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Attitudes and Laws About Abortion Are Linked to Extrinsic Mortality Risk: A Life-History Perspective on Variability in Reproductive Rights

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Abstract

Abortion policy is conventionally viewed as a political matter with religious overtones. This article offers a different view. From the perspective of evolutionary biology, abortion at a young age can represent prioritization of long-term development over immediate reproduction, a pattern established in other animal species as resulting from stable ecologies with low mortality risk. We examine whether laws and moral beliefs about abortions are linked to local mortality rates. Data from 50 U.S. states, 202 world societies, 2,596 adult individuals in 363 U.S. counties, and 147,260 respondents across the globe suggest that lower levels of mortality risk are associated with more permissive laws and attitudes toward abortion. Those associations were observed when we controlled for religiosity, political ideology, wealth, education, and industrialization. Integrating evolutionary and cultural perspectives offers an explanation as to why moral beliefs and legal norms about reproduction may be sensitive to levels of ecological adversity.

Keywords

abortions, abortion laws, reproductive rights, social norms, evolutionary psychology, life-history theory, open data, open materials

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After the historic overturn of the *Roe v. Wade* precedent in 2022, public opinion and laws regarding abortion have taken center stage in the American sociopolitical landscape. Why are attitudes toward abortion so polarizing? Conventional explanations suggest that views about reproductive rights reflect people's religious beliefs, political ideologies, and socioeconomic backgrounds (Dutta et al., 2021; Hoffmann & Johnson, 2005; Strickler & Danigelis, 2002; Woodrum & Davison, 1992). Notwithstanding the important role played by these forces, we suggest a different perspective: both laws (among governments) and attitudes (among individuals) may reflect adaptive responses calibrated to the level of survival threat in the immediate ecology.

From the standpoint of evolutionary biology, abortion—particularly in younger women—may reflect a means of prioritizing personal long-term growth and development over immediate reproduction. A similar pattern of delaying reproduction in other animal species has been linked to stable ecologies with low mortality risk (Charnov & Berrigan, 1990; Ellis, 2004; Kaplan & Gangestad, 2005). All living organisms face trade-offs related to the optimal allocation of limited bioenergetic resources; one such trade-off involves prioritization of immediate reproduction versus long-term growth. The way animal species manage this trade-off reflects features of their local ecologies, mainly harshness (risk of morbidity and mortality) and unpredictability (stochastic fluctuations in morbidity and mortality risk across time and contexts; Del Giudice, 2009; Ellis et al., 2009; Promislow & Harvey, 1990). Harsh and unpredictable environments cause organisms to prioritize immediate reproduction, because if reproduction is delayed, death may intervene. Such organisms (insects or small rodents

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being prototypical examples; Clissold & Simpson, 2015; Dobson & Oli, 2007) lean toward a faster life-history strategy characterized by earlier and more abundant reproduction. Conversely, in more stable ecologies with low mortality risk, organisms can afford to invest resources into long-term development and thus adopt a slower reproductive trajectory, resulting in older age at parturition and higher investment in fewer offspring. Prototypical examples of this slower reproductive strategy include chimpanzees, elephants, and humans.

Originally used to explain between-species variation in reproductive pacing and other fitness-related traits (e.g., fertility, mortality, offspring size), life-history theory has also been applied to humans (Zietsch & Sidari, 2020). Human populations may adjust their reproductive timing and number of offspring to local mortality-risk levels (Anderson, 2010; Low et al., 2008), whereas harsh and unpredictable childhood environments may trigger faster reproductive trajectories in adolescents, resulting in earlier age of sexual maturity and greater promiscuity (Belsky et al., 1991; Ellis, 2004).

Benefits of Slower and Faster Life-History Strategies

From a life-history perspective, neither strategy, fast or slow, is inherently better than the other: Both are well-calibrated to the immediate environment; the most adaptive feature is flexibility. Indeed, evidence in modern humans suggests that there is no perfect age for parenting. In westernized societies, older parents are, on average, better able to provide for children than younger parents are, because of their higher education levels, their social and emotional maturity, and their greater investment in childcare (Barnes et al., 2014; Trillingsgaard & Sommer, 2018). However, these benefits of older parenting are specific to advanced economies over the past few decades: in the mid-20th century, when life expectancy was lower, older parenting was associated with worse offspring outcomes (Myrskylä et al., 2017). Optimal timing of reproduction may thus be determined by features of human environments: Delayed reproduction may serve as an adaptive response to safety and predictability, whereas higher environmental risk may trigger earlier reproduction.

Abortion as a Sign of a Slower Strategy

Evolutionary scientists have conceptualized abortion as a sign of slower life history (Hill & Low, 1992). When mortality risk is low, younger women with high future reproductive potential may forego immediate reproduction, instead investing into personal development to devote greater resources to higher-quality parental care in the future; this strategy appears less adaptive under higher risk of early mortality (Adair & Lozano, 2022). Indeed, one investigation in England and Wales used a life-history perspective to link lower environmental adversity to higher abortion rates, suggesting that earlier reproduction may be favored in areas with higher mortality (Virgo & Sear, 2016). This human pattern is consistent with the phenomenon of spontaneous abortion in other animal species, which sometimes occurs in response to environmental stress (Inzani et al., 2019).

Modern (medical) forms of abortion are evolutionarily novel; their earliest mentions date back only to 2737 BC (Himes, 1934). Nevertheless, decisions regarding abortion likely reflect the operation of fundamental evolved motivations. Ecological stability may cause temporary downregulation of motives, including mating (see Dinh et al., 2017) and parenting (Schaller, 2018), in favor of motives of status seeking and social belonging (Dinh et al., 2021; Kenrick et al., 2010). Building status and social-support networks allows one to invest in higher-quality parenting later in life. Thus, although modern abortion is evolutionarily novel, the motives underlying it likely are not.

Reproductively Relevant Beliefs and Attitudes

Evolutionary principles have helped explain attitudes toward important and controversial social phenomena.

Statement of Relevance

After the overturn of *Roe v. Wade*, public opinion and laws regarding abortion have taken center stage in the American sociopolitical landscape. Rather than an issue specific to U.S. politics, however, reproductive norms are an essential social issue worldwide, and the debate about the acceptability of abortion appears universal. This article incorporates the evolutionary perspective of life-history theory to look at abortion—especially in younger women—as an adaptive means of prioritizing long-term development over immediate reproduction, a pattern established in other animal species as a feature of stable ecologies with low mortality risk. Social norms, beliefs, and laws about abortions may serve as cultural tools people use to regulate reproductive behavior in response to local mortality risk. Supporting this perspective, global, local, and individual data from multiple sources suggest that lower levels of extrinsic mortality risk are associated with more permissive laws and attitudes toward abortion.

Committed sexual strategies, for example, predict negative attitudes toward abortion (Weeden, 2003), harsher moral judgment of drugs (Kurzban et al., 2010), and less acceptance of sexual minorities (D. Pinsof & Haselton, 2016), each of which has been theorized to help committed individuals succeed in the mating arena (Weeden & Kurzban, 2017). Within the context of life-history theory, adverse environments predict various sexual beliefs, including more permissive attitudes toward premarital sex (Brumbach et al., 2007, 2009) and early pregnancy (Quinlivan, 2004), both of which have been conceptualized as reflecting a fast life-history strategy (Frederick, 2012). Reproductive considerations thus may lead people to adopt attitudes about social phenomena that increase their reproductive success. The current work advances this literature by using a life-history perspective to examine links between environmental mortality risk and individual attitudes, shared beliefs, and laws concerning abortion.

The Current Research

Although women may make individual reproductive decisions, the act of abortion is highly social, reliant on infrastructure and community support. Attitudes, social norms, and laws regarding abortion influence women's willingness and ability to control their own reproductive outcomes (Moseson et al., 2020; Sorhaindo & Lavelanet, 2022).

Legal and social norms emerge from interactions among individuals and, at the same time, powerfully regulate individual attitudes, decisions, and behavior (Schultz et al., 2007). Just as mortality risk in the local ecology may be linked with abortion rates (Virgo & Sear, 2016), so too may it be linked with attitudes, social norms, and laws that govern women's rights and reproductive decisions.

In the current work, we investigate whether low (vs. high) local levels of extrinsic mortality risk are associated with more permissive (vs. restrictive) local laws and with individual and shared social attitudes regarding abortion. We control for variables conventionally believed to drive abortion attitudes, including religiosity, political ideology, income, education, and social class (Dutta et al., 2021; Hoffmann & Johnson, 2005; Strickler & Danigelis, 2002; Woodrum & Davison, 1992). Original data sets and descriptions of all statistical procedures are available on the Open Science Framework (https://osf.io/7tsq2/).

Method

Analytic strategy

To test the hypothesized association between the restrictiveness of abortion laws and beliefs and local mortality rates, we used publicly available data on four levels: (a) 50 U.S. states, (b) 2,596 individuals residing in 363 U.S. counties, (c) 202 nations, and (d) 147,260 individuals from 88 world societies. On each level, we controlled for conventional explanatory variables and tested whether local mortality would predict abortion attitudes and laws.

Overview of variables

Abortion views and laws. Outcome variables of interest included (a) individual attitudes people hold toward abortions, (b) culturally shared views concerning abortions, (c) state-level laws that regulate access to abortion, and (d) national-level laws that regulate access to abortion.

Mortality. We used life expectancy at birth as a cumulative measure of mortality risk. We also conducted similar analyses using infant mortality instead of life expectancy to rule out alternative explanations, such as maternal mortality during childbirth (see the Discussion section). The two variables were included in separate models because they are similar both conceptually and operationally (life-expectancy factors in mortality across all ages, including infant mortality) and because their high correlation ($r = -.81$) causes problems with multicollinearity. Models that include life expectancy are reported in the main text; models that include infant mortality are reported in the Supplemental Material available online.

Religiosity. In the United States, Catholicism and certain branches of Protestantism are associated with negative attitudes toward abortion; so are other forms of religious fundamentalism (Hoffmann & Johnson, 2005; Woodrum & Davison, 1992). We controlled for religiosity in models of attitudes held by individual Americans and of U.S. state laws (see the Operationalization of Variables section below for details).

Political orientation. Political conservatism in the United States, and specifically support of the Republican party, is strongly associated with more negative attitudes toward abortion (Strickler & Danigelis, 2002). Political orientation was included in analyses of individual American attitudes and state laws.

Education. Higher educational attainment is a robust predictor of more positive attitudes toward abortion, both in the United States and worldwide (Dutta et al., 2021). It was included as a covariate on all levels.

Industrialization. At the level of world nations, we controlled for industrialization, addressing an explanatory framework set forth by a prominent theory of cultural values (Inglehart & Welzel, 2005) in which progressive

values are a function of industrial-to-postindustrial transition. In this view, postindustrial countries tend to hold more liberal views of sexual and reproductive norms.

Wealth. To isolate the role of mortality, we controlled for socioeconomic status as well as its population-level analogues, such as median income or gross domestic product (GDP) per capita, or PPP. We refer to these variables collectively as "wealth."

Modeling strategy. Leveraging geographical data, we controlled for statistical nonindependence of data points that belong to the same regions. On three out of four levels, we used hierarchical linear modeling, in which individual data points were nested within larger geographical units (e.g., towns for individuals, world regions for world nations). On the level of U.S. states, however, we did not nest observations within regions because of the naturally small population size ($N = 50$); thus, statistical power to capture multilevel effects was limited.

Levels of analysis

U.S. states. The association between local mortality and the restrictiveness of state abortion laws was tested across 50 U.S. states; we controlled for state-level measures of political leaning, religiosity, educational attainment, and median income.

Individuals residing in U.S. counties. We used survey data on 2,596 individuals and census data on their 363 counties of residence to test the association between county-level mortality and individuals' attitudes toward abortion. We controlled for individually reported political leanings, religious beliefs, household finances, education, and social class.

World nations. We then moved beyond the United States and tested the same association between federal abortion regulations of 202 countries and their nation-level mortality, controlling for nation-level wealth, educational attainment, and industrialization. Finally, we tested the link between nation-level mortality and the individual abortion views of 147,260 respondents aggregated across their 88 countries of residence. On the level of world nations, we were unable to control for political or religious beliefs because of the absence of a global taxonomy of religions or political ideologies regarding their stance on abortions. However, we controlled for industrialization and education as conventional predictors of progressivity in shared cultural values (Inglehart & Welzel, 2005).

Aggregation. Depending on the level of analysis and the availability of data, we used the closest available unit of aggregation and the most appropriate variable available to represent each construct. For instance, when looking at predictors of individual attitudes to abortions, we used person-level income, religiosity, and political beliefs, but we used county-level data on mortality rates to represent local ecological risk levels. To represent wealth, we used reported household income on the individual level, median household income on the state level, and PPP on the national level.

Data sources. We used cross-sectional public data from multiple trusted open sources, including the Center for Reproductive Rights, the World Bank, the Centers for Disease Control and Prevention (CDC), and more. Each source is mentioned for a particular variable operationalization below; links to all sources can be found in the references and the Supplemental Material.

Whenever data sets from two or more sources were synthesized, we used a universal coding system to merge the data, such as ISO Alpha-3 and M-49 country codes, U.S. census ZIP codes, county Federal Information Processing Series (FIPS) codes, and U.S. states' letter and number codes. Original data sets and descriptions of all statistical procedures are available in a project folder on the Open Science Framework (https://osf.io/7tsq2/). See the Supplemental Material for a complete list of sources with links.

Operationalization of variables

Laws and attitudes regarding abortion.

State abortion laws. We used data on state abortion laws (Center for Reproductive Rights, 2022), where experts rated the restrictiveness of each state's abortion laws. Ratings include *expanded access* (coded as 1), *protected* (2), *not protected* (3), *hostile* (4), and *illegal* (5).

National abortion laws. We used data on federal abortion regulations of 202 nations classified by the necessary and sufficient grounds for getting an abortion procedure (Center for Reproductive Rights, 2022). Categories span from more to less accessible and include *on request* (coded as 1), *broad social or economic grounds* (2), *to preserve health* (3), *to save the woman's life* (4), and *prohibited altogether* (5).

Individual attitudes to abortion. We used the U.S. subset of the seventh round of the World Values Survey (WVS; Haerpfer et al., 2020), which contained 2,596 responses of individual Americans. We focused on item Q184: "Justifiable: Abortion," which uses a scale ranging from 1 to 10 (1 = *can never be justified*, 10 = *can always be justified*), which reflects individual opinions about the acceptability of abortion.

Table 1. Zero-Order Correlations Between State-Level Variables

	Variable	*M*	*SD*	1	2	3	4	5	6	7	8
1	Abortion law restrictiveness	3.06	1.43								
2	Life expectancy, years	78.75	1.80	−.73**							
3	Republican leaning, %	37.30	11.76	.68**	−.47**						
4	Protestants and Catholics, %	67.08	11.60	.44**	−.57**	.19					
5	All Christians, %	71.30	7.45	.70**	−.67**	.52**	.72**				
6	All religious, %	76.26	5.85	.53**	−.53**	.36**	.71**	.95**			
7	Median income, $1,000	64.98	10.60	−.70**	.81**	−.56**	−.53**	−.60**	−.43**		
8	Educational attainment, %	32.00	5.24	−.71**	.77**	−.58**	−.44**	−.61**	−.46**	.85**	

**$p < .01$.

Nation-level attitudes to abortion. We used the joint European Values Survey/World Values Survey data (EVS/WVS, 2021), focusing on item F120: "Justifiable: Abortion" (same scale as above). The data set contained responses from 147,260 individuals, which we aggregated by their 88 countries of residence.

Mortality.

State-level life expectancy and infant mortality. We used data from the CDC (Arias et al., 2022) measuring total life expectancy in years and infant-mortality rates in the 50 U.S. states. Life expectancy at birth is calculated as the number of deaths in a particular year divided by the average number of people alive in this year. Infant mortality is measured as the number of deaths of infants under 1 year old per 1,000 live births.

County-level life expectancy and infant-mortality rates. We used data on life expectancy by U.S. county (Institute of Health Metrics and Evaluation, 2022), as well as CDC data on infant-mortality rates by U.S. county (Infant Mortality Rates for Metropolitan and Nonmetropolitan Counties, by Single Race and Hispanic Origin, 2021). Infant mortality was measured as number of deaths per 1,000 live births, aggregated across four infant age groups (< 1 day, 1–6 days, 7–27 days, 28–364 days) to represent total mortality rates in infants under 1 year old.

Nation-level life expectancy and infant-mortality rates. We used data on life expectancy and infant-mortality rates by country from World Development Indicators (World Bank, 2022); data were averaged across the years 2011 through 2021.

Note that life expectancy and infant mortality are both reasonable operationalizations of extrinsic mortality risk. For conciseness, in the main text we report analyses focusing on life expectancy—the most cumulative measure of mortality rates. All reported results held for infant mortality (see the Supplemental Material for full statistical reporting and figures).

Covariates: Socioeconomic indicators.

State-level indicators. We synthesized data from multiple sources to control for state-level wealth, educational attainment, religiosity, and prevailing political orientation. Religiosity on the state level was operationalized in three ways: the percentage of people who self-identify as (a) Catholics, (b) as Christians, and (c) as religious (source: Pew Research Center, 2015). The proportion of Christians had the highest zero-order correlation with the outcome variable (see Table 1), so we adopted a conservative approach and used it in the primary statistical models. The table includes the three most relevant ways to operationalize religiosity with regard to the American abortion debate. In regression models below, we conservatively use the highest zero-order correlate of law restrictiveness (% of Christians) as a covariate representing religiosity. See correlations with infant mortality in Table S1 in the Supplemental Material.

Political leaning on the state level was measured as the percentage of the adult population identifying as Republicans (Gallup, 2017). State-level education was measured as the percentage of adults with a college degree (U.S. Department of Agriculture, 2022). Wealth was measured as median household income (U.S. Bureau of Economic Analysis, 2022).

Individual-level indicators. To control for individuals' religious beliefs, we used two WVS items interchangeably: "Are you a religious person?" (*yes* or *no*), and "importance of God in your life" (1 = *not at all*, 10 = *very important*). Both measures yielded similar results; in the main text, we report models using the latter (continuous) predictor.

To control for political ideology, we used two WVS items: "Which party would you vote for if there were a

national election tomorrow?" (recoded as 1 = *Republican*, 0 = *Democratic, Libertarian, or Green*) and "In political matters, people talk of 'the left' and 'the right.' How would you place your views on this scale, generally speaking?" (1 = *left*, 10 = *right*). We used the items interchangeably, and the models yielded similar results; in the main text, we report models using the latter (continuous) predictor.

To control for individual education, income, and social class, we used the following items: "highest educational level attained" (0 = *less than primary*, 8 = *doctoral or equivalent*), "satisfaction with financial situation of household" (1 = *completely dissatisfied*, 10 = *completely satisfied*), "income scale" (1 = *lowest*, 10 = *highest*), and "social class" (reverse-coded as 1 = *lower*, 5 = *upper*).

Nation-level indicators. To represent wealth, we used World Bank Development Indicators data on national PPP averaged across the years 2011 through 2021. To control for education, we used World Bank Development Indicators data on the percentage of population with at least intermediate education (see Fig. S5 in the Supplemental Material for the rationale of selecting this variable among other educational indicators). To control for industrialization, we used an industrialization intensity index, part of the Competitive Industrial Performance Index (United Nations Industrial Development Organization, 2022). Industrialization intensity is the average share of manufacturing value added in GDP and the share of medium and high-technology activities in manufacturing value added. The former captures the role of manufacturing in the economy, and the latter captures the technological complexity of manufacturing.

Power analysis. Based on prior work reporting effects of mortality on human reproductive behavior (e.g., Anderson, 2010; Low et al., 2008), we expected the effects of mortality to be in the medium to large range. A calculation of Cohen's f^2 from previously reported R^2 (Cohen, 1988) yielded estimates varying of .18 to 1.16 (see the Supplemental Material for calculations). Conservatively using the lower-bound estimate as an expected effect size, we conducted a post-hoc power (sensitivity) analysis, which suggested that on the level of 50 U.S. states, multiple-regression models had conventionally sufficient statistical power (> 80%) to capture the expected effects with a model containing one predictor. Increasing the number of predictors to two or three decreased sensitivity to 75% and 68%, respectively. Hence, for state-level analyses ($N = 50$), we report hierarchical regression analyses, introducing groups of predictors step by step. On the levels of individuals and counties ($N = 2{,}596$ and $N = 363$) and world nations ($N = 202$), regression models with up to six predictors resulted in sensitivity of 100% and 99%, respectively; therefore, there were no power-related limitations in using all predictors within the same models.

Ethical approval and consent to participate. This research was exempt from review by the Internal Review Board of Florida State University because it did not involve any interaction with human subjects and used secondary deidentified data from public sources. All research was performed in accordance with relevant guidelines and regulations.

Results

State abortion laws in the United States

Zero-order correlations. On the level of U.S. states, life expectancy significantly and negatively correlated with abortion-law restrictiveness ($r = -.73$, $p < .01$). Educational attainment, all religiosity indicators, and median income were also significantly correlated with abortion-law restrictiveness (see Table 1).

Multiple regressions. Life expectancy was a significant predictor of abortion-law restrictiveness in a univariate regression model. It remained significant in a multiple-regression model that controlled for average state religiosity and dominating political-party affiliation. It also remained significant in a model that controlled for state educational attainment and per capita income. In a model with all four covariates together, life expectancy remained marginally significant ($p = .058$; see Table 2 and Fig. 1).

Americans' individual beliefs about the acceptability of abortion

Zero-order correlations. Life expectancy in respondents' county of residence significantly and positively correlated with their individual proclivity to justify abortions ($r = .13$, $p < .01$). Individual-level political leaning, religiosity, income, educational attainment, and social class also significantly correlated with positive attitudes to abortion (see Table S2 in the Supplemental Material).

Hierarchical linear models. We used hierarchical linear modeling to predict individual attitudes toward abortion from county-level life expectancy, controlling for respondents' individually reported religiosity, political leanings, educational attainment, household income, and financial situation. Individuals were nested within their cities or towns of residence to account for shared variance in features of local ecology. Notably, life expectancy was the only group-level variable against five individual-level

Table 2. Hierarchical Regression Analysis of Restrictiveness of State Abortion Laws as Predicted by State-Level Life Expectancy, Religiosity and Political Leaning, Income per Capita, and Educational Attainment

	B	*SE*	*t*	*p*	Partial r^2
Adjusted model R^2 = .526, $F(1, 48)$ = 55.39					
Life expectancy in years	**−0.58**	**0.07**	**−7.442**	**< .001**	**0.526**
Adjusted model R^2 = .689, $F(3, 46)$ = 37.29					
Life expectancy in years	**−0.31**	**0.08**	**−3.58**	**< .001*** **	**0.219**
Republicans (%)	**0.04**	**0.01**	**3.81**	**< .001*** **	**0.240**
Christians (%)	**0.05**	**0.02**	**2.22**	**.031***	**0.096**
Adjusted model R^2 = .567, $F(3, 46)$ = 22.37					
Life expectancy in years	**−0.32**	**0.13**	**−2.44**	**.018****	**0.115**
Median income, $1,000	−0.00	0.00	−0.56	.577	0.006
Educational attainment, %	−0.08	0.05	−1.63	.109	0.055
Adjusted model R^2 = .683, $F(5, 44)$ = 20.92					
Life expectancy in years	−0.23	0.12	−1.94	.058	0.079
Republicans (%)	**0.03**	**0.01**	**3.13**	**.003****	**0.181**
Christians (%)	**0.04**	**0.02**	**2.09**	**.041***	**0.091**
Median income, %	−0.00	0.00	−0.21	.837	0.001
Educational attainment	−0.03	0.04	−0.71	.484	0.011

Note: N = 50. Highlighted in bold are coefficients for predictors significant at p = .05 or lower. In the model with five predictors, the effect of life expectancy is marginally significant.
*p < .05. **p < .01. ***p < .001.

variables, yet it remained significant over and above all covariates (see Table 3 and Fig. 2).

National abortion laws

Zero-order correlations. On the level of world nations, restrictiveness of abortion laws significantly and negatively correlated with life expectancy (r = −.46, p < .01; GDP per capita was also a significant and negative correlate; see Table S3 in the Supplemental Material).

Hierarchical linear models. In a hierarchical linear model predicting the restrictiveness of national abortion laws across 202 world nations nested within 21 larger world regions (to account for shared ecological and cultural variance), life expectancy remained a significant predictor over and above national GDP per capita, level of industrialization, and rates of intermediate education among the working-age population (see Table 4 and Fig. 3).

Nationally aggregated beliefs about the acceptability of abortions

Zero-order correlations. A nationally aggregated proclivity to justify abortion significantly and positively correlated with nation-level life expectancy (r = .64, p < .01). GDP per capita, industrialization, and education were also significant correlates (see Table S3 in the Supplemental Material).

Hierarchical linear models. In a hierarchical linear model of averaged attitudes toward abortion, nation-level life expectancy remained significant over and above nation-level GDP per capita, level of industrialization, and educational attainment (see Table 5 and Fig. 4).

Infant mortality

All the above results held when life expectancy was replaced with infant mortality; see the Supplemental Material for hierarchical regression models (Tables S4, S5, S7, and S8) and visualizations (Figs. S1–S4) for each level.

Discussion

Across multiple levels of analysis, we observed a robust pattern: More restrictive abortion attitudes and laws are predicted by higher local mortality rates. Moreover, this link holds beyond conventional explanatory variables, including religiosity, political ideology, education, wealth, and industrialization, suggesting a robust association between mortality levels and people's (and governments') stances regarding reproductive rights.

Notably, the link held when we controlled for individual socioeconomic status or population-level wealth. Socioeconomic status is often used as a proxy for mortality risk (Belsky et al., 1991; Ellis, 2004) because the two are strongly and inversely correlated (and socioeconomic status is often easier to measure). A strength of the current work is that we included direct measures

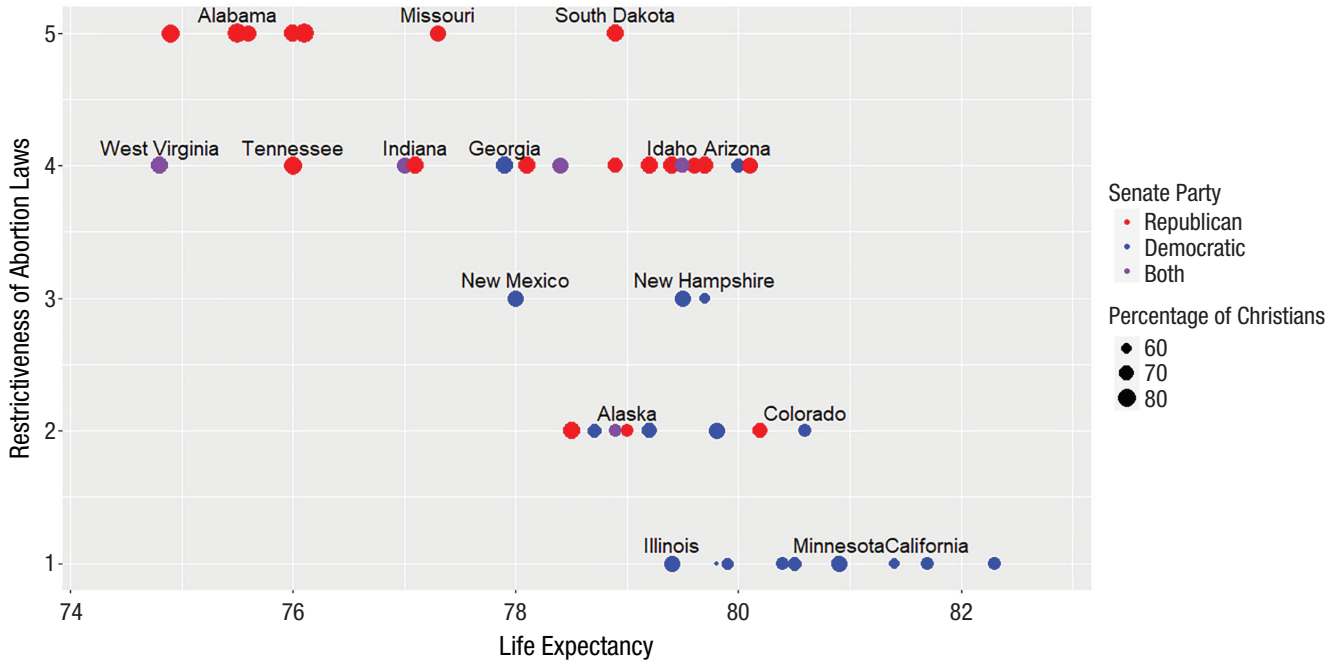

Fig. 1. Restrictiveness of state abortion laws as predicted by life expectancy. The size of dots reflects religiosity; colors illustrate the dominant Senate party in the state.

of mortality without relying on proxy variables. Mortality remained a significant predictor on all levels of analysis, suggesting that there are effects specific to mortality that are not captured by conventional socioeconomic proxies.

Implications

The current findings fit with theories of adaptive calibration and human life history in suggesting that people adjust their reproductive pace to the adversity of their

Table 3. Hierarchical Linear Model of Americans' Individual Attitudes to Abortion as Predicted by Local Life Expectancy and Individual Religiosity, Political Leaning, Income, Education, and Social Class

	How justifiable is abortion?			
Predictors	Estimates	95% CI	*p*	Semi-partial *r*
(Intercept)	5.25	[5.08, 5.43]	< **.001**	
Life expectancy (county-level in years)	**0.24**	**[–0.09, –0.40]**	**.002**	0.009
Religiosity (self-reported)	**–1.12**	**[–1.26, –0.98]**	< **.001**	0.156
Political leaning (higher score = right)	**–0.88**	**[–1.02, –0.74]**	< **.001**	0.100
Education (highest level attained)	**0.18**	**[0.03, 0.33]**	**.021**	0.004
Social class (subjective)	–0.10	[–0.27, 0.08]	.276	0.001
Income group (self-reported)	**0.19**	**[–0.03, 0.36]**	**.023**	0.004
Household finances (self-reported)	–0.09	[–0.24, 0.06]	.242	0.001
Random effects				
σ^2		5.99		
τ_{00Town_Code}		0.28		
ICC		.05		
N_{Town_Code}		245		
Observations		1,345		
Marginal R^2 / conditional R^2		.325 / .356		

Note: Predictors were scaled. Highlighted in bold are predictors significant at $p < .05$. An alternative model with infant mortality as the primary predictor is available in the Supplemental Materials (see Table S5; see Table S6 for a similar model that controls for participant's gender, age, and their interaction term). CI = confidence interval; ICC = intraclass correlation coefficient.

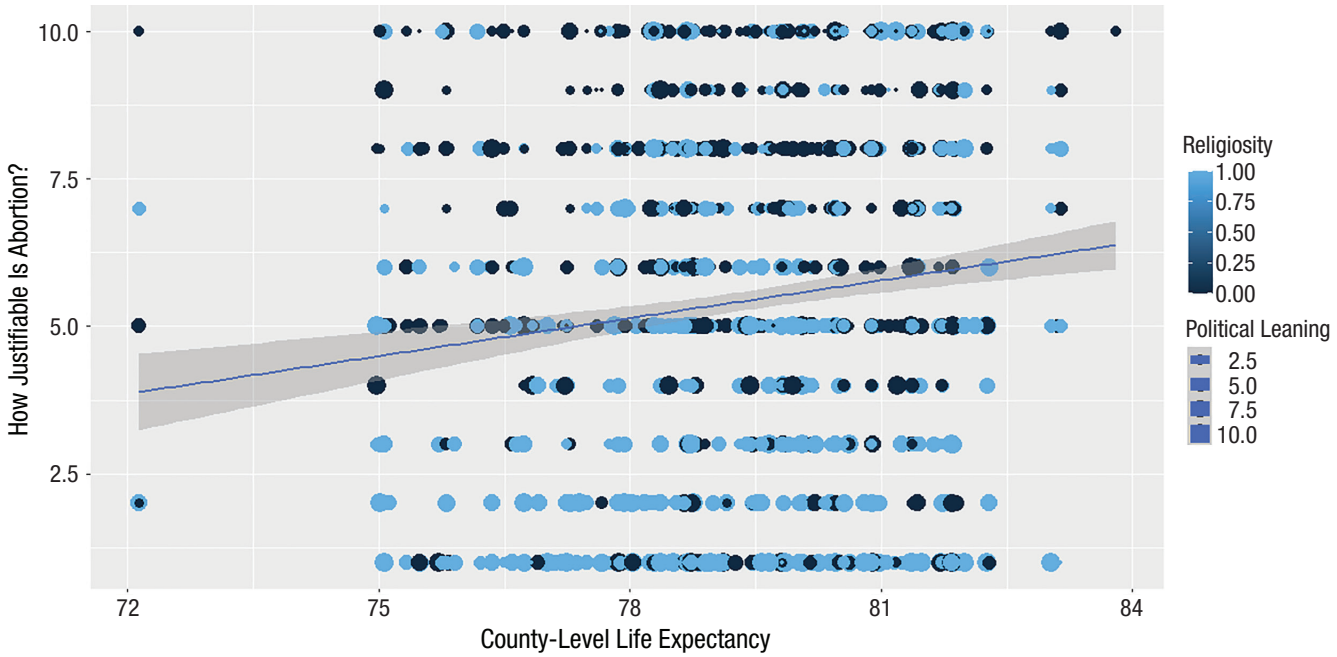

Fig. 2. Individual attitudes to abortion as predicted by county-level life expectancy. The size of the dots reflects political leaning (1 = left, 10 = right). Color intensity represents religiosity (lighter color illustrates higher religiosity). The shaded area represents the confidence interval for the slope.

immediate ecology (Del Giudice, 2009; Ellis et al., 2009). Abortions may represent behaviors aimed at delaying reproduction in favor of long-term personal development (e.g., getting an education, building a career). Conversely, more restrictive views toward abortion may facilitate accelerated reproduction in response to high mortality risk. Our findings go beyond existing evidence involving individual abortion choices: Mortality rates also predicted shared norms on the national level, as well as state-level and nation-level laws.

How might supporting shared cultural norms and laws enhance an individual's reproductive fitness? We considered a few possible explanations. One involves fitness interdependence among kin and members of

Table 4. Hierarchical Linear Model of National Abortion Laws as Predicted by Nation-Level Life Expectancy, Controlling for Industrialization, Wealth, and Education

	Restrictiveness of national abortion laws			
Predictors	Estimates	95% CI	*p*	Semi-partial r^2
(Intercept)	2.50	[2.10, 2.89]	< .001	
Life expectancy	**−0.52**	**[−0.92, −0.12]**	**.012**	**.076**
GDP per capita (PPP)	0.03	[−0.39, 0.46]	.876	.010
Industrialization	−0.00	[−0.27, 0.26]	.974	.000
Intermediary education rates	−0.14	[−0.41, 0.13]	.313	.000
Random effects				
σ^2		1.31		
$\tau_{00\ world\_region}$		0.58		
ICC		.31		
N_{world_region}		21		
Observations		133		
Marginal R^2 / conditional R^2		.116 / .389		

Note: Countries are nested withing larger world regions. Highlighted in bold are coefficients for the only significant nation-level predictor of national abortion-law restrictiveness: life expectancy. (See the Supplemental Material for a model using infant mortality as the primary predictor.) CI = confidence interval; GDP = gross domestic product; ICC = intraclass correlation coefficient.

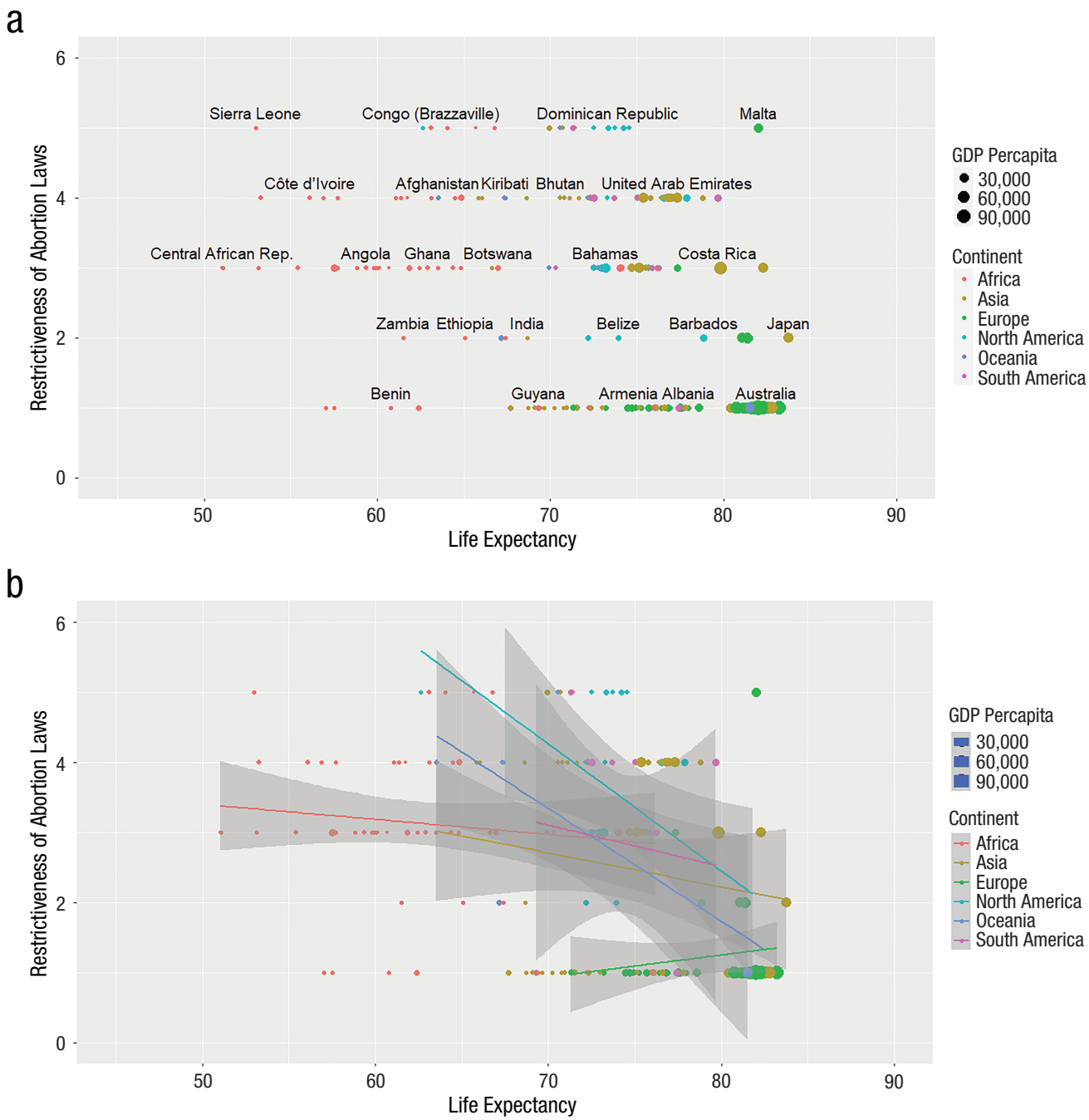

Fig. 3. Restrictiveness of national abortion laws as predicted by nation-level life expectancy: scatterplot (a) and relevant regression slopes by continent (b). The size of the dots reflects gross domestic product (GDP) per capita; colors represent continents. (See the Supplemental Material for findings using infant mortality as the primary predictor.) The shaded areas represent confidence intervals around the regression slopes in the bottom panel.

cooperative alliances (Van Lange & Balliet, 2015). Although the modern world is filled with strangers, the tendency to impose adaptive reproductive norms on other people could have evolved in ancestral hunter-gatherer groups through mechanisms involving kin selection and reciprocal altruism (Trivers, 1971). Ancestral groups consisted primarily of kin or highly interdependent others; encouraging such close others to adopt adaptive reproductive behaviors could have benefited the reproductive outcomes of those who held and spread strong beliefs. Such an explanation is consistent with theories of evoked culture, in which human groups develop and transmit social and moral norms that help their members survive and reproduce more effectively (Gangestad et al., 2006; Schaller & Murray, 2008; Tooby & Cosmides, 1992).

Table 5. Hierarchical Linear Model of Nationally Aggregated Abortion Attitudes as Predicted by Nation-Level Life Expectancy, GDP per Capita, Education, and Industrialization

	How justifiable is abortion? National aggregates			
Predictors	Estimates	95% CI	*p*	Semi-partial r^2
(Intercept)	3.61	[3.18, 4.05]	< .001	
Life expectancy	**0.61**	**[0.12, 1.10]**	**.016**	**.081**
GDP per capita (PPP)	**0.62**	**[0.18, 1.06]**	**.006**	**.102**
Industrialization	0.17	[–0.08, 0.42]	.176	.023
Intermediate education rates	0.06	[–0.25, 0.37]	.710	.002
Random effects				
σ^2		0.62		
$\tau_{00world\_region}$		0.86		
ICC		.58		
N_{world_region}		16		
Observations		81		
Marginal R^2 / conditional R^2		.382 / .740		

Note. Each item is measured as respondents' reports on the corresponding scale in European Values Survey / World Values Survey averaged across ~2,000 responses per country. CI = confidence interval; GDP = gross domestic product; ICC = intraclass correlation coefficient.

Another possible explanation is that cultural transmission of abortion-related values and norms is merely a nonfunctional byproduct of individual reproductive attitudes. This, however, would hardly seem to explain why people so ardently impose their moral views on others (Hone et al., 2021; Krebs, 2008; Kurzban et al., 2010).

A third type of explanation involves intrasexual competition: People may impose on others norms that help them compete in the mating arena. Although not consistent with the current findings, people pursuing a committed mating strategy have been found to oppose abortion because abortion might be viewed as facilitating casual sex, thus undermining the efficacy of their own long-term mating strategies (see Baumeister & Vohs, 2004; Kurzban et al., 2010; D. R. Pinsof, 2018).

Limitations and future directions

Third-variable and reverse-causality explanations are plausible. Lack of medical access to safe and legal abortion underlies higher maternal mortality during childbirth (Kulczycki et al., 1996), which may partially explain the association between abortion laws and mortality. However, this interpretation is unlikely to explain the association with infant mortality. Being denied an abortion can exacerbate poverty (Miller et al., 2020), which, in turn, can lead to greater mortality of both mother and offspring. In areas with poor health care, women may hesitate to undergo abortion for fear of negative health outcomes, and hence they may develop negative attitudes toward abortion (this speculation, however, would not explain variability of attitudes within countries with advanced health care, such as the United States).

Because the current findings are based on analyses of correlational, cross-sectional, aggregated data coming from different years, we cannot draw strong causal conclusions about the nature of the relationship. To continue investigating this relationship, future researchers would be wise to select experimental, quasiexperimental, and longitudinal designs. They could also explore the effects of mortality on attitudes and laws concerning other aspects of human reproduction, such as attitudes toward contraception, sexual education, or childlessness. Finally, future work might examine the role of hormonal mechanisms in delaying reproduction (e.g., increases in progesterone relative to estradiol) in favor of other motivations, including social affiliation (Dinh et al., 2021).

Readers should be aware of debates regarding the application of life-history theory to humans. Some question whether adaptive calibration to ecological variables results in "strategies" (Nettle & Frankenhuis, 2020) and whether they exist on a fast-to-slow continuum (André & Rousset, 2020; Stearns & Rodrigues, 2020). However, others argue that the notion of fast or slow life histories serves as a useful conceptual framework for generating hypotheses about human behavior (Del Giudice, 2020).

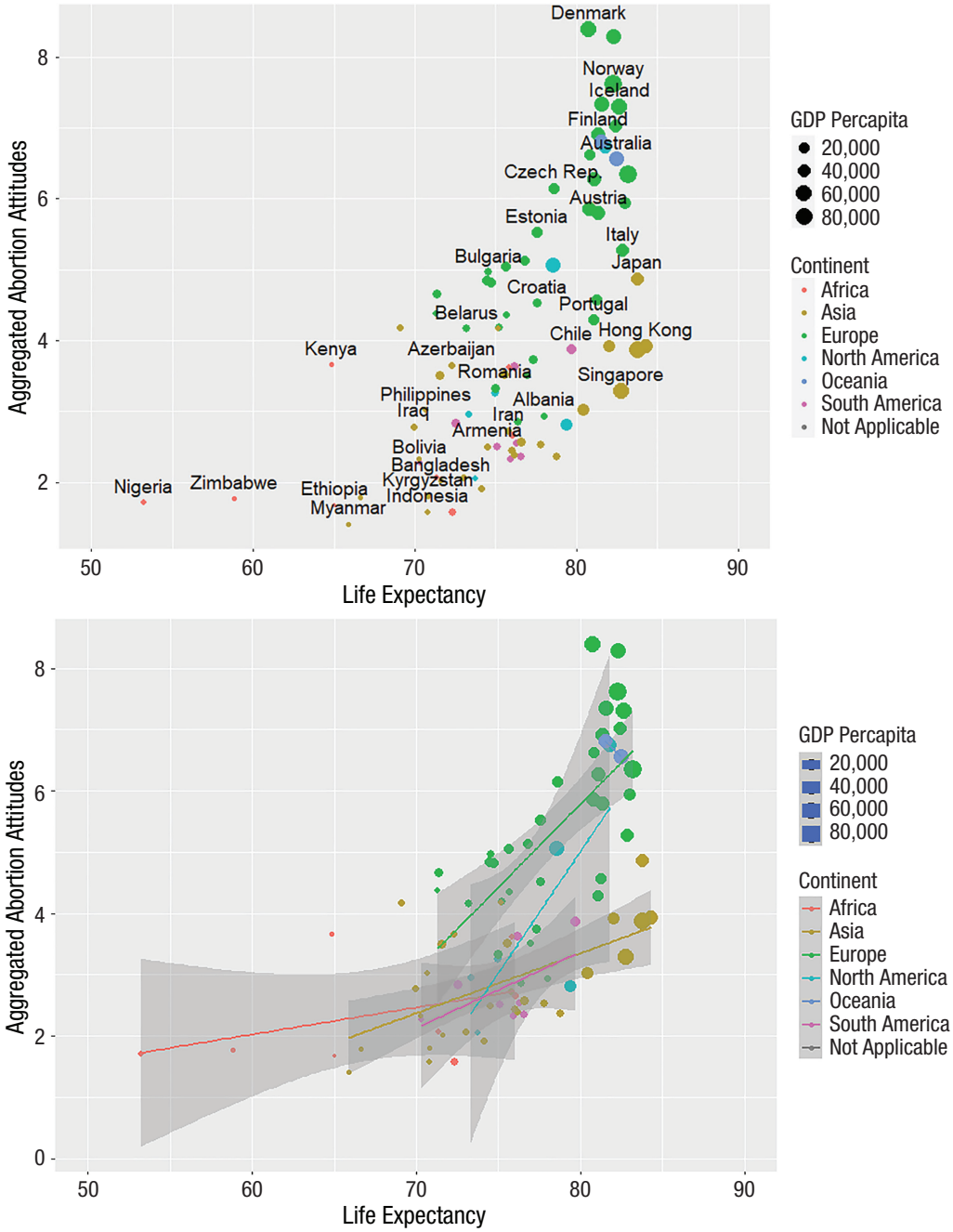

Fig. 4. Nation-level averaged attitudes to abortion as predicted by nation-level life expectancy. Size of dots reflects gross domestic product (GDP) per capita; colors represent continents.

Conclusion

The current research is among the first to examine abortion-related attitudes and laws from an evolutionary perspective, documenting links between features of human environments and systems of morality and law that guide reproductive behavior. Whereas many life-history applications focus on individual differences, this work suggests that ecological variables may also play a crucial role in calibrating societal and cultural processes that serve as a foundation for human reproductive decision-making.

Transparency

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Elena Brandt: Conceptualization; Data curation; Formal analysis; Project administration; Visualization; Writing – original draft.

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Open Practices

Original data sets and descriptions of all statistical procedures are available on the Open Science Framework (https://osf.io/7tsq2/). This article has received the badges for Open Data and Open Materials. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

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