Cultural similarity among co-religionists within and between countries

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Abstract

Cultural evolutionary theories suggest that world religions have consolidated beliefs, values, and practices within a super-ethnic cultural identity. It follows that affiliation with religious traditions would be reliably associated with global variation in cultural traits. To test this hypothesis, we measured cultural distance between religious groups within and between countries, using the Cultural Fixation Index (CF_{ST}) applied to the World Values Survey (88 countries, N=243,118). Individuals who shared a religious tradition and level of commitment to religion were more culturally similar, both within and across countries, than those with different affiliations and levels of religiosity, even after excluding overtly religious values. Moreover, distances between denominations within a world religion echoed shared historical descent. Non-religious individuals across countries also shared cultural values, offering evidence for the cultural evolution of secularization. While nation-states were a stronger predictor of cultural traits than religious traditions, the cultural similarity of co-religionists remained robust controlling for demographic characteristics, geographic and linguistic distances between groups, and government restriction on religion. Together, results reveal the pervasive cultural signature of religion and support the role of world religions in sustaining superordinate identities that transcend geographical boundaries.

Significance

People who live in the same country often share cultural traits. Do people who affiliate with the same religious tradition also share cultural traits? We found that the world religions (Christianity, Islam, Judaism, Hinduism, Buddhism) share a degree of cultural similarity, while also displaying unique patterns of cultural traits. People who share a particular religious tradition and level of commitment to religion were more culturally similar, both within and across countries, than those that do not, even after excluding overtly religious values. Despite their heterogeneity, religious denominations reflect superordinate cultural identities that display shared traits that persist across geographic and political boundaries. These findings inform cultural evolutionary theories about the place of religion and secularity in the world's cultural diversity.

Cultural similarity among co-religionists within and between countries

Religious traditions are an important element of the world's cultural diversity, and deeply intertwined with many other cultural traits¹. Beliefs, values and practices centered around these traditions have been hypothesized to foster a superordinate shared identity, with a corresponding package of cultural traits, shared across geographic and ethnic boundaries^{2–6}. It follows from this hypothesis that there is some degree of cultural similarity between co-religionists across the world. We test this hypothesis by comparing the cultural distance of co-religionists to non-co-religionists within and between countries. We also assess how the cultural distance of co-religionists compares to the cultural distance of co-nationals. We measure cultural distance using the Cultural Fixation Index (CF_{ST} ⁷) applied to responses provided by 243,118 individuals from 88 countries who completed the World Values Survey⁸ (WVS) in 3 waves between 2005 – 2019.

Previous research has documented many ways in which variation in cultural traits can be traced to variation across religious groups and to their particular beliefs and practices. Religious traditions bind people together into moral communities, by transmitting cultural norms about what is considered right, good, and true⁹. Religious group differences have been found to predict a variety of social judgments and behaviors, moral values, familial ties, personality traits, educational attainment, and economic preferences^{1,10–14}. Across many countries, more religious people (e.g., those with stronger belief in God and the afterlife) tend to moralize a wider range of behaviors than do non-religious individuals^{15,16}. For example, more religious individuals often care about sexual morality, whereas non-religious individuals tend to be more permissive^{17–27}. Religious commitments predict attitudes towards family²⁸, with certain religious traditions predicting stronger family ties (e.g., percentage of Muslims within a country²⁹) and others predicting a loosening of kinship ties and greater individualism (e.g., history of exposure to the

Roman Catholic Church³⁰). Religious commitment and ritual participation is related to greater cooperative tendencies³¹; for example, participation in the Kavadi, an annual Hindu festival involving intense rituals and devotions, is associated with greater generosity among Tamil diaspora communities³². Across cultures and religious traditions, individuals who are committed to a more punitive, morally concerned god behave more generously towards co-religionist strangers in economic games,^{33,34} and belief in various forms of supernatural punishment play a role in the evolution of social complexity³⁵. And in judgments of moral transgressions, Protestants (i.e., members of a religious tradition that places great importance on personal beliefs) tend to emphasize transgressors' intentions and character traits, whereas Jews, Catholics, and Hindus (i.e., traditions that tend to care more about religious practice) prioritize the outcomes of transgressors' behaviour³⁶⁻³⁹.

Exposure to particular religious traditions is also related to people's orientations towards education and economic pursuits. For instance, the presence of Mainline Protestant denominations in a society often spreads pro-education, pro-market economic attitudes that manifest in greater educational attainment and/or economic prosperity cross-nationally⁴⁰⁻⁴⁴ (see also, specific case studies of Germany⁴⁵, Guatemala⁴⁶, China⁴⁷, and Africa⁴⁸). A similar influence has been documented for 18th century Jesuit missions among indigenous populations on educational attainment in Argentina, Paraguay, and Brazil⁴⁹. The Protestant heritage of the United States may likewise help to explain the value Americans' place on religious traditionalism, individualism, and moralization of work (often referred to as the "Protestant work ethic")^{50,51}. Conversely, the spread of religions is shaped by existing features of societies; for example, political leadership structures and small group size is implicated in the rates at which Christianity expanded among Austronesian societies⁵².

While there is mounting evidence from different fields that religious traditions and cultural preferences are importantly linked, secularization in many parts of the world and in subcultures within countries, have also been linked to shifts in cultural norms, beliefs, and values^{16,53–56}. However, the extent and significance of secularization continues to be hotly debated, with some proposing that secularization is not a significant phenomenon and that it has not fundamentally altered cultural values and practices^{57,58}. Therefore, the current study offers a novel test of whether non-religious individuals share cultural values within and across nations, consistent with the secularization thesis.

Parallel to the findings about the role of religious traditions, a large and diverse body of work shows that shared nationality also shapes values, beliefs, behaviors, and norms. For example, despite large population size and regional diversity, Americans living in different states look quite similar in their cultural values, and quite different from those living outside the USA⁷. Shared nationality is an important predictor of a wide range of outcomes, including behavioral,^{59,60} social,^{61,62} and economic trends⁶³. We did not have strong a-priori theoretical expectations about the relative strength of affiliation with nation-state versus religion in predicting cultural traits; we therefore treated this as an open question in the present study.

The World Values Survey has been foundational in attempts to map broad patterns of cross-country cultural variation in human values, beliefs, and preferences. It has been used extensively to document the consolidation of cultural values and beliefs within nation states⁶⁴. Early work using the World Values Survey has also shown that a country's dominant religious tradition is a good predictor of that country's cultural values. Using the 1995-1998 waves of the WVS, Inglehart and Baker⁶⁵ identified two major dimensions in which countries vary—traditional vs. secular-rational values and survival vs. self-expression values—and found that

countries classified along these two dimensions tend to fall into clusters that can be identified by their dominant religious histories. For example, separate clusters could be identified for historically Catholic, Protestant, and Orthodox European countries, and Confucian countries clustered separately from other Asian nations. Here we build on this landmark study and address several of its limitations. We draw on a much larger sample of countries, measure religion at the individual-level rather than only at the country-level, make use of the newly developed Cultural Fixation Index, and compare the relative importance of religious denominations within and across countries.

In the present research, we explore whether religious denominations correspond to broad patterns of variation in cultural values, using responses provided by 243,118 individuals from 88 countries who completed the World Values Survey (WVS) between 2005 – 2019. To measure cultural distance, we use the Cultural Fixation Index (CF_{ST}) measure⁷. F_{ST} was originally designed as a measure of genetic distances between populations^{66,67}, but can be applied to measure distances between any theoretically-interesting cultural groupings along any desired dimensions. Muthukrishna et al.⁷ applied the F_{ST} measure to cultural traits represented in the World Values Survey to create the CF_{ST} and found that cultural distance between countries predicts meaningful cross-country variation in psychological outcomes. To assess the pattern of cultural distances between religions, the present research likewise applies the CF_{ST} measure to the World Values Survey, but to religious denominations instead of countries. In some analyses, we further subset by level of religiosity and countries (to compare religious groups between and within countries).

While there are strong reasons to expect that religious affiliation is an important predictor of global cultural variation in values, beliefs, and preferences, this is not a foregone conclusion.

Alternatively, we may find that differences between countries overwhelm any similarities between members of the same religious traditions who live in different countries⁶⁸. That is, religious denominations could be more an identity label than a cultural group, and the extant diversity within broad categories such as “Christianity” or “Buddhism” might be too large to allow for overarching cultural traits. Perhaps local factors exert an overwhelming influence on a person’s cultural values that leaves little room for one’s religious tradition. For example, in studies of European countries, national cultures are a far better predictor than religion of the perceived importance of various virtues⁶⁹ and definitions of wisdom⁷⁰. Or perhaps, even if a religious tradition does predict cultural traits, it might only predict a person’s supernatural beliefs, ritual practices, and certain moral attitudes that are deeply intertwined with religious doctrines (e.g., attitudes towards euthanasia, norms about sexuality); beyond these belief-related traits, the effect of religion may not be detectable. Finally, it may be the case that simply being religious—of any denomination—has the largest effect on cultural traits and that specific religious traditions do not contribute beyond this. To test this, we also computed cultural distances between groups defined by their degree of religiosity.

The present study investigated whether religious denominations, measured at the individual level, predict global variation in cultural values. We compare the relative predictive power of sharing a nation and sharing a religious tradition on cultural distance between groups. We test the preregistered hypotheses that within a country, members of different religious denominations will be culturally distant, and across countries, those that share a religious tradition will be more culturally similar than those affiliating with different traditions.

We assessed these patterns of global variation in cultural values across different religious denominations that have historically supported large-scale cooperation through a suite of

mechanisms such as rituals, devotions, and fictive kinship, including supernatural punishments and rewards (God for Jews, Christians and Muslims^{4,33,34}; karma for Hindus and Buddhists^{5,71}). Next, we compared individuals with no religious affiliation to religious individuals of any denomination, to test whether people distanced from any religion across nations shared cultural values reflecting secularization. We also assessed whether there is any interaction between one's level of religiosity (e.g., the importance of religion in one's life or frequency of attending religious services) and their particular religious denominations (i.e., individuals who share a denomination may only be similar if they are highly committed to their religion). Finally, we tested the robustness of these results controlling for individual-level (e.g., age), national-level (e.g., government restrictions on religion), and cross-national factors (e.g., geographic distances between countries) that often covary with religion and could also be related to the degree of cultural similarities between groups. Prior to conducting any analyses regarding cultural distances between religions, the methods and analysis plan were preregistered on the Open Science Framework (https://osf.io/j4v2s/?view_only=c25f890edbde4864ac5f29994ab10762). We specify when our results were exploratory or when they deviated from the preregistration. We disclose all data exclusions, alternative analyses, and measures (in the article and in the accompanying Supporting Information).

Results

Cultural distances across religious denominations

The first preregistered analysis investigated the cultural distance between members of different religious denominations, collapsed across all countries, after aggregating the individual religious denominations available in the dataset into one of the following categories: Christian, Muslim, Jewish, Hindu, Buddhist, Spiritualist and pagan, Druze, Daoist, Native or Folk religion,

Ancestral Worshipping, no religious denomination, or other (see SI for full details). These categories ensured sufficient sample sizes and some uniformity in category options across countries, while retaining major distinctions between religious traditions. We calculated the Cultural F_{ST} (CF_{ST}) statistic to quantify the overall size of cultural differences between two groups, on a scale that can range from 0 (when populations are identical) to 1 (when populations are completely different). Larger CF_{ST} values indicate greater differences between the distributions of cultural traits in each group. (Between countries, human populations overlap considerably with a typical range from 0 to 0.3, suggesting more overlap than difference.⁷) For the focal analyses presented in the main text, we exclude any cultural traits that overtly describe a person's religious beliefs (e.g., belief in God, belief in life after death, frequency of prayer), and may therefore exaggerate the strength of association between religious traditions, religiosity, and global variation in cultural traits. The Supporting Information also contains additional analyses that follow our original preregistered plan, by using the full set of WVS variables (including religious beliefs), as well as a more conservative preregistered test that excludes all overtly religious content as well as the moral values and social norms that are not inherently religious but often cluster with a person's religious beliefs (e.g., disapproval of homosexuality or abortion, meaning and purpose in life). Similar patterns were found using all three analytic choices, although the associations are somewhat reduced when religious and moral values are excluded from the set of cultural traits.

The pairwise cultural distances between each of these groups are depicted in Figure 1. Additional analyses were conducted that retained separate categories for Roman Catholic, Orthodox, and Protestant/other Christian denominations (any other sub-denominations of major

world religions were not present in sufficient numbers across countries for a meaningful analysis, see Table S1).

The pattern of cultural distances between religions, across countries, reflected several patterns of known historical connections between religious groups. For example, Christians were highly similar to members of other Abrahamic faiths (Jews and Muslims), and more culturally distant from Hindus, Daoists, Spiritualists/Pagans, and Ancestor Worshipers. Sub-denominations of Christianity were also highly similar to one another: Roman Catholics were highly similar to Protestant/other Christians, $CF_{ST} = 0.005$ [0.005, 0.006] and slightly more distant (but still pretty similar to) Orthodox Christians, $CF_{ST} = 0.056$ [0.018, 0.079]. Buddhists tended to be quite similar to both traditional Eastern (Daoist and Native/Folk religion) and Dharmic traditions (Hindu), and less obviously, to Christians (see SI for further analyses of this similarity). It is noteworthy that in the larger context of the world, the Big 5 world religions (Christianity, Islam, Judaism, Hinduism, Buddhism) shared a high degree of cultural similarity and were collectively more distant from followers of Ancestral Worship and Spiritualist/pagan traditions (mean cultural distance within the five world religions was $CF_{ST} = .079$; mean distance from the five world religions to Ancestral Worship was $CF_{ST} = .132$ and to Spiritualist/pagan traditions was $CF_{ST} = .190$).

Secondary analyses confirmed that these global patterns occur across a variety of cultural value dimensions, not only those pertaining to the religious beliefs. The average distance between religious denominations is largest when including all values, including overtly religious beliefs, $CF_{ST} = .151$, and lowest when excluding all religious, moral, and norm-related beliefs, $CF_{ST} = .112$, but the overall pattern of distances between members of different religious

traditions was retained even after dropping these belief variables (see the SI for full results and for exploratory analyses conducted separately on each dimension of the WVS).

Figure 1. Cultural distance between religions, excluding overtly religious traits. Identical values are replicated in the upper and lower diagonal, with values shaded from closest (white) to most distant (blue).

Cultural distances across countries and religious denominations

The second preregistered analysis investigated the relative contribution of sharing a religious denomination and sharing a country in predicting cultural distances between groups. To

answer this question, we computed the pairwise cultural distances between members and non-members of a given religious denomination within and across all countries. Separate analyses were conducted by splitting the sample into members vs. non-members of four denominations: Christians vs. all non-Christians; Muslims vs. all non-Muslims; Buddhists vs. all non-Buddhists; and Hindus vs. all non-Hindus. For example, the Christian analysis provided us with an estimate of the cultural distance between (a) Christians vs. all non-Christians within each country, (b) Christians who live in different countries, (c) Christians vs. all non-Christians who live in foreign countries. Distances were computed for each country-by-religion pair, and then averaged across countries (according to preregistered exclusion criteria, this necessitated dropping data from any religious groups with fewer than 100 members/non-members within a country). The results of this analysis are presented in Figure 2, and a similar pattern was found for splits based on Christian, Muslim, Hindu, and Buddhist. Additional analyses excluding the entire moral beliefs dimension of cultural values also shows a similar pattern and are available in Figures S2 and S3.

Within each country, members of a religious tradition were quite similar to members of other religious traditions living within the same country. But does sharing a religious tradition predict cultural similarity, above and beyond country-level differences? Yes. Although the effect of sharing a religion was smaller than the effect of sharing a country (red points vs. blue points in Figure 2A), individuals who share a religious denomination were, on average, more similar than individuals who differ in both their religion and their country (blue points vs. green points in Figure 2A). For example, Christians living in China were quite similar to Buddhists living in China, $CF_{ST} = 0.015$ [0.015, 0.029], but across nations Christians in Mainland China tended to be more similar to other Christians in Taiwan, $CF_{ST} = 0.055$ [0.052, 0.073] and Singapore, $CF_{ST} = 0.067$ [0.062, 0.081], than they were similar to Buddhists in Taiwan, $CF_{ST} = 0.076$ [0.072,

0.091] and Singapore, $CF_{ST} = 0.085$ [0.079, 0.100]. The stronger effect of national culture was apparent even in cases where there is ongoing within-country religious conflict, such as between Hindus and Muslims within India^{72,73}. Muslims in India were more similar to Hindus in India, $CF_{ST} = 0.006$ [0.006, 0.014] than to Muslims in Pakistan, $CF_{ST} = 0.148$ [0.135, 0.168]. Similarly, despite a history of interreligious tensions, Lebanese Christians and Muslims were culturally similar ($CF_{ST} = 0.008$ [0.008, 0.011]), and more similar to each other than Lebanese Christians and Egyptian Christians ($CF_{ST} = 0.115$ [0.107, 0.131]), and Lebanese Muslims and Egyptian Muslims ($CF_{ST} = 0.168$ [0.16, 0.179]).

This pattern was consistent for analyses based on adherence to Christianity, Islam, Buddhism, and Hinduism, although exploratory analyses indicated that some religious denominations predict greater similarity across nations than do others. Interestingly, co-religionists across countries were more similar if they are Roman Catholic, $CF_{ST} = 0.117$ [0.113, 0.120]—a religion with a long history of top-down influence across countries from a centralized authority—or less obviously, Orthodox, $CF_{ST} = 0.092$ [0.082, 0.101], rather than Protestant and other Christian denominations, $CF_{ST} = 0.134$ [0.130, 0.139], which have historically existed as more dispersed and autonomous groups.

Figure 2. (a) Cultural distance between (i) in red: co-religionists and members of all other denominations within a country, (ii) in blue: co-religionists within a country to co-religionists in foreign countries, and (iii) in green: co-religionists and members of all other denominations in foreign countries. (b) Cultural distance between (i) in red: individuals with high vs. low religiosity within a country, (ii) in blue/violet: individuals who share high a level of religiosity (high or low) across countries, (iii) in green: individual high vs. low in religiosity across countries. “Religiosity” was calculated using three separate methods: choosing “No religious denomination” as their religious affiliation, importance of religion in life, and attendance at religious services. All values were computed separately for each country (colored data points) and an average value across countries (with bootstrapped 95% confidence intervals, in black).

Cultural distances across levels of religiosity

The preceding analyses showed that cultural similarities between religious denominations were evident between co-religionists living in different countries, and this pattern was present for Christians, Muslims, Hindus, and Buddhists. Our next preregistered analyses tested the possibility that cultural similarity may also be predicted by greater religious involvement, resulting in cultural distance between religious and non-religious individuals regardless of their specific religious denomination. We tested this by splitting the sample, across countries, into high religiosity and low religiosity groups based on three different criteria—importance of religion in one’s life, frequency of attendance at religious services, and whether they selected “no religious denomination” as their religious affiliation (see Figure 2B). According to each of these criteria, we found that highly-religious and non-religious individuals were slightly different within each country, and those who share a level of religiosity across countries were more similar than those who differ in level of religiosity across countries. Average cultural distances between those with no religious denomination across countries, $CF_{ST} = 0.140$ [0.128, 0.152] is a little larger but comparable to cultural distances between individuals with the same religious denomination across countries (Christian $CF_{ST} = 0.120$ [0.112, 0.129], Muslim $CF_{ST} = 0.118$ [0.106, 0.130], Buddhist $CF_{ST} = 0.100$ [0.085, 0.115], Hindu $CF_{ST} = 0.121$ [0.098, 0.153]). This supports the conclusion that level of religious commitment (regardless of the specific religion) also predicts cultural distance, above and beyond the predictive potential of belonging to specific religious traditions. In some cases, sharing a level of religious commitment was even more consequential than sharing a religious denomination. For example, within India, Hindus who reported that religion was very important were more similar to Indian Muslims who reported that

religion was very important, $CF_{ST} = 0.007$ [0.007 0.016], than they were to Indian Hindus who reported religion was not important, $CF_{ST} = 0.029$ [0.025, 0.039].

Interestingly, when we grouped religious traditions into broad categories with shared cultural ancestry—Abrahamic (Christian, Muslim, or Jewish), Dharmic religious denominations (Hindu, Buddhist), as well as non-religious (no denomination) individuals—members of Abrahamic and Dharmic denominations were more similar to each other across different countries, $CF_{ST} = 0.149$ [0.139, 0.160], than they were to individuals with no religious denomination: Abrahamic vs. no denomination across countries, $CF_{ST} = 0.181$ [0.166, 0.199]; Dharmic vs. no denomination across countries, $CF_{ST} = 0.161$ [0.137, 0.187]. This also replicates the finding reported earlier that the Big Five world religions show cultural similarities.

We also computed the pairwise cultural distances between all religious denominations (collapsed across countries), after splitting the sample into those high in importance of religion and low in importance of religion. The average cultural distance between denominations was approximately the same within the sample who considers religion highly important, $CF_{ST} = 0.122$ [0.105, 0.142], and within the sample who considers religion not important, $CF_{ST} = 0.103$ [0.089, 0.117], whereas the distance was larger when comparing the high importance and low importance samples across denominations, $CF_{ST} = 0.155$ [0.130, 0.184] (see Table S9 for full details). That is, sharing a level of commitment to religion, as well as sharing a religious affiliation, predicts greater cultural similarity.

In what ways do religious and non-religious people differ? The overt religious and moral content of some cultural values was an important part of the story: All religious groups differ from those with no religious denomination by at least $CF_{ST} = 0.130$ along the dimension of religious/moral beliefs ($CF_{ST} > 0.125$ when explicitly religious beliefs were removed, but

moral/norm attitudes were retained in this category). But as depicted in Figure 3, religious groups also differ from non-religious individuals across many other dimensions of culture. Some groups only differ by a little. In general, Christians, Jews, and Buddhists were quite similar to non-religious individuals along many dimensions. But other groups differed by quite a lot. For example, the distance between Hindu, Druze, and Ancestral Worshiping groups and non-religious groups was as large, along many dimensions, as the distance between Christian and non-religious groups on the religious/moral belief dimension.

Figure 3. Cultural distance between each religious group and those with no religious denomination, for each separate dimension of cultural values. Additional figures, displaying results across dimensions for each religious denomination as the reference group, are available in the SI.

Cultural distances according to level of religiosity, across countries and religious denominations

The final preregistered analysis investigated the combined influence of shared country, shared religious denomination, and shared importance of religion as predictors of cultural distance. We found no evidence for the hypothesis that similarity across religious denominations was only present among highly religious individuals; rather, individuals who shared both a religious denomination and who shared the same level of religious commitment (be it high or low), tended to be more similar to each other than to individuals with a different denomination or with a different level of commitment across countries. Results, depicted in Figures S4-S6, revealed unique contributions of all three factors: Individuals within a country were more similar than individuals across countries (the largest effect), but individuals were also more similar if they shared a religious denomination and a level of religiosity, than if they differed in their denomination or level of religiosity. For example, there was more cultural similarity among Muslims living in different countries who agreed that religion is highly important, $CF_{ST} = 0.116$ [0.104, 0.129], as well as among those who agreed that religion was not important, $CF_{ST} = 0.094$ [0.083, 0.108], whereas the cultural distance was larger between highly-religious Muslims and non-religious Muslims living in different countries, $CF_{ST} = 0.148$ [0.129, 0.169]. Sharing a level of religious commitment predicted additional similarity, beyond the effect of shared denomination. As in the preceding analysis, the same pattern tends to appear if moral, as well as religious, beliefs are excluded from the set of cultural values.

Robustness checks

We conducted three sets of exploratory analyses (documented in detail in the SI) to address alternative explanations for our findings. The first was to confirm that our results were

not driven by self-assortment, the second to confirm that our results are not better explained by demographic variables, and third to confirm that our results are not better explained by geographic, linguistic, or genetic distances between groups.

Country-level restrictions on religious freedom

We conducted exploratory analyses to examine whether these patterns can be explained by self-assortment. It is possible that individuals who are committed to a certain set of beliefs and preferences (e.g., meaning and purpose in life, disapproval of euthanasia) may subsequently choose to join a religion that reflects these attitudes. If so, then we would expect similarity among co-religionists in countries with high religious freedom, but not in countries where religion is more tightly constrained. Contrary to this explanation, there was little association between government restriction of religion and the degree of cultural distance among co-religionists. The greater cultural similarity among co-religionists compared to people who do not share a religion was present in both countries with high levels of religious freedom (same religion: $CF_{ST} = 0.115$; different religion: $CF_{ST} = 0.156$, averaged across Christian, Muslim, Hindu, and Buddhist splits) and countries with less freedom and more government restrictions on religion (same religion: $CF_{ST} = 0.116$; different religion: $CF_{ST} = 0.146$, averaged across splits, see Figures S9-S11).⁷⁴ While causal inference is not feasible given the observational nature of the data, this finding is more consistent with the hypothesis that cultural similarity among co-religionists is the result of exposure to religious traditions that have a consolidating effect on cultural traits, not merely individuals choosing to affiliate with particular traditions.

Demographic variables

We considered whether these patterns hold across other demographic variables that may be associated with religious affiliation. We did not find supportive evidence. Similar patterns

were documented when we separately analyzed distances between younger individuals and distances between older individuals, and the degree of cultural distance between religious groups within a country was uncorrelated with the degree of cultural distance between age groups, socioeconomic classes, regions, or ethnic groups within a country.

Geographic, linguistic, and genetic distances

The greater similarity between co-religionists across countries also cannot be explained by geographic, genetic, or linguistic distances between countries. To test these possibilities, we assessed whether these variables predict the set of pairwise cultural distances between all distinct country/religion groups, and whether cultural distances between religious groups predict additional unique variance beyond these factors. We assessed these relationships using both a Multiple regression on distance matrices (MRM) approach and using a multilevel model (that predicted these distances in a beta distributed model that included clustering of observations within religions and countries). Both analyses (described in full in the Supporting Information) indicated that small associations do exist between our focal cultural distance variable and geographic, linguistic, and genetic distances between groups. However, cultural distances between religious groups, and cultural distances between countries, predicted substantial additional unique variance, after accounting for these geographic, linguistic, and genetic differences. For example, within South Africa, where sufficiently large sample sizes of different linguistic groups were available, Protestant Christians were more similar to fellow Protestants who speak different languages (average $CF_{ST} = 0.0245$) than they were to non-Protestants who speak different languages within the country (average $CF_{ST} = 0.0406$), although all groups living within the same country tended to be quite similar to one another (between linguistic groups, average $CF_{ST} = 0.0299$, maximum $CF_{ST} = 0.116$).

Discussion

In the larger context of the world, there was considerable cultural convergence among adherents of the world religions (Hinduism, Buddhism, Christianity, Islam, Judaism) that together comprise the vast majority of the world's population⁵⁶. The results also supported the hypothesis that religious affiliation, and level of commitment to religion (irrespective of the particular tradition), are meaningful predictors of global variation in cultural values, beliefs, and preferences. Moreover, differences between countries were several times larger than differences between religious groups within a country – an interesting finding that was not predicted in advance. This was even the case for countries with a history of inter-religious tensions, such as India and Lebanon. These two findings, taken together, indicate that despite contemporary anxieties about religious divides around the globe⁷⁵, world religions share a great deal of cultural traits and the experience of living in nation-states continues to be more consequential than exposure to religions, at least when it comes to shared cultural values. These findings may indicate that (a) religious conflict is not necessarily accompanied or caused by greater cultural distance or (b) that other factors, such as feelings of group identity, rather than cultural distance, may be more important in intergroup conflict. The cultural distances between religious groups in previous conflicts, such as late 20th century conflicts in Ireland and Sri Lanka may shed light on this issue, and improve our understanding of the dynamics among groups that are unified by religion as well as politics.

Nevertheless, religious traditions also displayed robust, measurable differences in cultural values, beyond observed national differences. Within a country, individuals with different religious denominations and different levels of religiosity were more culturally distinct, and these distances between religious denominations were as large or larger than cultural distances

between other demographic groups, such as those defined by one's ethnicity, region, or level of education, status, or income (see SI Figure S16). Across countries, those who share a religious denomination or level of religiosity were more similar than those with different religious denominations and different level of religiosity. As a result, and despite living in different national cultures, people who do not affiliate with any religion shared cultural traits to some degree. This pattern is consistent with the cultural evolution of secularization,⁵³ and conforms with previous research on the causes and consequences of religious decline that is occurring in some parts of the world^{55,76}. Interesting open questions remain, however, about whether a global secularized culture is emerging, and if so, what explains it.

These cultural differences appeared across a range of values (e.g., political and economic attitudes, preferences for social relationships and important qualities to instill in children), not merely those that contain overtly religious content, thereby indicating that sharing a religious denomination has a broad association with cultural traits. These patterns of religious cultural distances were robust to demographic variables and could not be explained by other potential influences on cultural traits, such as geographic or linguistic proximity between populations. In addition, cultural similarity among co-religionists was unmoderated by the degree to which governments restrict religious freedom. This finding speaks against the self-assortment hypothesis – the idea that cultural similarity among co-religionists is mainly driven by people possessing certain beliefs and preferences selecting themselves into a religious tradition that reflects these traits. Contradicting this, religion predicted cultural traits equally in more restrictive as well as less restrictive countries. But these analyses cannot definitively determine the causal directions between religious traditions and cultural traits, and vice versa⁷⁷, nor do they specify how religion may co-evolve with a broader package of cultural traits that are impacted by

underlying factors, such as when religious beliefs and practices might adapt to particular societal ecologies^{78,79}. These are important questions for future research regarding the cultural evolution of religion and culture, which require richer historical data and more extensive longitudinal and phylogenetic analyses^{80–82}.

The present research also has methodological and theoretical implications that inform sampling choices in designing future studies in the behavioral sciences, and further our understanding of human behavioral diversity. For example, the United States is a canonically WEIRD (Western, educated, industrialized, rich, and democratic) country overrepresented in behavioral science research,⁸³ and cultural distance from the USA has been found to predict cross-national variation in many important psychological outcomes. Exploratory analyses of the cultural distance between the United States and members of religious denomination who live outside of the USA revealed that Christians, and in particular Protestants, were most similar to Americans ($CF_{ST} = 0.065$ [0.063, 0.069], see SI). This suggests that affiliation with Christian denominations around the world is to some extent related to WEIRD psychology,^{14,30} an important point that is often masked in cross-cultural comparisons of human behaviors and preferences. Moreover, researchers could utilize cultural distances to improve sampling from religiously diverse populations, to test the extent of cross-cultural generalizability of psychological findings and theories.

There are important limitations to the present analyses. We utilized a large cross-cultural dataset to depict cultural differences between broad categories of major world religions, but despite the overall very large sample size, the available data limited our ability to assess cross-national cultural distances for smaller religious groups or sub-denominations within broader religious traditions. By aggregating over many different denominations of Christianity, Islam,

Hinduism, or Buddhism, our results may exaggerate the size of cultural distances between coreligionists, whereas co-religionists may be more similar when they share a specific denomination (e.g., Catholic Christians were a little more similar, on average, than were members of any Protestant Christian denomination). We were also unable to analyze several other prevalent religious denominations (e.g., Sikh) due to a lack of representation across the entire dataset. Future research could apply the techniques used here to investigate cultural distances between more specific religious denominations, when additional data becomes available from these groups. Another limitation is that the present study is a snapshot that does not account for the dynamic nature of religious traditions that change over time, a question that future research can address using historical data. Future research is also needed to assess the degree to which these findings, which are based on the well-established World Values Survey, are robust and replicable across other datasets that measure cultural values and preferences. The World Values Survey presents the ideal data for a first test of these patterns, by surveying a variety of cultural traits (even if not an exhaustive set).

Religious affiliation and intensity of religious commitment are linked to global variation in cultural traits. In particular, people who share a religious denomination within and across countries were more culturally similar than those with a different religious denomination. The clustering of cultural traits by religious groups across geographic and linguistic distances is consistent with religion's role in the cultural evolutionary dynamics of large-scale cooperation and competition, as previous theories have hypothesized^{4,14}. Moreover, these findings add new evidence to recent efforts documenting that cultural diversity is orders of magnitude larger than genetic diversity in human populations^{7,66,84}, thereby allowing intergroup competition and multi-level selection to play a role in human cultural evolution. However, we emphasize that religious

traditions are not static or homogenous – they evolve over time in response to various social, demographic, political, and ecological pressures, which may result in corresponding changes in cultural values, beliefs, and preferences. Overall, these results highlight the importance of religion and secularity—besides country-level differences—as a meaningful part of humanity’s considerable cultural diversity.

Methods

Data source

Data were drawn from the World Values Survey (WVS⁸), Waves 5 – 7 (2005 – 2019). These datasets contain responses from 243,118 participants from nationally representative samples of 88 countries around the world. Analyses were conducted based on various divisions of this data into groups based on respondents’ religious affiliation, level of religiosity, and country of residence. As preregistered, any groups with fewer than 100 respondents (according to the grouping criteria of that analyses) were excluded, to ensure sufficiently large samples sizes for a reliable cultural distance estimate.

All data and code for the present analyses are available on the Open Science Framework (https://osf.io/4gv6d/?view_only=b140817381664728aea41eea86473fc5).

Cultural Values

Following the criteria used by Muthukrishna et al.⁷, the primary set of variables used to produce a measure of cultural distance include all values, preferences, beliefs, and self-reported behaviours available in the WVS that are plausibly culturally transmissible (e.g., excluding demographic characteristics, see Bell et al.⁶⁶ for a similar approach). These variables fall along several dimensions, covering topics including political views, attitudes towards strangers and outgroup/ingroup members, religious and moral values, preferences in social relationships and

child rearing, and attitudes towards economics, sexuality, and law. Following the procedure adopted by Muthukrishna et al.⁷, responses to these questions were collapsed into particular response categories, analogous to alleles in population genetics. To avoid any potentially confounding effect of different response styles across countries, valenced responses to Likert-type scales were collapsed into positive vs. negative response categories (e.g., “strongly agree” and “agree” were combined and “disagree” and “strongly disagree” were combined, the midpoint “neither” was treated as a third category). Questions with nominal responses were kept as separate response alleles. A full list of allele categorizations is available in SI.

We use the CF_{ST} metric developed by Muthukrishna et al.⁷ (including the R-code and allele dimensions available in their supplementary materials) to measure distance between religious groups according to their responses to these cultural values. The Cultural F_{ST} statistic represents the ratio of between- and within-group variance of particular responses to each question in the WVS set of cultural values (analogous to how Genetic F_{ST} reflects the variance of particular alleles at a particular locus of a genome). This statistic quantifies the overall size of cultural differences between any two groups of individuals (i.e., cultural distance). Unlike other measures of cultural differences, this metric considers distributions, rather than point estimates of mean differences, across a range of discrete, potentially-orthogonal cultural traits, rather than considering variation along a single dimension of culture that include continuous, binary, and nominal traits.

Values of CF_{ST} can range from 0 (populations are identical) to 1 (equal sized populations that are largely homogeneous, but different). To determine whether cultural distances between groups were statistically significant, 95% confidence intervals for all estimates were calculated by bootstrapping with 1000 replications (following^{7,66}). Larger CF_{ST} values indicate greater differences between the patterns of cultural traits in each group, and indicate the degree to which

the populations can be considered structured and separate. F_{ST} is a nonlinear metric, meaning for example, that an F_{ST} of 0.6 is larger, but not twice as large, as an F_{ST} of 0.3. Past research investigating cultural distances between countries⁷ has documented CF_{ST} values that tend to range from 0 to about 0.3, with an average $CF_{ST} = 0.13$ between countries, indicating substantial overlap, and greater similarity than differences, between most country-level groups.

Our analyses take two approaches to minimize potential confounds between the religious denomination grouping and other cultural values. First, we removed the importance of religion or attendance at religious services from the set of cultural values for any analyses where importance/attendance was used as a grouping variable. Second, to test the robustness of the results, we conducted all analyses using three alternative coding approaches: (a) the full set of WVS dimensions, described above, (b) all WVS dimensions *except* the items from the “beliefs” dimensions, which contains explicitly religious content (e.g., whether they believe in God and life after death), but retains attitudes towards moral norms that are not inherently measures of religious commitment but are often intertwined with religious issues (e.g., the justifiability of homosexuality, abortion, and euthanasia), and (c) only the WVS dimensions that do not refer to religious or moral beliefs (i.e., financial, group membership, law, political, sexuality, and social relationship dimensions identified by Muthukrishna et al.⁷).

Grouping Variables

Religious affiliation

Religious denomination was drawn from WVS variable #F025. For most analyses, religious denominations were grouped into broader categories that collapsed across different sub-denominations of larger categories of world religions, including sub-denominations of Christianity (Roman Catholic, Orthodox, and Protestant/Evangelical/Pentecostal/Other Christian

denominations), Islam (including Sunni, Shia, and a general ‘Muslim’ option), Buddhism, Judaism, Spiritualism/Paganism (such as Brazilian Candomblé and Umbanda, Haitian Vodou, and other paganism and spiritualism), and Native or Folk religions.

This approach has the advantage of providing larger sample sizes than were available for most of the specific unique denominations available in the data, and also aggregated across variability caused by different ways of asking the religious denomination question in each country. For example, the classification of Muslims as Sunni vs. Shia (rather than a broad “Muslim” category) was only available in 5 countries, but where this distinction was available, Sunni vs. Shia were very culturally close, $CF_{ST} = 0.026$ [0.025, 0.031], and both Shia, $CF_{ST} = 0.035$ [0.0316, 0.0383], and Sunni, $CF_{ST} = 0.026$ [0.0238, 0.0304], were very culturally close to the overall non-specific Muslim category. Therefore, we collapsed participants who selected Sunni, Shia, or Muslim into a single Muslim category for our analyses (see SI for a more detailed discussion of these religious denomination classifications).

Religiosity

Two different measures were used as indicators of religious commitment, and analyses were conducted separately using each classification.

Importance of religion to one’s life (WVS variable #A006): Participants were split into (a) high importance: those who feel that religion is important (“very important” or “rather important”) and (b) low importance: those who feel that religion is not important (“not very important” or “not at all important”). Secondary analyses were also conducted that compare those who state religion is “very important” vs. “rather important” vs. “not very important” and “not at all important,” to allow us to look specifically at the most devout individuals. Results of

these analyses were consistent with the division of participants into the broader high vs. low religious importance categories, presented in the main text (full details are available in the SI).

Attendance at religious services (WVS variable #F028): Participants were split into (1) high attendance: those who attend religious services more than once a week or once a week, (2) mid attendance: those who attend religious services once a month, only on special holy days/Christmas/Easter days, or other specific holy days, and (3) low attendance: those who attend religious services once a year, less often, or never/practically never.

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Supporting Information for
Cultural similarity among co-religionists within and between countries

Methods – Additional Details

Data checks prior to analyses

Data were drawn from the World Values Survey (WVS, Inglehart et al., 2014), Waves 5 - 7 (2005 – 2019). These datasets contain responses from 243,118 participants from nationally representative samples of 88 countries around the world. As preregistered, we used the most recent available version of these datasets.

Muthukrishna et al. (2020) used Waves 5 & 6 (2005 – 2014) to investigate cultural distances between countries (Wave 7 was not available at the time). These datasets have not previously been used to investigate cultural distance between different religious denominations. Therefore, before preregistering this study we analyzed the frequency of religious denominations in the dataset, to ensure that there was sufficient data available to investigate religious cultural distances.

Measures

Religious affiliation

Religious denominations were drawn from WVS variable #F025. Religious denomination responses were grouped into broader categories for analysis as described below:

- **Christianity:** Evangelical, Armenian Apostolic Church, The Church of Sweden, Christian, Anglican, Independent African Church (e.g. ZCC, Shembe, etc.), ZA Evangelical/Apostolic Faith Mission, Jehovah witnesses, Pentecostal, Alliance, Presbyterian, Other Christian com, Aglipayan, Dutch Reformed (Nederlands Hervormd), Seven Day Adventist, Baptist, Reformed Churches in the Netherlands (Gereformeerde), Christian Reform, Greek Catholic, Methodists, Iglesia ni Cristo (INC), Mormon, Free church/Non-denominational church, Ratana, Gregorian, New Apostolic Church, Salvation Army, AU Uniting Church, Lutheran, Church of Christ / Church of Christ / Church of Christ of Latter-day Saints, DZ Christian (Quakers, Jehovahs Witnesses, Evangelical, Protestant), Assembly of God, Israelita Nuevo Pacto Universal (FREPAU), Unitarian, Born again, Orthodox, Protestant, Roman Catholic, Wesleyan Methodist Church, Grace Communion International (Worldwide Church of God)
- **Islam:** Al-Hadis, Muslim, Shia, Sunni
- **Buddhism:** Buddhist, Hoa hao
- **Judaism:** Jewish, Zionist
- **Daoism:** Taoist, Daoism
- **Spiritualism/paganism:** Spiritista, Paganism, Other Brasil Espirit, Candomblé, Umbanda, esoterism, occult, Spiritualists, Other Brasil Espirit, Candomblé, Umbanda, esoterism, occultism, HT Vodou, HT Vodou and Christian, Wicca
- **Native or folk religion:** Native, Folk religion, ZAAfrican Traditional Religion
- **No religious denomination**

As preregistered, analyses dropped any religious groups with <100 members across all countries that could not be meaningfully classified into one of the previous categories (e.g., Sikh, Zoroastrian, Jain, Bahai, Confucianism), and individuals with “other” or missing data for this question were not analyzed as a unique religious group due to this response option not representing a coherent social category.

In this process of assessing the frequency of religious denominations in the dataset (Longitudinal data file containing Waves 1-6), we discovered that the religious denomination variable in Haiti was not properly coded to match the scheme used to categorize religions in other countries in the dataset (e.g., 1 = “Vodou” in Haiti, whereas 1 = “Aglipayan” in the other countries in the dataset). After consulting with the administrators of the WVS data file, we altered the coding of religious denominations in Haiti to appropriately match the coding scheme used in the remainder of the dataset. These coding errors had been corrected in more recent versions of the dataset (“WVS_TimeSeries_1981_2020_spss_v1_2”), used in the present analyses.

Table S1. Number of participants with each religious affiliation in each country

	ANCESTRAL WORSHIPPING	BAHAI	BUDDHIST	CONFUCIAN	DAOIST	DRUZE	HINDU	JAIN	JEWISH	MUSLIM	NATIVE OR FOLK RELIGION	NO RELIGIOUS DENOMINATION	ORTHODOX	OTHER	PROTESTANT OR OTHER	ROMAN CATHOLIC	SIKH	SPIRITUALIST AND PAGAN	ZOROASTRIAN
ALGERIA	0	0	0	0	0	0	0	0	0	1194	0	0	0	0	6	0	0	0	0
ANDORRA	0	0	6	0	0	0	18	0	1	23	0	714	20	15	20	1186	0	0	0
ARGENTINA	0	0	71	0	0	0	9	0	12	3	0	581	3	188	40	2102	0	0	0
ARMENIA	0	0	1	0	0	0	0	0	2	1	0	67	998	14	0	1	0	12	0
AUSTRALIA	0	5	75	0	1	1	28	0	41	34	0	2020	87	22	1233	1037	6	8	0
AZERBAIJAN	0	0	0	0	0	0	0	0	2	966	0	15	17	0	2	0	0	0	0
BANGLADESH	0	0	10	0	0	0	109	0	0	1081	0	0	0	0	0	0	0	0	0
BELARUS	0	0	0	0	0	0	0	0	4	4	0	205	1127	1	30	155	0	0	0
BOLIVIA	0	0	0	0	0	0	0	0	2	0	0	306	1	4	467	1225	0	1	0
BRAZIL	0	0	8	0	0	0	0	0	4	1	0	683	6	103	1232	2513	0	145	0
BULGARIA	0	0	2	0	0	0	0	0	1	98	0	142	736	0	4	1	0	0	0
BURKINA FASO	0	0	0	0	0	0	1	0	2	818	76	16	3	8	120	473	0	0	0
CANADA	0	0	14	0	0	0	3	0	9	23	0	609	17	249	339	876	0	0	0
CHILE	0	0	2	0	0	0	3	0	8	0	0	720	3	45	353	1804	0	0	0
CHINA	0	0	553	0	9	0	1	0	0	104	0	6214	2	24	216	26	0	0	0
COLOMBIA	0	0	2	0	0	0	0	0	0	2	0	1429	0	30	819	3769	0	1	0
CYPRUS	0	0	0	0	0	0	0	0	3	1432	0	118	1465	8	3	12	0	0	0
ECUADOR	0	0	0	0	0	0	0	0	0	0	0	707	1	11	300	1361	0	0	0
EGYPT	0	0	0	0	0	0	0	0	0	4019	0	0	0	0	232	0	0	0	0
ESTONIA	0	0	1	0	0	0	0	0	0	3	0	979	361	19	116	30	0	0	0
ETHIOPIA	0	0	1	0	0	0	0	0	6	577	20	10	1558	5	510	25	0	0	0
FINLAND	0	0	0	0	0	0	0	0	0	1	0	139	11	6	847	2	0	0	0
FRANCE	0	0	5	0	0	0	0	0	2	49	0	496	2	2	26	411	0	0	0
GEORGIA	0	0	1	0	0	0	1	0	1	91	0	31	2539	0	18	11	0	0	5

	ANCESTRAL WORSHIPPING	BAHAI	BUDDHIST	CONFUCIAN	DAOIST	DRUZE	HINDU	JAIN	JEWISH	MUSLIM	NATIVE OR FOLK RELIGION	NO RELIGIOUS DENOMINATION	ORTHODOX	OTHER	PROTESTANT OR OTHER	ROMAN CATHOLIC	SIKH	SPIRITUALIST AND PAGAN	ZOROASTRIAN
GERMANY	0	0	5	0	0	0	2	0	2	138	0	2347	47	57	1679	1312	0	0	0
GHANA	0	0	1	0	0	0	1	0	1	417	28	72	201	72	1723	531	0	0	0
GREECE	0	0	0	0	0	0	2	0	2	27	0	47	1096	5	1	6	0	0	0
GUATEMALA	0	0	5	0	0	0	2	0	1	3	0	241	1	49	731	1152	0	0	0
HAITI	0	0	0	0	0	0	1	0	3	16	0	209	1	502	667	511	0	0	0
HONG KONG SAR	0	0	443	0	0	0	8	0	1	9	0	3042	2	62	592	156	0	0	0
HUNGARY	0	0	0	0	0	0	0	0	2	0	0	297	4	12	182	502	0	0	0
INDIA	0	0	62	0	0	0	4852	25	12	609	0	77	0	193	127	0	65	0	0
INDONESIA	0	0	10	8	0	0	101	0	2	4518	0	7	0	9	428	125	0	0	0
IRAN	0	8	0	0	0	0	0	0	0	4072	0	47	4	0	5	0	0	0	7
IRAQ	0	0	0	0	0	0	0	0	0	5058	0	0	8	0	19	11	0	0	0
ITALY	0	0	2	0	0	0	1	0	0	0	0	121	0	2	0	885	0	0	0
JAPAN	0	0	1618	0	0	0	0	0	2	0	0	2793	8	140	39	20	0	0	0
JORDAN	0	0	0	0	0	0	0	0	0	3525	0	0	20	0	28	29	0	0	0
KAZAKHSTAN	0	0	10	0	0	0	2	0	1	1630	0	410	636	0	11	20	0	0	0
KUWAIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KYRGYZSTAN	0	0	2	0	0	0	1	0	23	2356	0	106	92	2	92	8	0	0	0
LEBANON	0	0	0	0	0	100	0	0	0	1252	0	0	238	104	310	325	0	0	0
LIBYA	0	0	0	0	0	0	0	0	0	2058	0	0	0	35	0	0	0	0	0
MACAU SAR	0	0	201	0	0	0	0	0	1	2	0	693	0	20	59	45	0	0	0
MALAYSIA	0	0	689	44	0	0	256	0	3	2268	0	63	0	26	378	84	0	0	0
MALI	0	0	1	0	0	0	8	0	11	1426	12	5	1	4	8	27	0	0	0
MEXICO	0	0	3	0	0	0	9	0	2	3	0	834	8	25	479	3832	0	0	0
MOLDOVA	0	0	0	0	0	0	0	0	4	1	0	23	965	8	35	10	0	0	0
MOROCCO	0	0	0	0	0	0	3	0	7	2384	0	0	1	1	1	2	0	0	0

	ANCESTRAL WORSHIPPING	BAHAI	BUDDHIST	CONFUCIAN	DAOIST	DRUZE	HINDU	JAIN	JEWISH	MUSLIM	NATIVE OR FOLK RELIGION	NO RELIGIOUS DENOMINATION	ORTHODOX	OTHER	PROTESTANT OR OTHER	ROMAN CATHOLIC	SIKH	SPIRITUALIST AND PAGAN	ZOROASTRIAN
MYANMAR	0	0	1031	0	0	0	9	0	0	43	0	89	0	0	22	6	0	0	0
NETHERLANDS	0	0	7	0	0	0	7	0	3	54	0	1607	57	147	338	595	0	0	0
NEW ZEALAND	0	0	10	0	0	0	28	0	9	15	0	1018	4	40	1245	346	0	4	0
NICARAGUA	0	0	0	0	0	0	0	0	0	0	0	227	0	0	463	510	0	0	0
NIGERIA	0	0	0	0	0	0	3	0	22	1233	0	183	93	8	903	545	0	0	0
NORWAY	0	0	5	0	0	0	0	0	1	10	0	327	2	20	642	13	0	0	0
PAKISTAN	0	0	0	0	0	0	19	0	0	3157	0	0	0	14	1	0	0	0	0
PALESTINE	0	0	0	0	0	0	0	0	0	997	0	0	0	1	0	2	0	0	0
PERU	0	0	0	0	0	0	9	0	2	1	0	387	0	17	657	2996	0	0	0
PHILIPPINES	0	0	0	0	0	0	0	0	0	146	0	141	0	47	293	1768	0	0	0
POLAND	0	0	1	0	0	0	0	0	1	0	0	68	21	12	9	1833	0	0	0
PUERTO RICO	0	0	5	0	0	0	1	0	0	0	0	227	0	227	103	554	0	0	0
QATAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROMANIA	0	0	2	0	0	0	0	0	2	11	0	59	3889	2	307	232	0	0	0
RUSSIA	0	0	24	0	0	0	7	0	8	430	0	1906	3674	23	52	18	0	0	0
RWANDA	0	0	5	0	0	0	1	0	3	305	1	201	32	94	753	1639	0	0	0
SERBIA	0	0	0	0	0	0	0	0	8	48	0	120	1949	6	22	91	0	0	0
SINGAPORE	0	0	532	0	154	0	143	0	6	324	0	375	0	90	214	133	0	0	0
SLOVENIA	0	0	3	0	0	0	1	0	0	31	0	589	40	10	31	1370	0	0	0
SOUTH AFRICA	0	0	22	0	0	0	116	0	13	121	161	1021	24	425	3274	899	0	0	0
SOUTH KOREA	0	0	688	8	0	0	2	0	3	3	0	1631	4	22	732	542	0	0	0
SPAIN	0	0	5	0	0	0	1	0	0	3	0	494	3	22	14	1817	0	0	0
SWEDEN	0	0	1	0	0	0	2	0	1	32	0	663	7	21	1427	32	0	0	0
SWITZERLAND	0	0	0	0	0	0	0	0	6	20	0	240	0	47	407	509	0	0	0
TAIWAN ROC	0	0	712	0	643	0	0	0	0	1	649	875	0	578	175	46	0	0	0
TAJIKISTAN	0	0	0	0	0	0	0	0	0	1158	0	42	0	0	0	0	0	0	0

	ANCESTRAL WORSHIPPING	BAHAI	BUDDHIST	CONFUCIAN	DAOIST	DRUZE	HINDU	JAIN	JEWISH	MUSLIM	NATIVE OR FOLK RELIGION	NO RELIGIOUS DENOMINATION	ORTHODOX	OTHER	PROTESTANT OR OTHER	ROMAN CATHOLIC	SIKH	SPIRITUALIST AND PAGAN	ZOROASTRIAN
THAILAND	0	0	4011	0	0	0	1	0	3	156	0	7	26	6	3	16	0	0	0
TRINIDAD AND TOBAGO	0	0	5	0	0	0	435	0	0	122	0	126	8	28	850	404	0	0	0
TUNISIA	0	0	0	0	0	0	0	0	2	2390	0	13	0	0	0	1	0	0	0
TURKEY	0	0	0	0	0	0	0	0	2	5281	0	58	1	3	0	0	0	0	0
UKRAINE	0	0	5	0	0	0	2	0	14	12	0	481	1706	0	42	191	0	0	0
UNITED KINGDOM	0	0	5	0	0	0	8	0	2	40	0	496	4	26	326	106	0	0	0
UNITED STATES	0	0	45	0	0	0	22	0	115	24	0	2140	24	700	1594	1250	0	0	0
URUGUAY	0	0	2	0	0	0	1	0	5	0	0	1157	0	110	144	575	0	0	0
UZBEKISTAN	0	0	1	0	0	0	3	0	1	1426	0	9	45	0	4	1	0	0	0
VIETNAM	776	0	540	0	0	0	2	0	3	1	0	1173	0	27	28	145	0	0	0
YEMEN	0	0	0	0	0	0	0	0	0	1000	0	0	0	0	0	0	0	0	0
ZAMBIA	0	0	2	0	0	0	4	0	1	20	22	82	2	160	694	513	0	0	0
ZIMBABWE	14	0	1	0	0	0	1	0	1	15	0	93	12	0	1063	300	0	0	0
TOTAL	790	13	11474	60	807	101	6250	25	417	60926	969	45960	23917	5015	31359	46611	71	171	12

Cultural distances across religious denominations

Table S2. Cultural distance between religions, with bootstrapped 95% confidence intervals (collapsed across countries and across sub-denominations of each religion). Values of CF_{ST} range closer to zero indicate similarity between populations, and CF_{ST} values closer to one indicate greater differences between populations. Includes all cultural traits (including explicitly religious traits).

	Ancestral worship.	Buddhist	Daoist	Druze	Hindu	Jewish	Muslim	Native or folk religion	No religious denom.	Orthodox	Protestant or other Christian	Roman Catholic	Spiritualist and pagan
Ancestral worshipping		0.120, 0.141	0.126, 0.215	0.246, 0.575	0.190, 0.221	0.149, 0.182	0.366, 0.464	0.0887, 0.112	0.174, 0.20	0.194, 0.218	0.211, 0.236	0.238, 0.263	0.417, 0.542
Buddhist	0.125		0.0554, 0.0968	0.0995, 0.162	0.0494, 0.0532	0.0594, 0.0848	0.0933, 0.0987	0.0364, 0.0432	0.0715, 0.0757	0.0294, 0.0312	0.0374, 0.0395	0.0496, 0.0521	0.179, 0.245
Daoist	0.136	0.061		0.142, 0.199	0.129, 0.155	0.0586, 0.0831	0.232, 0.288	0.0135, 0.0429	0.116, 0.146	0.0954, 0.123	0.101, 0.125	0.102, 0.129	0.147, 0.186
Druze	0.475	0.140	0.177		0.156, 0.207	0.103, 0.157	0.0936, 0.156	0.112, 0.178	0.271, 0.326	0.116, 0.179	0.120, 0.173	0.116, 0.175	0.105, 0.155
Hindu	0.195	0.051	0.134	0.183		0.137, 0.29	0.072, 0.148	0.0886, 0.102	0.215, 0.234	0.0537, 0.0584	0.0886, 0.108	0.0871, 0.112	0.225, 0.398
Jewish	0.159	0.067	0.062	0.135	0.193		0.267, 0.369	0.0454, 0.0617	0.0589, 0.0824	0.0763, 0.145	0.0392, 0.0626	0.0512, 0.0787	0.0553, 0.0774
Muslim	0.394	0.096	0.247	0.126	0.086	0.307		0.161, 0.188	0.147, 0.158	0.0516, 0.112	0.0483, 0.0644	0.0466, 0.0596	0.330, 0.445
Native or folk religion	0.092	0.038	0.015	0.156	0.094	0.050	0.172		0.0932, 0.106	0.0581, 0.0685	0.0656, 0.0773	0.0684, 0.0804	0.14, 0.183
No religious denomination	0.181	0.074	0.124	0.299	0.223	0.067	0.148	0.098		0.0728, 0.115	0.0606, 0.0632	0.0582, 0.0603	0.184, 0.226
Orthodox	0.200	0.030	0.099	0.150	0.056	0.105	0.069	0.062	0.105		0.0193, 0.0733	0.0187, 0.073	0.147, 0.229
Protestant or other Christian	0.218	0.038	0.106	0.148	0.097	0.046	0.049	0.070	0.062	0.061		0.0053, 0.00615	0.0817, 0.118
Roman Catholic	0.244	0.051	0.107	0.150	0.095	0.060	0.047	0.073	0.059	0.052	0.005		0.0771, 0.116
Spiritualism and paganism	0.457	0.199	0.152	0.130	0.279	0.057	0.368	0.150	0.195	0.174	0.089	0.084	

Table S3. Cultural distance between religions. Excludes explicitly religious cultural traits.

	Ancestral worship.	Buddhist	Daoist	Druze	Hindu	Jewish	Muslim	Native or folk religion	No religious denom.	Orthodox	Protestant or other Christian	Roman Catholic	Spiritualist and pagan
Ancestral worshipping		0.0952, 0.111	0.109, 0.196	0.197, 0.545	0.115, 0.127	0.133, 0.166	0.137, 0.156	0.079, 0.0954	0.173, 0.188	0.137, 0.153	0.139, 0.152	0.165, 0.179	0.375, 0.501
Buddhist	0.099		0.0564, 0.0999	0.083, 0.154	0.0361, 0.0393	0.0537, 0.0792	0.0466, 0.0499	0.033, 0.0402	0.0402, 0.0432	0.0216, 0.0232	0.0259, 0.0279	0.0358, 0.0381	0.162, 0.237
Daoist	0.121	0.062		0.136, 0.201	0.112, 0.138	0.0583, 0.0827	0.162, 0.212	0.0138, 0.0433	0.0661, 0.0917	0.0896, 0.12	0.0871, 0.112	0.0904, 0.119	0.132, 0.176
Druze	0.455	0.132	0.177		0.136, 0.185	0.0881, 0.148	0.0739, 0.131	0.112, 0.182	0.144, 0.204	0.098, 0.159	0.105, 0.161	0.103, 0.163	0.0987, 0.154
Hindu	0.119	0.037	0.116	0.165		0.112, 0.281	0.065, 0.138	0.0711, 0.0822	0.123, 0.142	0.0516, 0.0558	0.095, 0.117	0.0922, 0.12	0.239, 0.421
Jewish	0.144	0.062	0.061	0.126	0.176		0.155, 0.22	0.044, 0.0599	0.0229, 0.0361	0.0591, 0.133	0.0227, 0.0354	0.0334, 0.0501	0.0458, 0.0684
Muslim	0.143	0.048	0.173	0.108	0.079	0.180		0.105, 0.125	0.0751, 0.0851	0.0327, 0.0987	0.0425, 0.0573	0.041, 0.0525	0.298, 0.41
Native or folk religion	0.083	0.035	0.016	0.159	0.075	0.048	0.113		0.0515, 0.0623	0.0502, 0.0597	0.053, 0.0639	0.058, 0.0684	0.131, 0.178
No religious denomination	0.178	0.042	0.071	0.181	0.131	0.026	0.076	0.055		0.0327, 0.0816	0.014, 0.0153	0.0151, 0.0164	0.0804, 0.111
Orthodox	0.142	0.022	0.094	0.135	0.053	0.090	0.052	0.053	0.069		0.0162, 0.0771	0.0177, 0.0789	0.138, 0.233
Protestant or other Christian	0.143	0.027	0.092	0.138	0.104	0.025	0.043	0.057	0.015	0.063		0.0052, 0.0062	0.0788, 0.118
Roman Catholic	0.170	0.037	0.096	0.141	0.102	0.038	0.041	0.061	0.016	0.056	0.005		0.073, 0.115
Spiritualism and paganism	0.416	0.184	0.140	0.127	0.298	0.047	0.336	0.141	0.084	0.169	0.086	0.081	

Table S4. Cultural distances between religions. Lower diagonal = point estimates, upper diagonal = bootstrapped 95% confidence intervals. Includes all cultural traits (including explicitly religious traits).

	Ancestral worshipping	Buddhist	Christian	Daoist	Druze	Hindu	Jewish	Muslim	Native or folk religion	No religious denomination	Spiritualist and pagan
Ancestral worshipping		0.120, 0.140	0.222, 0.248	0.124, 0.211	0.248, 0.563	0.189, 0.222	0.150, 0.182	0.364, 0.464	0.0887, 0.114	0.173, 0.198	0.417, 0.539
Buddhist	0.125		0.0507, 0.0533	0.0556, 0.0935	0.099, 0.160	0.0492, 0.0532	0.0584, 0.0844	0.0936, 0.0989	0.0367, 0.0433	0.0716, 0.0758	0.178, 0.25
Christian	0.229	0.052		0.0937, 0.117	0.109, 0.167	0.0977, 0.115	0.0429, 0.0703	0.0409, 0.0533	0.0601, 0.0717	0.0698, 0.072	0.0815, 0.120
Daoist	0.136	0.061	0.098		0.142, 0.200	0.129, 0.156	0.0591, 0.0827	0.233, 0.288	0.0134, 0.0406	0.117, 0.144	0.145, 0.186
Druze	0.475	0.140	0.141	0.177		0.156, 0.207	0.103, 0.156	0.0941, 0.155	0.113, 0.178	0.271, 0.328	0.104, 0.154
Hindu	0.195	0.051	0.105	0.134	0.183		0.135, 0.292	0.0735, 0.152	0.0889, 0.102	0.214, 0.234	0.223, 0.387
Jewish	0.159	0.067	0.052	0.062	0.135	0.193		0.263, 0.366	0.0459, 0.0614	0.0602, 0.0825	0.0549, 0.0771
Muslim	0.394	0.096	0.041	0.247	0.126	0.086	0.307		0.162, 0.188	0.147, 0.156	0.331, 0.443
Native or folk religion	0.092	0.038	0.064	0.015	0.156	0.094	0.050	0.172		0.0934, 0.106	0.138, 0.183
No religious denomination	0.181	0.074	0.071	0.124	0.299	0.223	0.067	0.148	0.098		0.184, 0.228
Spiritualist and paganist	0.457	0.199	0.088	0.152	0.130	0.279	0.057	0.368	0.150	0.195	

Table S5. Cultural distances between religions. Lower diagonal = point estimates, upper diagonal = bootstrapped 95% confidence intervals. Excludes explicitly religious traits.

	Ancestral worshipping	Buddhist	Christian	Daoist	Druze	Hindu	Jewish	Muslim	Native or folk religion	No religious denomination	Spiritualist and pagan
Ancestral worshipping		0.0941, 0.109	0.148, 0.164	0.109, 0.206	0.195, 0.545	0.115, 0.126	0.132, 0.166	0.137, 0.155	0.0785, 0.0951	0.172, 0.189	0.375, 0.506
Buddhist	0.099		0.032, 0.0341	0.057, 0.104	0.0821, 0.154	0.0361, 0.0392	0.0543, 0.0791	0.0469, 0.0499	0.0328, 0.0399	0.0403, 0.0434	0.161, 0.238
Christian	0.154	0.033		0.0828, 0.112	0.0946, 0.154	0.104, 0.124	0.0275, 0.0445	0.0353, 0.0506	0.0485, 0.0592	0.0179, 0.0191	0.0772, 0.119
Daoist	0.121	0.062	0.088		0.135, 0.202	0.112, 0.14	0.0574, 0.0836	0.163, 0.215	0.0135, 0.0454	0.0658, 0.0938	0.132, 0.177
Druze	0.455	0.132	0.131	0.177		0.136, 0.185	0.0884, 0.147	0.0734, 0.132	0.109, 0.182	0.143, 0.206	0.0974, 0.152
Hindu	0.119	0.037	0.112	0.116	0.165		0.113, 0.286	0.0605, 0.15	0.071, 0.0819	0.123, 0.142	0.235, 0.419
Jewish	0.144	0.062	0.032	0.061	0.126	0.176		0.157, 0.219	0.0434, 0.0594	0.0227, 0.0356	0.046, 0.0691
Muslim	0.143	0.048	0.036	0.173	0.108	0.079	0.180		0.105, 0.125	0.0751, 0.0869	0.299, 0.407
Native or folk religion	0.083	0.035	0.052	0.016	0.159	0.075	0.048	0.113		0.0516, 0.0619	0.13, 0.179
No religious denomination	0.178	0.042	0.018	0.071	0.181	0.131	0.026	0.076	0.055		0.08, 0.114
Spiritualist and paganist	0.416	0.184	0.086	0.140	0.127	0.298	0.047	0.336	0.141	0.084	

Table S6. Cultural distance between religions, excluding "beliefs" dimension of cultural values. Lower diagonal = point estimates, upper diagonal = bootstrapped 95% confidence intervals.

	Ancestral worshipping	Buddhist	Christian	Daoist	Druze	Hindu	Jewish	Muslim	Native or folk religion	No religious denomination	Spiritualist and pagan
Ancestral worshipping		0.127, 0.150	0.184, 0.205	0.145, 0.313	0.249, 0.747	0.149, 0.166	0.130, 0.165	0.167, 0.192	0.0979, 0.119	0.185, 0.208	0.346, 0.493
Buddhist	0.134		0.0338, 0.0366	0.0482, 0.113	0.0878, 0.158	0.0345, 0.0381	0.045, 0.0658	0.0323, 0.0351	0.0305, 0.0391	0.0285, 0.0311	0.120, 0.178
Christian	0.192	0.035		0.0768, 0.113	0.0872, 0.145	0.120, 0.148	0.0259, 0.0442	0.0189, 0.0418	0.0477, 0.0595	0.0102, 0.0112	0.0675, 0.104
Daoist	0.168	0.054	0.082		0.134, 0.188	0.087, 0.126	0.0546, 0.0881	0.0968, 0.168	0.0122, 0.0661	0.0651, 0.096	0.103, 0.148
Druze	0.626	0.132	0.120	0.159		0.140, 0.189	0.0754, 0.119	0.0738, 0.139	0.110, 0.179	0.120, 0.175	0.0764, 0.118
Hindu	0.155	0.036	0.132	0.092	0.166		0.0886, 0.342	0.0738, 0.193	0.0576, 0.068	0.104, 0.132	0.178, 0.448
Jewish	0.141	0.051	0.032	0.059	0.098	0.179		0.0877, 0.136	0.0455, 0.0643	0.0167, 0.0304	0.0387, 0.0641
Muslim	0.175	0.034	0.019	0.107	0.111	0.097	0.103		0.0558, 0.0717	0.0399, 0.0591	0.152, 0.237
Native or folk religion	0.103	0.033	0.052	0.014	0.152	0.062	0.052	0.062		0.0516, 0.0642	0.102, 0.143
No religious denomination	0.194	0.030	0.011	0.070	0.149	0.116	0.022	0.041	0.056		0.063, 0.0925
Spiritualist and pagan	0.396	0.136	0.075	0.111	0.096	0.268	0.041	0.177	0.112	0.068	

Figure S1. Cultural distance between religions, for each separate dimension of cultural values. Each figure depicts the distance of all religions from the specified reference group.

(a) Reference group: Ancestral worshipping

(b) *Reference group: Buddhist*

(c) Reference Group: Christian

(d) Reference group: Daoist

(e) *Reference group: Druze*

(f) Reference group: Hindu

(g) Reference group: Jewish

(h) *Reference group: Muslim*

(i) Reference group: Native or folk religion

(j) *Reference Group: No religious denomination*

(k) Reference group: Spiritualist and pagan

Cultural Distances Between Religious Denominations and the USA

We also conducted exploratory analyses of the cultural distance between the United States and members of each religious denomination who live outside of the USA. The United States is a prototypically Western, Educated, Industrialized, Rich, and Democratic (WEIRD) society in which the majority of psychological and other behavioral science research is conducted (Henrich et al., 2010; Rad et al., 2018), and cultural distance from the USA has been found to predict cross-national variation in several psychological outcomes, including individualism, extraversion, egalitarianism, tightness/looseness, and prosocial behaviour (Muthukrishna et al., 2020). Recent research has also found that historical exposure to the Christian church is associated with the package of cultural traits sometimes called WEIRD psychology, with the United States as a historically majority-Christian country (Henrich, 2020; Muthukrishna et al., 2021; Schulz et al., 2019). This raises the question as to whether members of Christian denominations around the world to some extent share WEIRD cultural traits, defined as cultural proximity to the USA. As depicted in Tables S7 and S8, this was indeed the case, consistent with this work. However, this should be interpreted with the understanding that one's country mattered considerably more in explaining global variation in cultural traits than one's religious denomination.

Table S7. Distance, with bootstrapped 95% confidence intervals, between the USA and each religious denomination (collapsed across all other countries excluding the USA), among (a) all participants, (b) those who report religion is very important in their lives, and (c) those who report religion is not important in their lives. Includes all cultural traits.

Religion	All			High Religiosity			Low Religiosity		
	Mean	LL	UL	Mean	LL	UL	Mean	LL	UL
Ancestral worshipping	0.246	0.239	0.265	0.320	0.307	0.375	0.270	0.260	0.286
Buddhist	0.089	0.087	0.093	0.105	0.102	0.109	0.088	0.083	0.094
Daoist	0.154	0.147	0.174	0.174	0.168	0.200	0.190	0.180	0.229
Druze	0.296	0.262	0.326	--	--	--	--	--	--
Hindu	0.114	0.111	0.118	0.106	0.103	0.110	0.172	0.163	0.187
Jewism	0.099	0.090	0.120	0.134	0.123	0.164	0.086	0.073	0.135
Muslim	0.298	0.290	0.307	0.244	0.237	0.253	0.129	0.124	0.136
Native or folk religion	0.131	0.125	0.141	0.135	0.127	0.148	0.183	0.173	0.203
No religious denomination	0.105	0.102	0.109	0.074	0.072	0.077	0.078	0.074	0.084
Orthodox	0.111	0.108	0.116	0.113	0.110	0.118	0.112	0.107	0.118
Protestant or other Christian	0.065	0.063	0.069	0.074	0.072	0.078	0.037	0.035	0.041
Roman Catholic	0.093	0.090	0.097	0.093	0.090	0.097	0.074	0.070	0.080
Spiritualist and pagan	0.119	0.114	0.150	0.147	0.137	0.191	--	--	--

Table S8. Distance, with bootstrapped 95% confidence intervals, between the USA and each religious denomination (collapsed across all other countries excluding the USA), among (a) all participants, (b) those who report religion is very important in their lives, and (c) those who report religion is not important in their lives. Excludes explicitly religious traits, but includes moral/norm beliefs and all other cultural traits.

Religion	All			High Religiosity			Low religiosity		
	Mean	LL	UL	Mean	LL	UL	Mean	LL	UL
Ancestral worshipping	0.215	0.208	0.226	0.243	0.233	0.264	0.256	0.247	0.274
Buddhist	0.089	0.086	0.092	0.097	0.094	0.101	0.086	0.081	0.092
Daoist	0.149	0.141	0.170	0.155	0.147	0.181	0.180	0.169	0.221
Druze	0.278	0.239	0.311	--	--	--	--	--	--
Hindu	0.112	0.109	0.116	0.112	0.108	0.116	0.151	0.143	0.165
Jewish	0.098	0.089	0.120	0.127	0.113	0.153	0.082	0.071	0.132
Muslim	0.263	0.256	0.271	0.247	0.239	0.256	0.114	0.109	0.121
Native or folk religion	0.123	0.117	0.133	0.116	0.110	0.128	0.169	0.158	0.189
No religious denomination	0.056	0.054	0.059	0.054	0.052	0.057	0.067	0.063	0.073
Orthodox	0.107	0.104	0.111	0.109	0.105	0.114	0.102	0.096	0.109
Protestant or other Christian	0.061	0.059	0.064	0.073	0.071	0.077	0.035	0.033	0.039
Roman Catholic	0.086	0.084	0.090	0.090	0.087	0.095	0.063	0.059	0.069
Spiritualist and pagan	0.112	0.106	0.145	0.133	0.126	0.173	--	--	--

Cultural distances across countries and religious denominations

Figure S2. Cultural distance between (a) in red: co-religionists and members of all other denominations within a country, (b) in blue: co-religionists within a country to co-religionists in foreign countries, and (c) in green: co-religionists and members of all other denominations in foreign countries. Analyses were performed including all WVS cultural traits (upper panel) and excluding the religious and moral “beliefs” dimension from the cultural traits (lower panel). Separate analyses were conducted for members vs. non-members of each religion.

Cultural distance across levels of religiosity

Figure S3. Cultural distance between (a) in red: individuals with high vs. low religiosity within a country, (b) in blue/violet: individuals who share high a level of religiosity across countries, (c) in green: individual high vs. low in religiosity across countries. “Religiosity” was calculated using three separate methods: (a) importance of religion in life (high vs. low), (b) importance of religion in life (high vs. mid vs. low), (c) attendance at religious services (highly frequent, infrequent), and (d) choosing “No religious denomination” as their religious affiliation. Analyses were performed including all WVS cultural traits (upper panel) and excluding the religious and moral “beliefs” dimension from the cultural traits (lower panel).

Cultural distances according to level of religiosity, across countries and religious denominations

Figure S4. Cultural distance between members and non-members of each religion, according to level of attendance at religious services (high or low, dropping mid-level religious service attendance). Analyses were performed including all WVS cultural traits (upper panel) and excluding the religious and moral “beliefs” dimension from the cultural traits (lower panel).

Figure S5. Cultural distance between members and non-members of each religion, according to importance of religion in one’s life (high or low). Analyses were performed including all WVS cultural traits (upper panel) and excluding the religious and moral “beliefs” dimension from the cultural traits (lower panel).

Figure S6. *Cultural distance between members and non-members of each religion, according to importance of religion in one’s life (very high vs. low, dropping mid-level importance of religion). All WVS cultural traits.*

Table S9. Cultural distance between religions, among those who think religion is important (upper diagonal) and those who think that religion is not important (lower diagonal). Includes all cultural traits (including explicitly religious traits).

	Ancestral worshipping	Buddhist	Christian	Daoist	Hindu	Jewish	Muslim	Native or folk religion	No religious denomination	Spiritualist and pagan
Ancestral worshipping		0.147	0.274	0.158	0.234	0.127	0.348	0.113	0.170	0.288
Buddhist	0.117		0.07	0.081	0.049	0.073	0.09	0.044	0.028	0.23
Christian	0.214	0.04		0.113	0.107	0.035	0.031	0.06	0.043	0.104
Daoist	0.173	0.045	0.087		0.14	0.067	0.216	0.023	0.079	0.135
Hindu	0.127	0.064	0.131	0.078		0.103	0.087	0.089	0.077	0.325
Jewish	0.281	0.08	0.047	0.084	0.133		0.159	0.037	0.029	0.054
Muslim	0.135	0.032	0.06	0.092	0.036	0.183		0.137	0.132	0.399
Native or folk religion	0.138	0.049	0.093	0.022	0.067	0.105	0.065		0.037	0.125
No religious denomination	0.219	0.059	0.024	0.131	0.24	0.047	0.14	0.132		0.098

Table S10. Cultural distance between religions, among those who think religion is important (upper diagonal) and those who think that religion is not important (lower diagonal). Excludes explicitly religious traits.

	Ancestral worshipping	Buddhist	Christian	Daoist	Hindu	Jewish	Muslim	Native or folk religion	No religious denomination	Spiritualist and pagan
Ancestral worshipping		0.146	0.272	0.157	0.232	0.125	0.348	0.113	0.168	0.284
Buddhist	0.115		0.07	0.081	0.049	0.071	0.09	0.045	0.028	0.222
Christian	0.209	0.041		0.113	0.107	0.034	0.03	0.059	0.043	0.101
Daoist	0.172	0.044	0.086		0.139	0.067	0.216	0.023	0.079	0.132
Hindu	0.125	0.064	0.13	0.078		0.102	0.086	0.089	0.077	0.321
Jewish	0.27	0.076	0.045	0.081	0.131		0.153	0.036	0.029	0.054
Muslim	0.134	0.032	0.059	0.092	0.035	0.174		0.138	0.131	0.384
Native or folk religion	0.137	0.048	0.09	0.022	0.066	0.1	0.065		0.037	0.12
No religious denomination	0.214	0.059	0.024	0.129	0.239	0.046	0.138	0.129		0.095

Christian-Buddhist Cultural Similarity

The similarity between Christians and Buddhists was surprising given their divergent cultural phylogenies (Abrahamic vs Dharmic). One possibility is that this difference is driven by Christian converts to Buddhism in the West. However, additional analyses looking at the cultural distance between Buddhists and other religions *within* different world regions showed that Buddhists are roughly equidistant to Christians and Hindus: East Asia = 0.07 vs. 0.16; Europe and Central Asia = 0.23 vs. 0.23; North America = 0.45 vs. 0.37 (Christians vs. Hindus, respectively). These results suggest that the Buddhist-Christian similarity is not just driven by Western converts to Buddhism, though it remains possible that Buddhist conversion to Christianity (or vice versa) in non-Western contexts or both Hindus and Christians converting to Buddhism may drive this effect. Further investigation is required.

Robustness check: Age

We conducted additional analyses to explore whether the cultural distances between religious groups were confounded with other demographic clusters within the population. For example, younger individuals may be more likely to identify as non-religious than older individuals, meaning that cultural distances may reflect generational differences rather than religious distances. To test this, we investigated the cultural distances between members of different religious groups separately for older participants (over 40 years old) and younger participants (40 or under). As depicted in Figures S7 and S8, both younger and older participants showed the same general pattern across different comparisons, such that those with different religions are slightly different within a country, and across countries those who share a religion are less distant than those with different religions.

Furthermore, if cultural differences were attributable to demographic distances, then we would expect that the degree of cultural distance between religious groups within a country would be correlated with the degree of cultural distance between demographic clusters within a country. We found no evidence of this: A country's mean level of distance between religions was not significantly correlated with the country's cultural distance between older vs. younger adults, those high vs. low in subjective social status, those high vs. low in income, those living in different regions, or between ethnic groups (all r s < .15). Therefore, a country's level of religious cultural heterogeneity is a unique source of variance that is not obviously confounded with other differences in cultural traits across demographic clusters.

Figure S7. Cultural distances between members of different religious groups, among younger participants (≤ 40 years old). Excludes explicitly religious traits.

Figure S8. Cultural distances between members of different religious groups, among older participants (>40). Excludes explicitly religious traits.

Figure S9. Cultural distances between members of different religious groups, among younger participants (≤ 40 years old). Excludes all traits from the religious and moral “beliefs” dimension.

Figure S10. Cultural distances between members of different religious groups, among older participants (>40). Excludes all traits from the religious and moral “beliefs” dimension.

Robustness check: Religious freedom

We conducted additional exploratory analyses to test the possibility that results were driven by people choosing to affiliate with particular religions, rather than exposure to religions shaping individuals' cultural traits. If our results were driven by people with similar traits selecting certain religions, then we would expect similarity among co-religionists who have freedom to choose their denomination, but not expect the similarity when religion is more tightly constrained by external factors. We tested whether results were different between countries with relatively high vs. low levels of government restrictions on religion (GRI; provided by Pew Research Center, 2019, comprised of favoritism of religious groups, general laws and policies, harassment of religious groups, and limits on religious activity; analyses used the average levels of GRI between 2007 and 2017).

We found no evidence for this alternative explanation. As depicted in Figures S9 and S10 below, the same patterns of results – with greater similarity among people who share a religious denomination – appeared in both countries with high levels of religious freedom and countries with low levels of religious freedom. These results cannot definitively establish the causal relationship between religion and cultural traits, but they do speak against the possibility that cultural differences between religious groups are typically caused by people with certain traits choosing to affiliate with certain traditions.

Countries with high religious freedom, listed from high to low freedom (below-average government restrictions on religion):

New Zealand, Japan, Trinidad and Tobago, Uruguay, South Africa, Brazil, Bolivia, Burkina Faso, Mali, Canada, Taiwan, Estonia, Macau, Australia, Chile, Philippines, Ghana, Hong Kong, Netherlands, Finland, Slovenia, Guatemala, Sweden, Hungary, Ecuador, Cyprus, Switzerland, Colombia, Nicaragua, Peru, Poland, South Korea, United Kingdom, Norway, Haiti, Italy, Lebanon, United States, Zambia, Zimbabwe, Georgia, Rwanda, Germany, Ukraine, Spain, Ethiopia

Countries with low religious freedom, listed from high to low freedom (above-average government restrictions on religion):

Armenia, Thailand, Serbia, Palestine, France, Moldova, Nigeria, Bangladesh, Mexico, Qatar, Yemen, Libya, Bulgaria, Greece, Kyrgyzstan, Romania, Jordan, Tunisia, India, Kuwait, Iraq, Singapore, Azerbaijan, Morocco, Tajikistan, Belarus, Pakistan, Kazakhstan, Turkey, Russia, Indonesia, Vietnam, Malaysia, Myanmar, Egypt, Uzbekistan, Iran, China

Figure S11. Cultural distances between members of different religious groups, among countries with relatively high levels of religious freedom. Excludes explicitly religious traits.

Figure S12. Cultural distances between members of different religious groups, among countries with relatively low levels of religious freedom. Excludes explicitly religious traits.

Figure S13. Cultural distances between members of different religious groups, among countries with relatively high levels of religious freedom. Excludes all traits from the religious and moral “beliefs” dimension.

Figure S14. Cultural distances between members of different religious groups, among countries with relatively low levels of religious freedom. Excludes all traits from the religious and moral “beliefs” dimension.

Fig S15. Government restrictions on religion (i.e., low religious freedom) predicting cultural distances. Each point reflects one pairwise comparison within/ across countries. Excludes explicitly religious beliefs.

**Robustness checks:
Demographic variables and geographic, linguistic, and genetic distances**

We conducted additional analyses to explore whether the greater similarity between co-religionists across countries might be explained by geographic, genetic, or linguistic distances between countries. To test this possibility, we assessed whether these factors predict the set of pairwise cultural distances between all distinct country/religion groups, and whether distances between religions also predict these distances between country/religion groups when controlling for geographic, genetic, or linguistic distances. Specifically, the primary unit of analysis was the set of pairwise distances between all 184 unique country/religion groups. For example, the distance between Canadian Christians and Chinese Buddhists is defined by two countries (Canada and China) and two religious groups (Christian and Buddhist), and this was predicted from the geographic, genetic, or linguistic distances between Canada and China, as well as the cultural distances between Canada and China overall (collapsed across religious groups) and the cultural distances between Christians and Buddhists overall (collapsed across countries). Distances between identical groups were coded as zero, the maximally-similar CF_{ST} value (e.g., the country-level distance between Canadian Christians and Canadians with no denomination = 0, because both refer to Canadian participants).

Geographic distances were taken from Centre d'Études Prospectives et d'Informations Internationales (CEPII) GeoDist database (Mayer & Zignago, 2011), linguistic distances through the linguistic proximity measure taken from the CCEPII Language database (Melitz & Toubal, 2014, recoded to represent distances, such that 0 = maximally similar), and genetic distances were based on genetic data from the Pemberton, DeGiorgio, and Rosenberg (2013) study, matched to country by Spolaore and Wacziarg (2018). Countries that included missing data for geographic, linguistic, or genetic distances were dropped from those analyses, but retained on other analyses where data was available. Linguistic distances where data was missing from certain pairwise comparisons between countries, but where data was present for comparisons with other countries, were imputed using the additive method for filling in incomplete distance matrices (Makarenkov & Lapointe, 2004). All distances were scored so that larger numbers represent larger distances between groups.

Analysis A: MRM

We first analyzed this using a Multiple regression on distance matrices approach (MRM, Lichstein, 2007; available in the *ecodist* package in R, Goslee & Urban, 2007). Geographic distance was not significantly associated with cultural distances between country/religion groups, $b = 0.000000323$, $p = .70$, $R^2 = .000093$, but cultural distances between religious groups did predict cultural distances between country/religion groups, $b = .799$, $p < .001$, $R^2 = .10$, after controlling for geographic distances, and even after also controlling for cultural distances between countries, $b_{Religion} = .714$, $p < .001$, $b_{Country} = 1.15$, $p < .001$, $b_{Geography} = -0.00000136$, $p = .044$, $R^2 = .39$.

Linguistic distance did predict cultural distances between country/religion groups, $b = 0.0189$, $p < .001$, $R^2 = .015$. Again, religious group distances also predicted cultural distances between country/religion groups, $b = .842$, $p < .001$, $R^2 = .12$, after controlling for linguistic

distances, and even after also controlling for linguistic distance and cultural distances between countries, $b_{Religion} = .761, p < .001$, $b_{Country} = 1.20, p < .001$, $b_{Language} = -0.003, p = .28$, $R^2 = .40$.

Genetic distance did not predict cultural distances between country/religion groups, $b = 0.118, p = .67$, $R^2 = .00017$, but religious group distances did predict cultural distances between country/religion groups, $b = .788, p < .001$, $R^2 = .10$, after controlling for genetic distances, and even after also controlling for genetic distance and cultural distances between countries, $b_{Religion} = .713, p < .001$, $b_{Country} = 1.18, p < .001$, $b_{Genes} = -0.36, p = .12$, $R^2 = .39$.

Analysis B: MLM

We also analyzed this data using a multilevel model that predicted these distances in a beta distributed model (available in the *glmmTMB* package in R, Brooks et al., 2017) that included clustering of observations within religions and within countries (results were nearly identical if fixed effects of continent were also included in the model, as a further source of covariation). For the GLMM we further standardized geographic, linguistic, and genetic distances prior to analysis, to ease in comparisons of effect sizes across different predictors.

In this analysis, geographic distance predicted slightly greater cultural distances between country/religion groups, $b = 0.126, p < .001$, and cultural distance between religious groups also predicted cultural distances between country/religion groups, $b = 4.74, p < .001$, even after also controlling for cultural distances between countries, $b_{Religion} = 3.77, p < .001$, $b_{Country} = 6.03, p < .001$, $b_{Geography} = 0.009, p = .10$. Linguistic distance also predicted cultural distances between country/religion groups, $b = 0.187, p < .001$. Again, religious group distances also predicted cultural distances between country/religion groups, $b = 4.98, p < .001$, even after also controlling for linguistic distance and cultural distances between countries, $b_{Religion} = 4.05, p < .001$, $b_{Country} = 6.12, p < .001$, $b_{Language} = 0.04, p < .001$. Genetic distance also predicted cultural distances between country/religion groups, $b = 0.204, p < .001$, but religious group distances also predicted cultural distances between country/religion groups, $b = 4.55, p < .001$, even after also controlling for genetic distance and cultural distances between countries, $b_{Religion} = 3.65, p < .001$, $b_{Country} = 6.17, p < .001$, $b_{Genes} = 0.04, p < .001$.

These patterns were similar when all variables were entered together into the same model: Cultural distances between country/religion groups were associated with both cultural distance between countries, $b = 6.05, p < .001$, and cultural distance between religious groups, $b = 3.97, p < .001$, in addition to the small relationships with geographic distance, $b = -0.021, p = .007$, genetic distance, $b = 0.042, p < .001$, and linguistic distance, $b = 0.041, p < .001$.

Overall, these results demonstrate that variation in cultural distances across groups defined by their religious denomination and their country can be predicted by both distances between broad religious groups and distances between nations, after accounting for variance attributable to geographic, linguistic, and genetic distances between populations. Geographic, linguistic, and genetic distances were much more weakly (sometimes non-significantly, and sometimes negatively) associated with cultural distances.

Figure S16. Cultural distances within a country, based on groups defined by various demographic characteristics. Mean distances depict the average distance between all pairwise within-country comparisons, and maximum distances depict that largest distance between any two groups within each country. Each point represents the CF_{ST} value within a country, black points represent the mean (and 95% confidence interval) across all countries. On average, religious groups were more culturally distant from one another than were groups within a country defined by other demographic characteristics, such as their ethnicity, region or residence, or socioeconomic status.

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