler, 2007). Older adults were less likely to believe in luck and precognition and women more likely to believe in luck and precognition across cultures. However, relative to education, age, and gender, a far better indicator of a person's belief in luck and precognition was their cultural context.

We also conducted the first direct test of the cultural factors that may account for cross-cultural differences in belief in luck and precognition. According to the uncertainty

hypothesis, variation in belief in luck and precognition may be a function of differences in cultural uncertainty tolerance. However, we found no evidence that cultural uncertainty tolerance, as indexed by Hofstede's Uncertainty-Avoidance cultural dimension, was associated with belief in luck and precognition. We also tested a second cultural dimension – Individualism-Collectivism – which was proposed by Burger and Lynn (2005) as a possible explanation for national differences in luck belief. Findings were mixed: people in individualistic countries were less likely to believe in luck, but this was only observed in Study 2.

There are several considerations to make when interpreting the mixed findings for Individualism-Collectivism. First, the non-significant effects in Study 1 may be a result of a restricted range in this cultural dimension. Study 1 primarily sampled Western and European countries, relatively high in Individualism. In Study 2, the negative association between individualism and luck beliefs contrasts with previous work. Burger and Lynn (2005) found that US baseball players were more likely to believe in luck compared to Japanese players. It may be that people in countries higher in Individualism are generally motivated to attribute outcomes to individual effort, rather than luck. However, Individualism-Collectivism and HDI were highly correlated in Studies 1 and 2, also noted in previous research (e.g., Basabe & Ros, 2005). It is therefore a statistical challenge to definitively disentangle the effects of Individualism-Collectivism and HDI, one that ideally requires a much larger number of countries than that available to use in the current paper.

The most consistent nation-level predictor of belief in luck and precognition was the HDI, a measure of socio-economic development. People were less likely to believe in luck and precognition if they were living in a country with a high HDI score. It is, however, unclear why socio-economic development (HDI) might be related to belief in luck and precognition. One possibility is that the HDI taps into structural uncertainty. Consistent with

the uncertainty hypothesis, it may be that when people are in a context where access to healthcare, education, and income is uncertain, they may be more likely to believe in luck and precognition to restore a sense of security and control. A similar point has been made by Barber (2011), who found an association between economic development and belief in God. A second possibility is that HDI is related to modernization and a stricter focus on science and technology. Such a focus may, in turn, influence the extent to which people report magical beliefs. Interestingly, individual levels of education were inconsistently or weakly associated with belief in luck and precognition. As such, a modernization account could be explored in future research which should also consider how modernization is reflected in broader political, educational, and religious systems.

In addition to these nation-level variables, it is plausible that there are culturally specific historical factors that contribute to increased or decreased openness to such beliefs. For example, in Study 1, belief in luck and precognition were highest in Latvia and Russia relative to other nations, consistent with Torgler's (2007) findings. Torgler (2007) theorized that magical beliefs may be particularly prominent in formerly Communist countries because religion was banned during Soviet rule, and people may have turned to magical beliefs as a politically sanctioned substitute for their religious beliefs. Another possibility is that, during Soviet rule, neither magical beliefs nor religious beliefs was tolerated, yet magical beliefs had firmer historical roots and were harder for the Soviet education system to extinguish (Wigzell, 2011). Wigzell (2011) refers to the tendency for children to be brought up with the lore of their *babushka*s, or grandmothers, who held magical beliefs including beliefs in fortune-telling, which were generally popular throughout nineteenth century literature, art, and philosophy in Russia (Menzel, 2009). Indeed, a study of 6,300 young people in Russia in 1982-3 (post-Soviet rule) found that 35% of people believed in fortune-telling, whereas only

23% believed in an immortal soul or divine revelation (see Wigzell, 2011). Thus, magical beliefs in previously Communist countries may reflect deeply-rooted cultural practices.

In Study 2, South Asian and Confucian cultural regions scored highly on magical beliefs relative to European and English-speaking countries, consistent with findings from business and marketing (e.g., Brown et al., 2002; Chang & Lii, 2008). The relative strength of magical beliefs in regions such as China may reflect a similar phenomenon to Eastern Europe, where the banning of religion led to a rise in magical beliefs as a substitute. However, this explanation does not extend to South Asian countries, which have no comparable history of banning religion or fortune-telling (e.g., Ropi, 2017; Sahgal et al., 2021). It may be that, in these cultures, magical beliefs are firmly embedded in economic and political systems, and as such, is more likely to be broadly accepted.

Another possibility is that there is variation, not in the extent to which magical beliefs 'survive' but in the extent to which it is culturally stigmatized. The cultures that score consistently lower in magical beliefs include European and English-speaking countries, which have a history of actively rejecting magical beliefs. During the 'Enlightenment' era in Europe, magical beliefs, including beliefs in witchcraft and pagan rituals, was actively abolished, and magic was shamed as sign of intellectual immaturity (Vyse, 2013). Rejecting magical beliefs was therefore tied to class and status and was then used as a justification for racist and sexist policies and attitudes (Janack, 1997; Peters, 2019). The cultural derision of anti-scientific thought may therefore suppress tendencies towards magical beliefs in Europe, and later, other predominantly White, colonized cultures.

Limitations and future directions

While our studies contribute to our understanding of the global landscape of magical beliefs, they were limited in their operationalization of magical beliefs. We relied on one to four item measures of luck and precognition beliefs, which was in part related to the

challenge of developing comparable measures across cultures. In Study 2, the five-item scale developed to measure belief in luck was reduced to a three-item scale due to invariance of two items across nations. Further, we limited our analysis of magical beliefs to luck and precognition, specifically. Since instantiations of magical beliefs vary cross-culturally, it was important for us to select forms of magical beliefs that were relatively ubiquitous across cultures. As such, our study cannot speak to variation in beliefs related to supernatural beings, such as ghosts, demons, spirits or animism, the belief that non-human objects have a spiritual essence.

Further, we assessed participants' overt belief in luck and precognition and did not examine participants' unconscious or unspoken beliefs. It seems plausible that, under high-cost scenarios, the cultural variation in behavior motivated by magical beliefs would be smaller. The attitude-behavior inconsistency has been demonstrated by Subbotsky and Quinteros (2002), who found that British people were more likely to report that they rejected magical beliefs than participants from rural Mexico. However, British and Mexican participants were similarly likely to behave in ways that reflected magical beliefs in high-cost scenarios. Since participants in Studies 1 and 2 were asked to report whether or not they held magical beliefs, our findings cannot speak to cultural variation in unconscious or behavioral manifestations of magical beliefs.

Finally, we used the Inglehart-Welzel cultural map to group nations into cultures. While this approach has several strengths, critical scholars have raised concerns about White, Western centrism reflected in the map's structure and terminology (e.g., Dervin et al., 2020). Dervin et al. (2020) note that the cultural groupings essentialize the people within each country in ways that recreate colonialist discourses. However, we consider it an appropriate analytical tool for the purposes of this study, and the essentialism critique is mitigated by our ability to analyze both within and between culture variability.

Conclusion

This study presents a multinational account of cultural variation in magical beliefs, operationalized as belief in luck and precognition. We find that, while magical beliefs are common across cultures, magical beliefs may be more common in some cultures than others. Magical beliefs were least common in Western cultures and most common in Latvian, Russian, and South Asian cultures. We find limited evidence that the cultural dimensions of Individualism-Collectivism is associated with belief in luck, and no evidence that Uncertainty Avoidance is associated with belief in luck or precognition. We find more consistent evidence for an effect of socio-economic development, with belief in luck and precognition being more common in countries with a lower HDI score. Our studies expand the limited account of magical beliefs across the world, including a number of Asian, African and South American nations. While magical beliefs are clearly present across cultures, we show that their influence is culturally relative.

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