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Religions Grow in Tighter (vs. Looser) Cultures: Two Studies of Inter & Intra-Country Data*

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Religious affiliations and non-affiliations in society can grow through personality environment correlation and interaction. In Study 1, mixed-effects analyses of moderated mediation conducted on online data collected from 111 countries (N = 4,270) showed that personality factors could predict religious affiliations growing faster in tighter (vs. looser) countries between the years 2000 and 2015. Through a multi-level SEM analysis of serial mediation, Study 2 investigated the survey responses of a random sample (N = 4,963) recruited through random digit dialing from the U.S. population. Results showed that personality could anticipate preferences to live in a relatively looser (vs. tighter) country region with a higher religious non-affiliation rate by first predicting identification with the religious ingroup and then religiosity. The results have implications for showing culture and personality's impact on religions' population growth, religiosity, and religious ingroup identification, sometimes independently of religious affiliation/non-affiliation self-reports.

Keywords: religious affiliation vs. non-affiliation, religiosity, religious ingroup identification, personality environment correlation and interaction, tighter vs. looser cultures, population growth

Highlights:

- Religious affiliations grow in tighter and non-affiliations in looser cultures.
- Religions might spread through a personality-religious ingroup identification link.
- Religions might spread through a personality-religiosity link.
- Religiosity and religious ingroup identification predict religions' prevalence.
- Religious affiliation/non-affiliation self-reports partly reveal religions' prevalence.

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Religious affiliation/non-affiliation self-reports might be biased. In one study, Atheists rose from 3% to 26% when researchers used relatively less stigmatizing techniques in data collection (Gervais & Najle, 2018). This rise was close to the non-affiliation increasing from 13.5% to 35.6% when reports of "none" could be combined with "Spiritual but non-affiliated" as a religious preference in a different study (Saucier & Skrzypinska, 2006). Generally, being spiritual but not religious or spiritual but not affiliated with a religion constitute a significant minority of studied samples (10%–27%) across studies (Corrigan et al., 2003; Saunder et al., 2020; Shahabi et al., 2002; Saucier & Skrzypinska, 2006). Because people may not identify with religions in new ways or report affiliations to avoid stigma, it is hard to study the prevalence and growth/decline of religiously affiliated populations in society without examining the underlying psychological processes. The present study focuses on the potential roles of personality culture *correlation* and *interaction* in the growth/decline of religious affiliations (e.g., Christian, Buddhist) and non-affiliations (i.e., Agnostic/skepticism toward or Atheist/rejection of God, reporting "none" as religious preference, spiritual but not affiliated) in connection with or independently of demographic self-reports.

Religious Affiliations/Non-affiliations As Personality vs. Group Membership Across Cultures

Religiosity characterizes belief in "some greater-than-human power" (Hill et al., 2000, p. 56). Unlike religiosity, spirituality emphasizes independence from established religious traditions, worship practices, or beliefs (Hill, 2000), constituting a distinct category in characterizing people's various dispositions (Saucier & Skrzypinska, 2006). Spirituality may, for example, help attribute a spiritual meaning to or sanctify more secular aspects of one's life (Mahoney et al., 2005). Religiosity, independent of spirituality, predicts religious affiliations such as affiliating with a particular religious denomination (e.g., Catholic, Protestant) (Shahabi et al., 2002). On the other hand, in one study, spirituality, after being controlled for religiosity, predicted religious non-affiliations, such as reporting "no religion" as a religious preference (Shahabi et al., 2002).

Both spirituality and religiosity relate to personality trait factors (for a meta-analysis, see, e.g., Saroglou, 2010). However, they might also relate to culture and self-concept. For instance, Openness To Experience predicts being less religious in general and especially in country regions with a relatively smaller number of religious individuals (Gebauer et al., 2014). Religiosity also predicts affiliating with a religion (Shahabi et al., 2002) as a collective identity aspect of one's self-concept alongside race and ethnic identity (Berzonsky et al., 2013; Cheek & Briggs, 1982). For example, on the Aspects of Identity Questionnaire (Cheek et al., 1994), individuals indicate on a 1-5 scale how important religion is to their sense of who they are as a measure of their *collective identity*. In Identity Style Inventory—Version 5 (Berzonsky et al., 2013), collective identity attributes such as family, religion, and ethnicity help measure the normative identity style. In sum, religiosity might predict religious affiliations as personality differences and collective identities across cultures.

Tightness vs. Looseness

A meaningful cultural variation that might interact or correlate with religious affiliations/non-affiliations and associated religiosity might be a recently proposed cultural dimension, tightness vs. looseness (Gelfand et al., 2011). Societies that strictly impose social norms with a low tolerance for deviant behaviors rank higher on a scale of tightness (vs. looseness) across the globe or within a country across its regions (Gelfand et al., 2011; Harrington & Gelfand, 2014). Countries like Malaysia, South Korea, China, and Germany, and the U.S. states like Alabama, Arkansas, and Oklahoma rank higher on tightness. In contrast, countries like Spain, Brazil, the Netherlands, and Ukraine, and the U.S. states like California, Florida, and Idaho rank higher on looseness. Tightness (vs. looseness) predicts population density and scarce resources in a society with relatively greater natural or human-made disasters, disease threats, and territorial conflicts in its history, necessitating stricter rules and punishments for those who violate social norms.

One recent study (Jackson et al., 2021) conducted in the U.S., a relatively looser country, primed cultural tightness (vs. looseness) by having participants read paragraphs and endorse statements about a society's success being due to its tight vs. loose culture or by asking them to imagine themselves living in a tight (vs. loose) future society. Those experimental manipulations led participants to view God as either strict and punishing or caring and forgiving. The researchers assumed a causal relationship between the tight (vs. loose) cultures and the content of religious faith as punitive vs. tolerant. However, the study used general religiosity as a control variable and left unanswered how tighter vs. looser cultures or mindsets might impact being religious. Notably, the study left answered how individuals might *choose* in addition to *react to* being in a tighter (vs. looser) culture, with consequences for religions' population growth/decline across societies.

Tighter cultures might be "more religious, thereby reinforcing adherence to moral conventions and rules that can facilitate social order and coordination." (Gelfand et al., 2011, p. 1101). Individuals in tighter (vs. looser) cultures are relatively more conscientious and less open to experience (Gelfand et al., 2011). This personality profile predicts higher religiosity (Gebauer et al., 2014) and somewhat lower spirituality (Saroglou, 2010). As described earlier, being religious independently of being spiritual predicts religious affiliations, while being spiritual without being religious positively correlates with religious non-affiliations (Shahabi et al., 2002). Thus, a culture's tightness-looseness and connection with personality might be a crucial predictor of religious affiliations vs. non-affiliations' prevalence across societies.

Tightness-looseness relates to the "predominance of strong vs. weak situations in everyday life" (Gelfand et al., 2011, p. 1101). Strong situations restrict the number of situationally appropriate behaviors, while weak ones allow for a wider range of responses from which an individual can select. Once a collective—religious (e.g., Christian, Buddhist) or non-religious (e.g., ethnic, racial)—identity becomes prevalent, a specific set of cultural norms may emerge for a broader range of societal situations. On the other hand, religious affiliations

have grown faster than non-affiliations in recent decades worldwide (Johnson & Grim, 2013), becoming a valuable tool in tighter cultures to define "moral norms" (Gelfand et al., 2011, p. 1101) across social contexts. Critically, some tightness-looseness scale items measure "the degree to which social norms are pervasive" (Gelfand et al., 2011, p. 1102), suggesting the growing *prevalence* of religious identities across the globe in recent decades might covary with tightness-looseness across societies. Specifically, tighter cultures might further facilitate the ongoing growth of collective identities such as religious ones in recent decades (Johnson & Grim, 2013). In relatively looser cultures, religious affiliations might be growing somewhat slower or might not be growing.

In the sociology of religion, early theories such as the secularization hypothesis (e.g., Wilson, 1966) predicted the decline of religions with the emergence of global modernization and urbanization (Casanova, 2018). However, the recent growth trends of religions (Johnson & Grim, 2013) seem to support an alternative hypothesis: religious pluralization, including religious-secular pluralism, whereby both religious and secular spheres co-exist across societies (Casanova, 2018). For example, Casanova (2018) observes simultaneous changes in Latin America's recent population growth trends toward increasing the Protestant/Catholic ratio and religious non-affiliations. This pluralization might partially relate to culture because Latin American countries are primarily loose cultures (Gelfand et al., 2011), where religious non-affiliations might be expected to grow faster. On the other hand, Casanova (2018) also observes failed attempts in China and Vietnam, relatively tighter cultures, to stop religions' growth. Therefore, religious-secular pluralism might emerge today, partially through religions primarily growing in tighter cultures while religious non-affiliations in relatively looser ones.

In sum, the societal-level evidence (Casanova, 2018; Gelfand et al., 2011; Harrington & Gelfand, 2014) suggests but does not directly show that religious affiliations might become more prevalent in tighter and non-affiliations in looser cultures. On the other hand, the psychological evidence (Jackson et al., 2021) shows the importance of tightness (vs. looseness) for determining a religious belief's content without exploring culture's implications for religious affiliation growth across societies and religiosity across individuals. The present study aims to merge this gap across levels by exploring the role of personality and culture in predicting religious affiliations' growth across cultures and individuals.

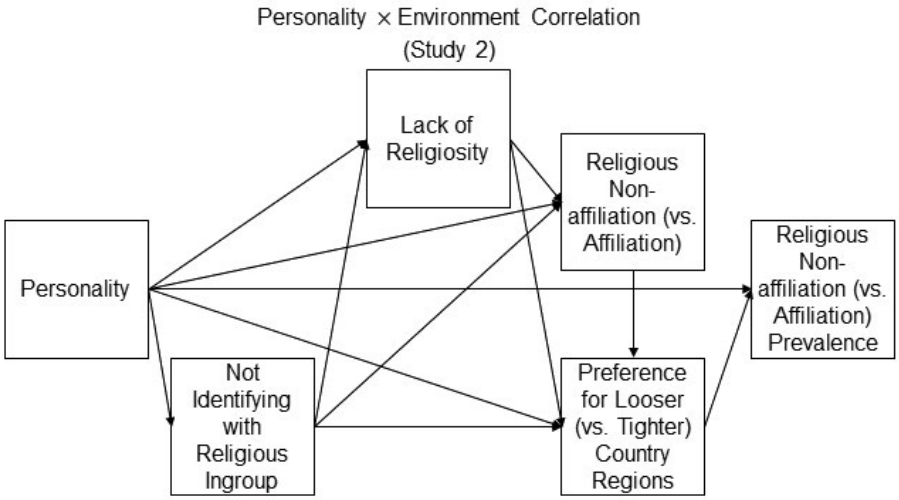
Religions Affiliations'/Non-affiliations' Growth as Personality Environment Interaction vs. Correlation

Gene environment interaction and correlation shape personality traits and outcomes (Dick, 2011; Persson, 2020). Those processes can give rise to "personality environment interaction" and "personality environment correlation" in accounting for religiosity and spirituality (Saroglou, 2010, p. 118). Specifically, personality might interact or correlate with tighter vs. looser cultural environments to predict the growth and prevalence of religious affiliations/non-affiliations.

Conscientiousness, Agreeableness, and decreased Openness to Experience predict being religious (Gebauer et al., 2014) and affiliating with a religion (vs. being an Atheist or Agnostic) (Senay, 2022). Although Openness to Experience partially predicts spirituality (Saroglou, 2010), spirituality, after being controlled for religiosity, predicts religious non-affiliations, such as reporting "no religion" as a religious preference (Shahabi et al., 2002). As displayed in Figure 1, personality might lead to religious affiliations. A culture's tightness (vs. looseness) might modify that relationship. Or the tighter cultures might let faster-growing collective identities, such as religious affiliations in recent years (Johnson & Grim, 2013), flourish at a societal level. Thus, tighter cultures might further the religious affiliations' ongoing growth through a personality environment *interaction*.

Figure 1

A model of personality environment interaction in the growth of religious affiliations and non-affiliations



Moreover, other aspects of personality irrelevant to religious affiliations and non-affiliations but relevant to population growth/decline might also predict population growth in tighter countries where personality can potentially foster a particular type of prevalent behavioral norm in society. For example, Openness to Experience as a personality trait factor defines a relatively smaller number of individuals living in tighter cultures (Gelfand et al., 2011; Harrington & Gelfand, 2014). Hence, it might predict a population decline in tighter cultures independently of religious affiliations/non-affiliations, as shown in Figure 1. It might also be possible that a personality factor will have a mediated effect through religious affiliations/non-affiliations without interacting with tighter (vs. looser) cultures. Such an effect might not always mean tightness (vs. looseness) does not affect religious affiliation/non-affiliation growth. Openness To Experience and Conscientiousness at an individual level can differentiate tight vs. loose cultures (Gelfand et al., 2011; Harrington & Gelfand, 2014). Therefore, when Openness to

Experience or Conscientiousness does not interact with tight (vs. loose) cultures but predicts affiliation/non-affiliation and population growth, tight (vs. loose) cultures might also be having an effect through a partial overlap with personality.

Social and Structural Dynamics of Affiliating vs. Not Affiliating with Religions

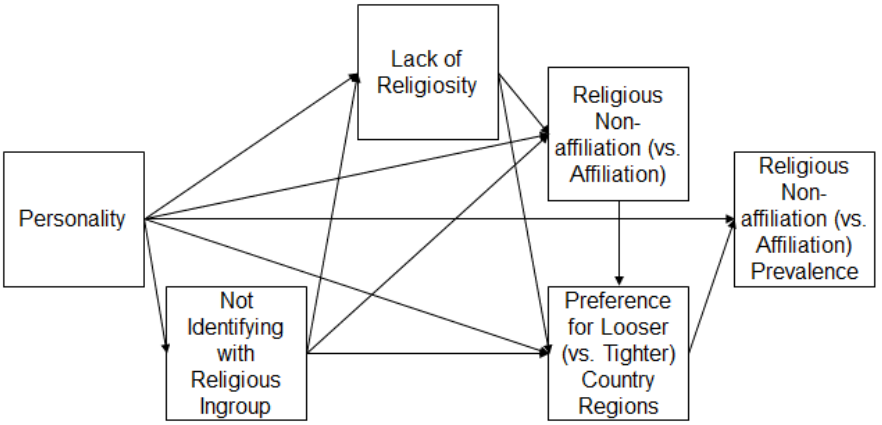
Personality might be more likely to lead to religious affiliation or religiosity when individuals feel connected with a religious community, hence may define themselves in terms of religion under the collective identity aspect of the self (Cheek & Briggs, 1982; Cheek et al., 1994). Group identification through which individuals feel strong ties with their ingroup is the strongest predictor of seeing one's ingroup as superior to outgroups (i.e., ingroup bias) independently of collective self-esteem (for a meta-analysis, see, e.g., Aberson et al., 2000). Ingroup cooperation played a vital role in the evolution of religions (Norenzayan & Shariff, 2008). The motivation for an ingroup bias is the highest when social identity is *emerging* and later *maintained* through competition with outgroups (for a review, see, e.g., Scheepers et al., 2006a).

One of the most significant functions of ingroup bias alongside *social identity creation* is to *confirm social reality*. People are most likely to rate their ingroup as superior to an outgroup after being given feedback about their ingroup's stable higher status (Scheepers et al., 2006b). Superior "morality" of a group (Scheepers et al., 2006a, p. 372), for example, might function to indicate higher status, and tighter cultures are expected to be "more religious" as a means to foster "adherence to moral conventions" (Gelfand et al., 2011, p. 1101). Thus, religions' morality can constitute norms in tighter cultures across various situations. As a result, religions might have higher perceived status in tighter cultures and hence can function to create and maintain religious identities.

The potentially higher status of religions in tighter cultures might impact a society's religious affiliation/non-affiliation rates. Non-affiliated individuals might find it hard in tighter cultures to disregard the ease of creating and maintaining a religious identity through an ingroup bias. Conversely, religiously affiliated individuals might easily maintain their religious identity in tighter cultures. As a result, non-affiliated individuals might prefer looser and religiously affiliated individuals tighter cultures, furthering the growth of religious non-affiliations in looser and affiliations in tighter cultures through personality environment *correlation*.

Figure 2 depicts four possibilities of a personality environment *correlation*. Individuals' personality profiles might predict being (1) religiously non-affiliated, (2) non-religious, (3) low on their identification with their religious ingroup, or (4) neutral concerning any of those preceding variables. In looser cultures, it might be easier to maintain a lack of religious identity without an ingroup bias that helps create and maintain a religious identity. On the other hand, religiously affiliated individuals might be happy living in a tighter culture where their religious community's higher status might help them maintain their collective identity. Therefore, individuals in the first three cases might want to move to looser cultural environments.

Figure 2
A model of personality environment correlation in the growth of religious affiliations and non-affiliations



In the fourth case, personality might directly impact preferences for where to live independently of religious group membership or religion-related variables. For example, individuals are more open to experience and less conscientious in looser (vs. tighter) cultures (Gelfand et al., 2011; Harrington & Gelfand, 2014); hence might generally prefer looser cultures to live in. Because Openness To Experience and Conscientiousness overlap with culture, culture through personality might also form new connections with religious affiliation/non-affiliation rates in society. For example, when conscientious individuals prefer to live in societies with high religious non-affiliation rates, societies with an increasing number of conscientious but not necessarily religious individuals might theoretically move toward becoming a tighter culture over time. As a result, the otherwise positive connection between tighter cultures and religious affiliation rates might weaken.

Study 1

Study 1 tests personality environment *interaction*, as displayed in Figure 1. A secondary data analysis investigates the connection between personality scores, on the one hand, and religious affiliation and non-affiliation data from 111 (valid $N = 57$) countries, with culture moderating the growth of religious affiliations/non-affiliations. Namely, personality might predict affiliating with religions, with culture as a possible moderator of this relationship. Then, religious affiliations might spread faster across populations of tighter (vs. looser) countries.

Method

Sample

An open-source data repository had a dataset with 4,270 people's responses to the International Personality Item Pool Big Five scales (Goldberg et al., 2006) (https://openpsychometrics.org/_rawdata, accessed on July 6, 2017). The data collection took place before 2015 online through a website (https://openpsychometrics.org). Participants gave their informed consent after completing tests. Specifically, survey takers reported if their answers were accurate and whether researchers could use their data for scientific purposes. The dataset included only the accuracy-confirmed data.

Some primary demographics broken down by religious affiliations/non-affiliations appear in Table 1. The education level and gender composition were not too different among different religions. Most people affiliated with Christian denominations, Judaism, and no religion were white. Participants in other categories were primarily Asian.

Table 1

Major sample characteristics by self-reported religious affiliations/non-affiliations

	Religious Non-affiliations		Religious Affiliations									
	Agn.	Athe.	Bud.	Cath.	Prot	Mrm.	Chr. Oth.	Hind.	Sikh	Mslm.	Jew	Oth. Rel.
					N							
No. of People	620	658	105	835	445	41	658	173	19	227	58	371
No. of Countries	61	63	25	51	37	8	47	19	7	38	7	38
					%							
Education												
LTHS	13.1	16.1	10.5	15.8	13	19.5	16.1	11.6	26.3	10.1	24.1	11.3
HS	41.9	42.7	46.7	47.5	37.8	39.0	46.7	22.5	21.1	36.6	34.5	50.4
Univ.	31.5	28.6	23.8	24.8	31.2	24.4	26.3	19.1	36.8	33.0	20.7	26.4
Grad.	13.2	12.2	19.0	10.8	17.1	14.6	10.2	45.1	15.8	19.4	20.7	10.8
Total	99.6	99.5	100.0	98.9	99.1	97.5	99.2	98.3	100	99.1	100	98.9
Race												
Asian	9.2	9.3	62.9	17.8	13.7	7.3	5.9	84.4	89.5	52.4	3.4	11.6
Arab	0.6	0.2	1.0	0.7	0	2.4	0.5	0	0	22	0	0.8
Black	1.3	0.9	1.9	5.1	8.8	2.4	18.4	2.9	0	3.5	1.7	4.6
White	77.6	81.8	27.6	58.6	70.3	80.5	63.8	2.3	0	6.2	87.9	67.9
Other	11.1	7.8	6.7	16.8	6.3	7.3	10.2	10.4	10.5	12.8	6.9	14.6
Total	99.8	99.8	100.0	99	99.1	100	98.8	100	100	96.9	100	99.5
Gender												
Male	35.2	45.7	41.9	29.1	28.3	39	28.1	46.2	26.3	37	39.7	29.9
Female	63.4	53.3	56.2	70.1	71.5	61	71.4	53.8	73.7	63	60.3	68.7
Other	1.1	0.8	1.9	0.7	0.2	0	0.3	0	0	0	0	1.3
Total	99.7	99.8	100.0	99.9	100	100	99.8	100	100	100	100	100

Note. Grad.: graduate degree; Univ.: university degree; H.S.: high school degree; LTHS.: less than high school degree; Agn.: Agnostic; Athe.: Atheist; Bud.: Buddhist; Cath.: Catholic; Prot.: Protestant; Mrm.: Mormon; Chrs. Oth.: Other Christian; Hind.: Hindu; Mslm.: Muslim; Jew: Jewish; Oth. Rel.: Other religion member.

Power Analysis. According to a similar study conducted worldwide, the median correlation between a personality trait factor and the critical dimensions of psychological constructs differentiating religious-cultural zones worldwide (Asian religions, Islam, Catholicism, Protestantism, Orthodox Christianity, Judaism, and secularism) was $r = .10$ (Saroglou et al., 2020). With a correlation coefficient of 0 under the null hypothesis and the minimum effect size of $r = .10$ ($\beta = .20$, $p = .05$), a Microsoft Excel Script (http://www.real-statistics.com/free-download) based on relevant guidelines (Zaiontz, 2020) calculated the minimum sample size as $N = 783$ for testing a two-tailed hypothesis. Thus, the sample size was adequate for Studies 1 and 2.

Measure

Participants rated ten items for each Big-Five factor (50 in total) on a 1-to-5 scale. The dataset also had many demographic variables, including 12 self-reported religion categories (Agnostic, Atheist, Buddhist, Christian/Catholic, Christian/Mormon, Christian/Other, Christian/Protestant, Hindu, Jewish, Muslim, Sikh, Other). Religions' most recent numbers of adherents for each year between 2000 and 2015, broken down by countries, were available from the World Religion Project Global Religion Database (Brown & James, 2019, accessed November 22, 2022). The data collection took place between 2013 and 2017. Unlike the personality dataset with Agnostic and Atheist as the religious non-affiliations, the demographics dataset had one category of broadly defined non-religionists, among whom were Atheists. Therefore, in the personality dataset, Agnostics and Atheists became a new category, which mapped onto Non-religionists in the demographics dataset. All other self-reported religion categories were the same between the two datasets, constituting 11 categories (Non-religionist, Buddhist, Christian/Catholic, Christian/Mormon, Christian/Other, Christian/Protestant, Hindu, Jewish, Muslim, Sikh, Other). The personality dataset also recorded participants' ISO country codes based on the technical information about internet users' access to the personality test website. People from 111 countries completed online surveys. The following formula previously used by Johnson and Grim (2013) in their demographic analysis of religions' population growth rates helped calculate the 15-year annual growth rate (from 2000 to 2015) of 11 affiliations/non-affiliations for each of the 111 countries in the personality dataset:

$$\left[\left(Adherents\,2015 / Adherents\,2000\right)^{1/15} - 1\right] \times 100$$

The tightness-looseness scores for 57 nations were available from Gelfand et al. (2021).

Data Analysis

Random intercept models included participants' countries as the grouping variable. Calculations used REML estimation. The religions' 15-year *annual population growth rate* in a specific country from 2000 to 2015 was a group-level dependent variable, which, as described below, did not violate the model residuals' normality assumptions across countries as the grouping variable in the analyzed linear-mixed models. There were two random-intercept models across countries for testing the moderated mediation shown in Figure 1 for five personality factors: Outcome and Mediation Models. For example, for Openness to Experience, those models had the form:

Outcome Model:

$$y_{ij} = ReligiousAffiliationGrowth = \beta_{0j} + \beta_{1j}(OpennessToExperience) + \beta_{2j}(Conscientiousness) + \beta_{3j}(Extraversion) + \beta_{4j}(Agreeableness) + \beta_{5j}(Neuroticism) + \beta_{6j}(CountryTightnessScore) + \beta_{7j}(ReligiousAffiliation) + \beta_{8j}(OpennessToExperience \times CountryTightnessScore) + \beta_{9j}(ReligiousAffiliation \times CountryTightnessScore) + r_{ij}$$

Mediation Model:

$$y_{ij} = ReligiousAffiliation = \beta_{0j} + \beta_{1j}(OpennessToExperience) + \beta_{2j}(Conscientiousness) + \beta_{3j}(Extraversion) + \beta_{4j}(Agreeableness) + \beta_{5j}(Neuroticism) + \beta_{6j}(CountryTightnessScore) + \beta_{7j}(OpennessToExperience \times CountryTightnessScore) + r_{ij}$$

Within-Country Intercept: $\beta_{0j} = \gamma_{00} + u_{0j}$

Religious Affiliation was a binary variable (religious affiliations = 1 vs. non-affiliations = 0). Therefore, mediation models with religious affiliations vs. non-affiliations as the dependent variable were a generalized linear mixed model with a binomial link function. In all statistical tests, the significance level was $p = .05$.

The R statistical packages "lme4" and "mediation" helped conduct the moderated mediation analyses for linear-mixed models. Effect sizes in linear-mixed models were the fixed effects' marginal R^2 calculated following Nakagawa and Schielzeth's (2013) recommendations using the R statistical package "performance." All data analysis codes used in Studies 1 and 2 are available at https://osf.io/43z9h?view_only=48d9c23289c54827af02f7bed8c4e981.

Results

Correlations among important study variables appear in Table 2. According to Cohen's (1988) conventions, a correlation coefficient of $r = .10$ in absolute value is a small effect size. Among the bi-variate relationships with at least a small effect size were the expected associations between tightness (vs. looseness), on the one hand, and religious affiliations (vs. non-affiliations), population growth, and decreased Openness to Experience (Gelfand et al., 2011; Harrington & Gelfand, 2014) on the other. Religious affiliations (vs. non-affiliations) also correlated with population growth, Conscientiousness, Agreeableness, and decreased Openness to Experience. Population growth predicted Openness to Experience. Neuroticism was negatively correlated with all other personality factors. Openness To Experience correlated with Extraversion and Agreeableness. Conscientiousness correlated with Agreeableness.

Table 2
Bivariate correlations among Study 1 variables

	1	2	3	4	5	6	7	8
1. Religious Affiliations (vs. Non-affiliations)	1	.138	.159	**-.174**	**.135**	.092	**.176**	-.058
2. Country Tightness (vs. Looseness)		1	**.455**	**-.107**	-.012	-.029	-.036	.016
3. Population Growth			1	**-.107**	-.005	-.024	-.041	.014
4. Openness To Experience				1	.075	**.194**	**.139**	**-.105**
5. Conscientiousness					1	.083	**.159**	**-.241**
6. Extraversion						1	.299	-.250
7. Agreeableness							1	-.106
8. Neuroticism								1

Note. Relationships with at least a small effect size of $r >$ appear in bold.

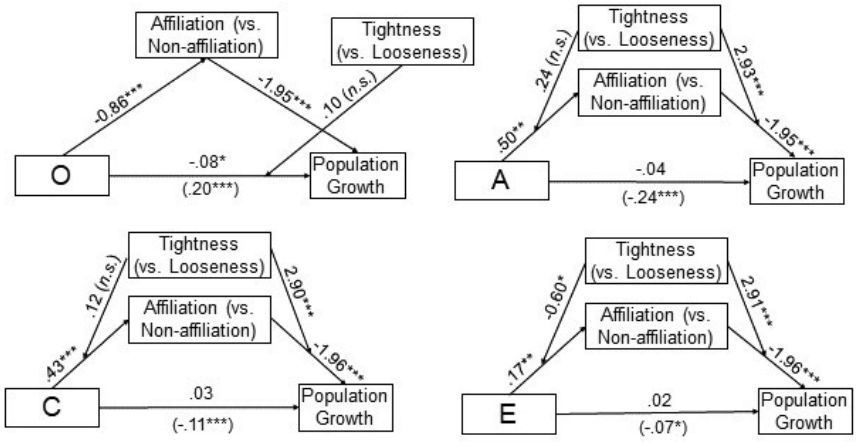
Following guidelines (Zuur et al., 2010) for the visual inspection of model residuals as a definitive test for homogeneity of variances, the examination of Normal Q-Q plots for outcome models with a group-level dependent variable (religions' population growth rates in a specific country) indicated no skewness. Plotting fitted values against residuals in the same models showed evenly distributed residuals around zero. Therefore, the random intercept analyses could proceed as specified earlier.

Personality Environment Interaction Effects

Mediation analyses for mixed models (Tingley et al., 2014) used Monte Carlo methods with 1000 simulations to test personality factors' mediated effects through affiliating (vs. not affiliating) with religions on religious affiliations' (vs. non-affiliations') growth rates. Moderated mediation analyses tested the mediation effects at one standard deviation below (M –SD = –.38) and above (M SD = .50) the mean tightness-looseness scores across countries (M = .06), with different proportions mediated at high vs. low tightness-looseness levels indicating a meaningful effect (Ananth, 2019).

As shown in Figure 3, all personality factors except Neuroticism had a significantly mediated effect through religious affiliations (vs. non-affiliations) on population growth rates (Mediation effect b's = .06, –.16, –.09, and –.21, with 95% CI = [.04, .09], [-.23,-.10], [-.15,-.03], [-.26,-.16], and p's < .01, for Openness To Experience, Conscientiousness, Extraversion, and Agreeableness, respectively). Openness To Experience predicted the decrease (R^2 = .05), and the other three factors (R^2's = .02, .01, and .03 for Conscientiousness, Extraversion, and Agreeableness, respectively), the increase in affiliating with religions that, in turn, predicted reduced population growth rates as a main effect (R^2 = .11) independently of cultures.

Figure 3
Mediation, moderation, and moderated mediation effects in random-intercept models in Study 1



Note. O: Openness To Experience; C: Conscientiousness; E: Extraversion; A: Agreeableness; ***: $p < .001$; **: $p < .01$: *: $p < .05$; *n.s.*: $p > .1$

As shown in Figure 3, most mediation effects got further moderated by countries' tightness-looseness. Conscientiousness (Proportion mediated *b*'s = 1.16 vs. .43, with 95% CI = [0.76, 2.41] vs. [-6.1, 6.18], and *p*'s = .016 vs. 0.654, in looser vs. tighter countries, respectively), Extraversion (Proportion mediated *b*'s = 1.26 vs. –.02, with 95% CI = [0.89, 2.52] vs. [-1.56, 2.11], and *p* = .008 vs. 0.880, in looser vs. tighter countries, respectively), and Agreeableness (Proportion mediated *b*'s = 0.92 vs. .28, with 95% CI = [0.67, 1.50] vs. [-1.23, 3.15], and *p* <.001 vs. *p* = 0.130, in looser vs. tighter countries, respectively) predicted religious affiliations with relatively lower population decline rates in relatively tighter countries. The mediated effect of Openness to Experience did not vary as a function of tighter vs. looser countries (Proportion mediated *b*'s = 1.97 vs. –.01, with 95% CI = [-25.15, 26.92] vs. [-.33, .32], and *p* = .414 vs. 0.802, in looser vs. tighter countries, respectively). The direct positive effect of Openness To Experience on population growth was only significant in looser countries (Direct effect *b*'s = .05 vs. –.02, with 95% CI = [-.22, –<.001] vs. [-.07, .18], and *p* = .046 vs. 0.790, in looser vs. tighter countries, respectively).

Discussion

The results from Study 1 show that when Conscientiousness, Extraversion, and Agreeableness predicted religious affiliations, religious affiliations were more likely to predict a decreased population decline in tighter (vs. looser) cultures. On the other hand, Openness to Experience predicting religious non-affiliations did not interact with tightness/looseness. However, the latter finding does not

mean that culture had no effect. Openness To Experience is higher in looser (vs. tighter) cultures (Gelfand et al., 2011; Harrington & Gelfand, 2014). Thus, the effect was likely due to Openness to Experience partly overlapping with looser (vs. tighter) cultures to predict religions' population growth/decline. These results partially support a personality environment *interaction* model where personality with increased Conscientiousness, Agreeableness, and Extraversion might predict religions' population growth in relatively tighter (vs. looser) countries. The results show that personality partly overlapping with culture (Gelfand et al., 2011; Harrington & Gelfand, 2014) might also determine religious affiliations/ non-affiliations' growth across cultures, with looser cultures having relatively more open-to-experience and non-affiliated people. Overall, the religions might grow in tighter cultures while relatively declining in looser ones.

Tighter (vs. looser) cultures did not modify the direct relationship between personality and religious affiliations/non-affiliations except for Extraversion, where they predicted a decrease in a single individual's religious affiliation. Future studies might investigate if the growth of religions across societies comes at the cost of not identifying with religions at an individual level. Finally, Openness To Experience predicted population growth in looser countries independently of religious affiliations/non-affiliations, most likely due to the higher number of people with relatively higher levels of Openness To Experience in those countries (Gelfand et al., 2011; Harrington & Gelfand, 2014).

Study 2

Study 2 tests the personality environment *correlation*, as presented in Figure 2, in a probabilistic sample (N = 4,963) representing the U.S. population. The repeated measures clustered by individuals include 8-9 year-apart longitudinal reports of religiosity, religious ingroup identification, personality, religious affiliations/non-affiliations, and preferences to live in a U.S. state differing in its tight (vs. loose) culture ranking and religious affiliation vs. non-affiliation rates. To the extent that personality predicts religious ingroup identification, religiosity, or religion self-reports, it might predict religious non-affiliation prevalence in looser cultures. Openness To Experience and Conscientiousness might also impact religious affiliation and non-affiliation prevalence through a direct preference for a specific society.

Method

Sample

With support from the National Institute on Aging, the MacArthur Midlife Research Network conducted a longitudinal follow-up in 2004-2005 (MIDUS 2) and 2013 (MIDUS 3) of 7,000 individuals with ages 25-74 randomly selected through Random Digit Dialing from the U.S. population in 1995-1996 (MIDUS 1). A description of the study with findings appears at http://www.midus.wisc.edu. The data were available from Inter-university Consortium for Political and Social Research for researchers (Ryff et al., 2021). The present report used the data with the variables critical for the current study from 2004-2005 (N = 4,963) and 2013 (N = 3,294) waves.

Some sample characteristics from the dataset's more inclusive 2004-2005 wave appear in Table 3. The religiously non-affiliated constituted 13.87% of the sample, mostly reporting no religious preference. Atheists and Agnostics were more likely to be male and more educated than the other groups. Groups were similar in being mostly white except for those in the "other religions" category and, to a certain extent, protestants. Unaffiliated individuals who self-identified as "Spiritual" were more likely to be females.

Table 3
Major sample characteristics by self-reported religious affiliations/non-affiliations

		Religious Non-affiliation				Religious Affiliation				
		Agn.	Ath.	Spirit.	No Rel. Pref.	Chris./ Cath.	Chris./ Prot.	Jew.	Other	Total
Valid *N*		81	31	27	415	993	2248	98	102	3995
% of Sample		2.03	0.78	0.68	10.39	24.86	56.27	2.45	2.55	100.00
		% of Group								
Education										
	LTHS	3.70	.00	3.70	7.71	6.14	8.29	1.02	6.06	
	HS	30.86	9.68	62.96	55.42	56.50	56.13	33.67	44.44	
	Univ.	35.80	38.71	22.22	21.45	23.16	21.53	28.57	26.26	
	Grad.	29.63	51.61	11.11	15.42	14.20	14.04	36.73	23.23	
	Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
Race										
	White	97.44	96.43	96.43	94.26	94.99	92.96	98.94	86.60	
	Black†	1.28	.00	.00	2.00	1.15	5.37	.00	3.09	
	Nat. Am.††	.00	.00	.00	.25	.31	0.51	1.06	.00	
	Asian†††	.00	.00	.00	2.00	.42	.19	.00	7.23	
	Other	1.28	3.57	3.57	.50	2.09	0.65	.00	2.06	
	Multi-racial	.00	.00	.00	1.00	1.04	.3242	.00	1.03	
	Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
Sex										
	Male	72.84	67.74	25.93	52.77	44.21	41.64	50.00	43.14	
	Female	27.16	32.26	74.07	47.23	55.79	58.36	50.00	56.86	
	Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	

Note. Agn.: Agnostic; Athe.: Atheist; Spirit.: Spiritual; No Rel. Pref.: No religious preference; Chris: Christian; Cath.: Catholic; Prot.: Protestant; Jew: Jewish; †: Black and/or African American; ††: Native American or Aleutian Islander/Eskimo; †††: Asian or Pacific Islander; Grad.: graduate degree; Univ.: university degree; HS: high school degree; LTHS.: less than high school degree

Measure

Participants reported two times—once between 2004 and 2005 and again later in 2013—their Big-Five personality trait levels, religious affiliations/non-affiliations, religiosity, and which U.S. state they would like to live in the next ten years. Personality scales measured Big-Five personality factors as self-ratings on a 1-4 scale of 26 adjectives selected from existing trait lists and inventories and

subsequently normed by Lachman and Weaver (1997). Higher scores indicated a lower standing on an adjective as a self-description. Therefore, item scores were re-coded in SEM analyses to have higher scores reflect higher standing on an adjective measuring a Big-Five personality dimension. Various studies used this personality scale to measure the Big-Five Model trait factors (Keyes et al., 2002; Staudinger et al., 1999). Lack of religious ingroup identification was one question asking, "How closely do you identify with being a member of your religious group?" Lack of religiosity was a single-item measure, "How religious are you?" Participants rated both questions on a 1-4 scale, with "1" meaning "A lot" and "4" "Not at all." Participants also answered the following question about the U.S. states.

> "Thinking back over all the places you've lived during your lifetime, including where you live now, which state would you most like to live in for the next 10 years if you could easily move there now?"

Possible answers included 51 U.S. states plus an option of "foreign." Tightness-looseness scores of 50 U.S. states were available from Harrington and Gelfand's (2014) paper. There was no information in the datasets about participants' presently-resided U.S. state.

Religious preference was one question with 45 possible responses. Table 3 presented four non-affiliation measures: No religious preference, Atheist, Agnostic, and Spiritual. There were also 28 Protestant, 3 Catholic, and 5 Jewish denominations to choose from, and other religious affiliations included Orthodox Christian, Buddhist, Hindu, Muslim, and a member of other religions. All affiliations/non-affiliations helped calculate one binary variable with religious non-affiliations including no religious preference, Atheist, Agnostic, and Spiritual grouped as 1 (vs. others = 0). The information about U.S. states' most recent prevalence of religious affiliations/non-affiliations in 2014 was available from Pew Research Center (2014).

Data Analysis

A multi-level Structural Equation Model (SEM) analysis tested the complex model in Figure 2. Two-time measures required a data analysis clustered by participants as the grouping variable. States' tightness-looseness scores and religious affiliation/non-affiliation prevalence rates measured across societies became embedded within and could vary across time independently of individuals reporting the U.S. state they wanted to live in at different times. The R package "lavaan" helped conduct the multi-level SEM analysis for clustered data.

Global Fit Indices can be problematic, especially when the model has serial mediation where correlations among variables in earlier mediation steps are, by default, present in later ones (McNeish et al., 2017), as tested in the present study. Therefore, following the guidelines provided by McNeish et al. (2017) and Saris and colleagues (2009), it was possible to detect model misspecifications by using modification indices (MI), expected parameter change (EPC), power analysis, and theory. Significant modification indices at $p < .05$, MI > 3.84, an

unacceptable level of model misspecification for latent factors at EPC> |.4|, and for the correlated errors in measurement models at EPC> |.1|, a power level of .80, and theory helped remodel the measurement errors. All five factors of the Big-Five model can load onto one General Factor of Personality (Van der Linden et al., 2010), suggesting that all item errors in measuring the Big-Five factors can correlate among themselves in the measurement models. Therefore, in line with the theory, the item errors in measuring the Big-Five factors as latent variables were allowed to correlate when they caused possible misspecification detectable through modification indices and residual correlations in the model. The 26 personality items only measured the factor they were supposed to measure. All statistical analysis codes are available at the URL provided earlier.

Results

Correlations among critical study variables in the dataset's more inclusive 2004-2005 wave appear in Table 4. Across the U.S. states, a robust and negative correlation existed between a country region's non-affiliation rate and tightness (vs. loosenesss) score. Across individuals, participants' non-affiliations and lack of religiosity predicted the decreased tightness of their desired country regions. Individuals' religious non-affiliations correlated with lower Agreeableness and lack of religiosity. A lack of religiosity also correlated with lower Extraversion. All personality factors correlated with one another, justifying the theoretical assumption that item errors could covary in predicting latent personality factors in SEM measurement models.

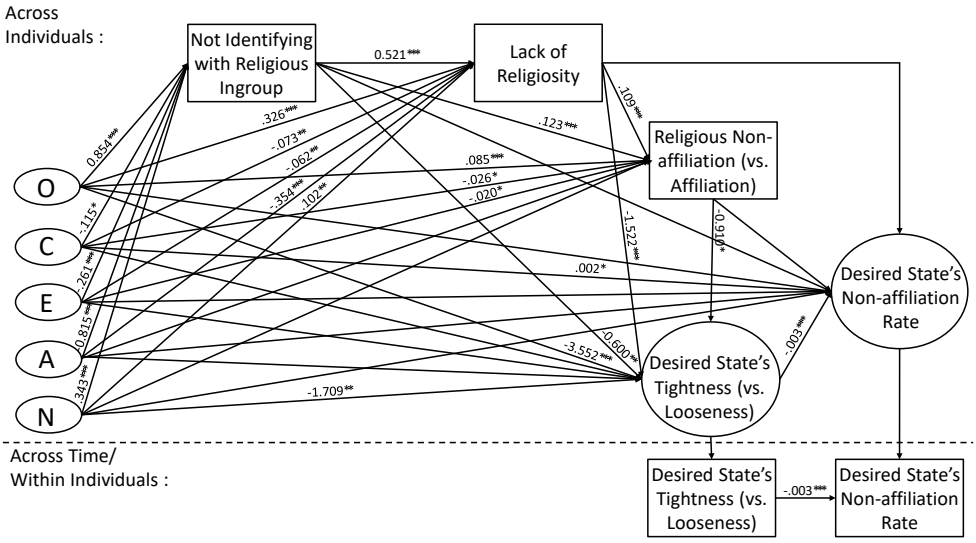
Table 4.
Bivariate correlations among Study 2 variables

	1	2	3	4	5	6	7	8	9	10
1. Desired Country Region's Tightness (vs. Looseness)	1	**-0.780†**	-.136	-.185	-.204	.029	.009	.002	-.025	-.087
2. Desired Country Region's Non-affiliation Rate		1	.121	.178	.175	-.031	-.013	-.007	.028	.072
3. Being Religiously Non-affiliated			1	**.238**	0.506	**-.119**	-.080	.005	-.033	.077
4. Not identifying with religious ingroup				1	0.660	**-.210**	**-.143**	.061	-.064	.025
5. Lack of Religiosity					1	**-.233**	**-.143**	.020	-.072	.030
6. Agreeableness						1	**.504**	**-.114**	**.291**	.331
7. Extraversion							1	**-.196**	**.284**	0.513
8. Neuroticism								1	**-.197**	-.213
9. Conscientiousness									1	**.342**
10. Openness To Experience										1

Note. The relationships with at least a small effect size of *r*> appear in bold. †: correlation calculated across 50 U.S. states

A multi-level SEM analysis for clustered data tested the model presented in Figure 4. The Chi-square test was significant (χ[230] = 1482.345, p <.001), but other indicators showed fit, with CFI = 0.980, TLI = 0.960, and RMSEA = .030 (90% CI = [.029, .032]). As discussed in the Data Analysis section earlier, specifying theoretically possible and potentially problematic correlations among item *errors* in predicting latent personality factors in measurement models resulted in no misspecification detectable through the criteria established by McNeish et al. (2017) and Saris et al. (2009).

Figure 4.
The multi-level Structural Equation Model testing the personality environment correlation in the growth of religious affiliations/non-affiliations in Study 2



Note. O: Openness To Experience; C: Conscientiousness; E: Extraversion; A: Agreeableness; N: Neuroticism; Only the significant model weights at p < .05 are shown; *: p < .05; **: p < .01; ***: p < .001

Openness to Experience, decreased Conscientiousness and decreased Agreeableness anticipated lower identification with the religious ingroup and a lack of religiosity. Not identifying with one's religious ingroup, lack of religiosity, and religious non-affiliation self-reports were all positively associated with one another. Openness to Experience, decreased Conscientiousness, and decreased Extraversion predicted a lack of religious affiliation. Lack of religious ingroup identification, lack of religiosity, and religious non-affiliation (vs. affiliation) self-reports indicated the preference to live in a relatively looser (vs. tighter) state. Openness to Experience predicted the preference for looser (vs. tighter) states. Neuroticism's effect was similar to Openness to Experience, except it did not predict religious affiliation/non-affiliation self-reports. Extraversion's effect was similar to Conscientiousness, Agreeableness, and decreased Openness to Experience, except that it did not predict preference for cultures. Only tightness

(vs. looseness) and Conscientiousness predicted the non-affiliation rates directly. Tightness (vs. looseness) predicted the non-affiliation rates across and within individuals over time.

Specific path analyses appear in Table 5. Each personality factor had a unique set of paths in predicting religious non-affiliation rates, except for Agreeableness and Extraversion, which impacted the religious non-affiliation rates through similar pathways. All personality factors predicted religious non-affiliation rates through a lack of religious ingroup identification and lack of religiosity, which were positively associated. Openness To Experience and Neuroticism also predicted the non-affiliation rates directly through a preference for looser cultures. The paths involving religious affiliation/non-affiliation self-reports were either non-significant or marginally significant. As a total effect, Openness to Experience and Neuroticism predicted increased non-affiliation rates; Agreeableness and Extraversion predicted decreased non-affiliation rates. Conscientiousness did not have a significant total mediation effect, having a direct effect instead, as described above.

Table 5.
Path analyses of the personality environment correlation in the growth of religious affiliations/non-affiliations in Study 2

Personality Factor	Path	*b*	*SE*	Z	*p* (>|z|)
Openness To Experience (O)	**O→LOR→(T→NAR)**	.002	.001	3.150	.002
	O→LOR2→(T→NAR)	.004	.001	5.832	<.001
	O→LOR→RN→(T→NAR)	<.001	<.001	1.936	.053
	O→LOR→LOR2→RN→(T→NAR)	<.001	<.001	1.930	.054
	O→LOR→LOR2→(T→NAR)	.002	<.001	5.853	<.001
	O→LOR2→RN→(T→NAR)	<.001	<.001	1.894	.058
	O→RN→(T→NAR)	<.001	<.001	1.862	.063
	O→(T→NAR)	.011	.002	4.750	<.001
	Total Effect	.020	.003	7.770	<.001
Agreeableness (A)	**A→LOR→(T→NAR)**	-.002	<.001	-3.176	.001
	A→LOR2→(T→NAR)	-.004	.001	-6.158	<.001
	A→LOR→RN→(T→NAR)	-<.001	<.001	-1.942	.052
	A→LOR→LOR2→RN→(T→NAR)	-<.001	<.001	-1.935	.053
	A→LOR→LOR2→(T→NAR)	-.002	<.001	-6.148	<.001
	A→LOR2→RN→(T→NAR)	-<.001	<.001	-1.917	.055
	A→RN→(T→NAR)	-<.001	<.001	-0.553	0.580
	A→(T→NAR)	-.002	.002	-0.827	.408
	Total Effect	-.010	.002	-4.998	<.001

Personality Factor	Path	*b*	*SE*	Z	*p* (>|z|)
Conscientiousness (C)	**C→LOR→(T→NAR)**	-<.001	<.001	-1.996	.046
	C→LOR2→(T→NAR)	-.001	<.001	-2.356	.018
	C→LOR→RN→(T→NAR)	-<.001	<.001	-1.549	.121
	C→LOR→LOR2→RN→(T→NAR)	-<.001	<.001	-1.545	.122
	C→LOR→LOR2→(T→NAR)	-<.001	<.001	-2.356	.018
	C→LOR2→RN→(T→NAR)	-<.001	<.001	-1.577	.115
	C→RN→(T→NAR)	-<.001	<.001	-1.481	.139
	C→(T→NAR)	-<.001	.001	-0.289	.772
	Total Effect	-.002	.001	-1.093	.274
Extraversion (E)	**E→LOR→(T→NAR)**	-<.001	<.001	-2.938	.003
	E→LOR2→(T→NAR)	-.001	<.001	-4.803	<.001
	E→LOR→RN→(T→NAR)	-<.001	<.001	-1.887	.059
	E→LOR→LOR2→RN→(T→NAR)	-<.001	<.001	-1.881	.060
	E→LOR→LOR2→(T→NAR)	-.001	<.001	-4.803	<.001
	E→LOR2→RN→(T→NAR)	-<.001	<.001	-1.607	.108
	E→RN→(T→NAR)	-<.001	<.001	-1.495	.135
	E→(T→NAR)	-.001	.001	-1.013	.311
	Total Effect	-.004	.001	-3.248	.001
Neuroticism (N)	**N→LOR→(T→NAR)**	.001	<.001	2.734	.006
	N→LOR2→(T→NAR)	.002	<.001	3.984	<.001
	N→LOR→RN→(T→NAR)	<.001	<.001	1.819	.069
	N→LOR→LOR2→RN→(T→NAR)	<.001	<.001	1.813	.070
	N→LOR→LOR2→(T→NAR)	.001	<.001	3.987	<.001
	N→LOR2→RN→(T→NAR)	<.001	<.001	1.597	.110
	N→RN→(T→NAR)	<.001	<.001	.366	.714
	N→(T→NAR)	.005	.002	2.915	.004
	Total Effect	.009	.002	4.105	<.001

Note. LOR: Lack of identification with religious ingroup; LOR2: Lack of Religiosity; RN: being religiously non-affiliated; T: The U.S. state's tightness (vs. looseness); NAR: The U.S. state's religious non-affiliation rate; The paths are across individuals with those within brackets indicating that path was adjusted for within-individual/across-time variations; Significant paths at $p < .05$ appear in bold

Discussion

Results from Study 2 generally support the personality environment *correlation* model presented in Figure 2, except that the effects were mainly through a lack of either religiosity or religious ingroup identification rather than

the religious affiliation/non-affiliation self-reports. Paths involving religious affiliation/non-affiliation self-reports were either non-significant or marginally significant. Ingroup identification was crucial in predicting religious affiliation/non-affiliation prevalence through personality environment *correlation*. First, religious ingroup identification was the closest variable to the personality factors, with no other religion-related factors mediating that relationship. Second, all personality factors were related to religious ingroup identification in predicting population prevalence. Third, in ultimately predicting preferences for cultures and affiliation/non-affiliation rates in society, no personality factor failed to first connect negatively or positively with religiosity through religious ingroup identification. Religious identities, likely having a higher status in tighter cultures, might have helped maintain religious group memberships through an ingroup bias. Thus, religious affiliations might have been more prevalent across tighter and non-affiliations in looser cultures.

The affiliation/non-affiliation self-reports did not sufficiently mediate the effects of personality on affiliation/non-affiliation prevalence in society through a personality environment *correlation*. This finding suggests that religiosity and religious ingroup identification might better reflect personality's role in predicting religions' prevalence in society. Personality also directly indicated preferences for societies, with Openness to Experience predicting preferences for looser cultures where individuals tend to be more open to experience (Gelfand et al., 2011; Harrington & Gelfand, 2014). Conscientiousness predicted preferences for societies with relatively higher non-affiliation rates without the mediation of culture or any religion-related variable. Conscientiousness is a common trait factor in tighter (vs. looser) cultures (Gelfand et al., 2011; Harrington et al., 2014). Therefore, through a Conscientiousness environment *correlation,* societies with relatively higher non-affiliation rates might also have an increasing number of conscientious, but not necessarily religious, individuals who theoretically can change those societies toward becoming a tighter culture over time.

General Discussion

In Study 1, testing personality environment *interaction*, personality predicted religious affiliations' population growth in tighter countries. Openness To Experience did not interact with tightness vs. looseness in Study 1. However, Openness to Experience partially overlaps with looser (vs. tighter) cultures (Gelfand et al., 2011; Harrington & Gelfand, 2014). Thus, religions' populations could generally grow faster in tighter instead of looser cultures. Study 2 showed that a significant personality environment *correlation* could be present in explaining religious non-affiliation prevalence in relatively looser (vs. tighter) country regions.

Religiosity, religious ingroup identification, and religious affiliation/non-affiliation self-reports showed small-to-large positive correlations (*r*'s

= .24 0.66) in Study 2. In Study 1, personality predicted religion's growth in tighter countries through religious affiliation/non-affiliation self-reports. In Study 2, religious ingroup identification, religiosity, or both mediated the effect of personality on religions' prevalence in society in a more population-representative sample. Therefore, personality predicted religions' population growth and prevalence as a joint function of tighter (vs. looser) cultures through a personality environment *interaction* and personality environment *correlation*.

Across both studies, as predicted by personality, religions' populations grew faster and were more prevalent in tighter (vs. looser) cultures. Affiliating or not affiliating with religions might be determined by personality (Gebauer et al., 2014; Saroglou, 2010; Senay, 2022; Shahabi et al., 2002) and by group membership or how one defines their collective self (Cheek & Briggs, 1982; Cheek et al., 1994). Tighter cultures can restrict the number of situationally appropriate behaviors for individuals to choose from through strictly-imposed social norms and are likely "more religious" (Gelfand et al., 2011, p. 1101). Thus, faster-growing collective identities, such as religious ones in the 21st century (Johnson & Grim, 2013), might become a valuable tool in tighter (vs. looser) cultures to foster "moral conventions" (Gelfand et al., 2011, p. 1101) in defining social norms across a broader range of situations.

It might be easier to maintain one's identification with a religious community through an ingroup bias confirming one's religious ingroup's higher status (Aberson et al., 2000; Scheepers et al., 2006a & 2006b) in tighter cultures. In tighter cultures, religions' moral conventions might define social norms across various situations (Gelfand et al., 2011), signaling a higher status for religions as a source of moral conventions (Scheepers et al., 2006a & 2006b). Religiously non-affiliated individuals might find it hard to maintain a lack of religious affiliation in tighter cultures. As a result, they might prefer looser cultures. On the other hand, religious or religiously affiliated individuals might prefer tighter cultures to identify with religions. Confirming that possibility, identification with the religious ingroup played a central role in explaining the effects of personality on religious non-affiliations' prevalence in looser (vs. tighter) cultures in Study 2. The religious ingroup identification was the first to mediate the effects of personality and rarely failed to mediate connections between personality and other religion-related variables in ultimately predicting religions' prevalence.

A recent study tested the role of being or imagining oneself in a tighter vs. looser culture on the content of religious faith (Jackson et al., 2021). Still, how tighter (vs. looser) cultures and mindsets might impact general religiosity and affiliation with religions remained unanswered, as well as the personality environment *correlation* through which individuals might not just *react* to tighter vs. looser cultural environments but *choose* them. The present study extends the previous findings about the relationship between religions and tightness vs. looseness to include personality environment *correlation* and religious affiliations/non-affiliations' growth.

The results also highlight problems with religious affiliation/non-affiliation self-reports as a predictor of religions' population prevalence. Although the most direct method to measure population prevalence, religious affiliation/non-affiliation self-reports did not play a role in the significant pathways through which personality predicted religious affiliation/non-affiliation rates across societies in Study 2. Therefore, religiosity and religious ingroup identification might be valuable individual-level measures to determine religions' prevalence at a population level. Those measures might also be less stigmatizing because of being relatively less specific and more privacy-protective about group membership, reducing bias (Gervais & Najle, 2018) in self-reporting religious affiliations/non-affiliations.

The prevalence and the faster growth of religious affiliations today in tighter cultures, as reported in the present study, might be related to religious affiliations starting to grow faster in the 21st century (Johnson & Grim, 2013). Faster-growing religious identities in the 21st century might have become a valuable tool in tighter (vs. looser) cultures to define "moral conventions" across a broader range of situations (Gelfand et al., 2011, p. 1101). Future trends can emerge, shifting the weight in tighter cultures toward the faster growth of religious non-affiliations at a societal level. For example, in Study 2, Conscientiousness, a common trait factor in tighter (vs. looser) cultures (Gelfand et al., 2011; Harrington & Gelfand, 2014), directly predicted preferences to live in societies with higher non-affiliation rates without the mediation of culture or any religion-related variable. Therefore, through a Conscientiousness environment *correlation,* conscientious individuals choosing societies with higher non-affiliation rates to live in might theoretically change those societies toward becoming a tighter culture. Then, to the extent that secular norms prevail in societies with relatively higher non-affiliation rates, the tighter culture emerging through conscientious, but not necessarily religious, individuals in those societies might also help the non-affiliation rates increase further. Shifting trends in religious affiliation/non-affiliation rates over specific periods and across cultures may constitute a future area of research.

A limitation of the present study is that Study 1, which tested personality environment *interaction*, included a non-probabilistic online sample. However, a probabilistic sample in Study 2 ensured the generalizability of the present study findings. Future studies can test personality environment *interaction* through samples more representative of country populations. Also, the causal models tested in the present investigation do not necessarily show causality without manipulating the tested variables. Future studies might use experimental paradigms like that of Jackson et al. (2021) to test the specific causal connections between tightness-looseness and religion-related variables. They might also investigate the combined effects of personality environment *interaction* and *correlation* in predicting religions' population growth/decline across societies. Future studies might also study the impact of gene environment correlation and gene environment *interaction* (Dick, 2011; Persson, 2020), which underlie the personality environment *correlation* and personality environment *interaction*, as well as other individual-level characteristics besides personality.

Conclusion

The relationship between culture and personality might be useful in understanding the growth trends of religious affiliations and non-affiliations and help measure society's religious affiliation and non-affiliation rates more accurately beyond self-reports. Rather than replacing one another, religiously affiliated and non-affiliated populations might co-exist across societies, with religiously non-affiliated preferring and remaining in looser cultures, whereas the religiously affiliated live in relatively tighter ones. Within the same country, two populations might also become members of relatively tighter vs. looser cultures or groups with relatively more conscientious and open-to-experience members, with tightness-looseness/Conscientiousness-Openness becoming a useful tool to characterize affiliations/non-affiliation profiles at multiple levels.

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Religije rastu u čvršćim (a ne u labavijim) kulturama: dve studije zasnovane na poređenjima između i unutar država

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Religijska pripadnost i ne-pripadnost u društvu mogu rasti kroz korelaciju i interakciju ličnosti i okruženja. U Studiji 1, analize mešovitih efekata moderirane medijacije sprovedene na onlajn podacima prikupljenim iz 111 zemalja (N = 4,270) su pokazale da je bilo moguće na osnovu faktora ličnosti predvideti da će broj ljudi koji se smatraju pripadnicima religija rasti brže u državama sa čvršćim kultarama (nasuport država sa labavijim kulturama) između 2000. i 2015. Kroz višeslojnu SEM analizu serijske medijacije, Studija 2 je istraživala odgovore na anketu slučajnog uzorka (N = 4.963) regrutovanog nasumičnim biranjem brojeva telefona iz populacije SAD. Rezultati su pokazali da bi ličnost mogla da predvidi preferencije da osoba živi u relativno kulturno labavijim (umesto kulturno čvršćim) regionima zemlje, sa višom stopom ne-pripadnosti religiji tako što je prvo predviđena identifikacija sa verskom grupom, a zatim religioznost. Rezultati imaju implikacije za pokazivanje uticaja kulture i ličnosti na rast populacija pripadnika različitih religija, religioznost i identifikaciju verskih grupa, ponekad nezavisno od samoprocena verske pripadnosti/nepripadnosti.

Ključne reči: verska pripadnost naspram ne-pripadnosti, religioznost, identifikacija verske grupe, korelacija i interakcija ličnost × okruženje, čvršće naspram labavije kulture, rast stanovništva

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