

Assessing Diverse Anthropogenic Attributions as Pathways to Climate Action

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Abstract

Individuals draw upon diverse knowledge frameworks to explain anthropogenic climate change. Yet whether such climate attributions motivate action, independently of or alongside scientific explanations, remains an open empirical question. Using an original, representative 2023 survey of climate attitudes in the Philippines, we assess whether three anthropogenic attributions—scientific, spiritual, and religious—shape not only understanding of climate change, but also willingness to act. All three attribution frames are associated with greater overall climate action, including lifestyle change, protesting, voting, and support for pro-climate economic policy, while the religious frame uniquely predicts economic policy. Spiritual convictions and religious beliefs thus appear to motivate climate action as effectively as scientific understanding. These findings, robust to social, political, and economic controls as well as subjective climate exposure, underscore the need to recognize and integrate multiple attribution frames in climate communication and policy, supporting more inclusive and effective climate action across diverse communities.

INTRODUCTION

In 2013, the Philippines was hit by a devastating typhoon. Days later, world leaders gathered in Warsaw for the UN climate summit. Speaking on behalf of the Philippines, Filipino climate activist and former climate negotiator Yeb Saño implored leaders to see climate change not only as an abstract scientific and policy matter, but also as a deadly reality. Taking immediate and urgent climate action, he argued, is something “we cannot afford to procrastinate”.¹

This is perhaps particularly true in the Philippines, which is continually ranked among the world’s most climate-vulnerable countries.² In response to this pressing need, a diverse array of Filipino activists, organizations, and institutions have long advocated for climate mobilization. Equally diverse are the frames through which they do so; in the Philippines, religious and spiritual understandings of climate change are relatively common alongside mainstream scientific frameworks. In fact, Saño himself now chairs the Laudato Si Movement, a network of Catholic leaders and organizations working to “inspire and mobilize the Catholic community,” “care for our common home” and protect “God’s creation.”³ Alongside religious climate activism, Indigenous Filipino groups continue to lobby for the inclusion of Indigenous knowledge systems in global climate governance, invoking similar calls to care for “Planet Earth.”³

Yet despite these diverse understandings, the link between individuals’ different ways of interpreting the causes of climate change—what we refer to here as climate attributions—and their intention to act remains underexamined. This gap—both practical and academic—stems at least in part from the assumption that a science-based understanding of climate change underpins and drives climate action. On one hand, dominant climate messaging and governance strategies rely primarily on scientific explanations for, and justifications of, climate action.⁴ Indeed, many global climate initiatives rely on evidence-based information campaigns designed to increase public acceptance of the scientific consensus on climate change and consequently, climate action.^{5,6} On the other hand, science

communications research often mirrors this approach, treating science-based understanding as the principal means for reducing climate skepticism.⁷ In doing so, non-science-based anthropogenic attributions risk being overlooked within inquiry, leaving their mobilizing potential underexplored.

In light of these gaps, we argue that scientific attribution is only one route through which individuals may understand humans as responsible for climate change. We therefore broaden the study of anthropogenic climate attributions to consider how diverse explanations relate to climate action. Specifically, we ask: does an anthropogenic understanding of climate change—science-based or otherwise—translate into greater willingness to act?

Using the Philippines as a purposive case where multiple attribution frames coexist, we draw on an original survey to examine the relationship between four types of climate attribution and willingness to engage in different forms of pro-climate action among 1,000 Filipino respondents. We examine three anthropogenic attributions: scientific, spiritual, and religious. Scientific attributions locate climate change in human-driven greenhouse gas emissions;⁴ spiritual attributions understand climate disruption as a consequence of humans upsetting the natural balance of Mother Earth;⁸ and religious, primarily Christian-influenced attributions interpret climate change as a divine response to human wrongdoing.⁹ Although grounded in distinct worldviews, each of these frames—whether centered on rising GHG emissions, Mother Earth, or God—connects climate change to human activity. Our fourth frame, natural change, attributes climate change to natural processes unrelated to human activity to provide a non-anthropogenic comparison.

Descriptive analyses indicate the salience of multiple attributions in understanding climate change; in fact, many respondents endorse several simultaneously. Regression analyses offer further insights, revealing an overall positive association between all three anthropogenic attributions and inclination to take multiple forms of climate action, independent of relevant sociodemographic controls. Exploratory analyses further reveal the capacity of some anthropogenic attributions to supplement another, linking joint versus singular endorsement to a significant increase in action. In contrast, the nonanthropogenic attribution is generally unrelated to action.

Together, our findings shift the central distinction in the study of climate attributions from scientific versus non-scientific explanations towards anthropogenic versus non-anthropogenic ones. In doing so, we make three contributions. First, we broaden climate attribution research beyond its predominantly scientific focus by showing that scientific, spiritual, and religious explanations can each provide a basis for climate action when they locate humans within the causal story of climate change. Thus, non-scientific anthropogenic attributions are not simply supplements to scientific understandings; they can and do relate to action independent of science. Second, by empirically comparing different attributions within a single population, we identify their relative and overlapping relationships with different forms of climate action. We show that climate communication need not rely on scientific messaging alone; religious and spiritual framings, already embedded in many communities' everyday lives and worldviews, can serve as equally effective levers for climate action. Finally, by focusing on the Philippines, we extend

climate attribution research beyond its predominantly Western empirical base to examine a highly climate-vulnerable, non-Western context. More broadly, our results highlight the value of engaging plural knowledge frameworks in the study of climate mobilization.

Below, we begin by discussing existing explanations for climate action, then move to discuss climate attributions in the literature and in the Philippines before turning to our data and methods. We finish with a discussion of our findings and their policy implications.

EXPLAINING CLIMATE ACTION

A substantial literature examines the drivers of climate action, ranging from psychological to more sociological explanations. Individual-level factors like knowledge, affect, and values, are consistently associated with climate engagement,^{10,11} as are demographic characteristics such as education, income, gender, and age.¹² Direct experience of extreme weather and psychological proximity to climate impacts are also associated with greater concern and action, though the effect is inconsistent^{13,14}. This relationship holds at the country level as well: the most climate exposed countries exhibit the highest support among citizens for climate change mitigation.¹⁵ Moreover, political ideology consistently outweighs both demographic and experiential factors as a predictor of climate belief and action.¹⁶

Among individual-level factors, knowledge occupies a particularly prominent place in the literature. According to the “knowledge-deficit model,” failure to act derives from a lack of knowledge and awareness about climate change.¹⁷ The solution to climate inaction, therefore, is thought to lie in information dissemination.¹⁸ Van der Linden et al. for instance, show that exposure to information about the scientific consensus on anthropogenic climate change increases support for public action.¹³ Notably, international policy language reflects this science-centered conception of climate knowledge: some interpret UN calls to “build knowledge and capacity to meet climate change”¹⁹ as referring specifically to scientific literacy.^{7,20}

Critics of the knowledge-deficit model, however, see scientific interpretations as only one of many frameworks through which we can understand climate change, and by extension, motivate action.^{21–23} According to this view, individuals are more likely to engage with climate issues when explanations resonate with their existing worldviews and systems of meaning—scientific or otherwise.²¹ Indeed, climate scholars have increasingly demonstrated the salience of non-scientific and often non-Western climate beliefs worldwide.^{24,25}

Yet few, if any, have directly adjudicated between these various worldviews and their association with climate action. In addition to addressing this gap, we offer a more nuanced interpretation of the knowledge-deficit model. We position climate action as driven not only by climate attributions that resonate with an individual’s worldview, but also those that specifically identify human activity as the central cause of climate change. It is this anthropogenic core, we argue, that activates a sense of

individual and collective responsibility for pro-environmental behavior, and in turn, motivates action. However, this distinction, as well the impact of various anthropogenic attributions on action, remains underexamined. This is due, in part, to how climate scholars tend to conceptualize climate (attribution) skepticism.

DISTINGUISHING CLIMATE SKEPTICISM

Broadly speaking, climate skepticism refers to “doubts and uncertainty about the physical and scientific aspects of climate change” (p.390).²⁶ One form, attribution skepticism, refers not to outright denial of climate change, but to doubt that it is caused by human activity.^{27,28} At its core then, attribution skepticism reflects nothing more or less than the “doubt that human activities are responsible” for climate change (p.78).²⁸ However, existing approaches often implicitly conflate anthropogenic attribution and scientific attribution, treating them as a single construct.²⁹ Others distinguish only between climate change attributed to human activity, natural causes, or some combination of the two.^{30,31} While useful for identifying attribution skepticism, these approaches leave little room for distinguishing different kinds of anthropogenic attributions.

Pursuing a more intentional treatment of climate attribution, we move this literature forward by disentangling non-science-based anthropogenic attributions from science-based ones. We distinguish among three anthropogenic attribution frames that have received growing attention in the context of the Philippines and beyond: scientific, spiritual, and religious. Using the Philippines as an illustrative case, we examine whether and how endorsement of these distinct anthropogenic attributions is associated with willingness to engage in climate action.

CLIMATE ATTRIBUTIONS: WAYS OF KNOWING IN THE PHILIPPINES

The Philippines provides an especially useful setting to examine this relationship. In addition to facing a constant threat of typhoons, cyclones, flooding, and other climate-related hazards,³² the Philippines is home to a diverse constellation of institutions and actors that mobilize culturally meaningful worldviews to shape how climate change is understood. Scientific, religious, and spiritual attributions are promoted—often simultaneously and in complementary ways—by overlapping networks that include state institutions, church officials, Indigenous organizations, activists, and grassroots initiatives.^{8,9} This institutional plurality is reinforced by the country’s demographic composition, which includes sizeable Indigenous and Christian populations, including approximately 79% Roman Catholics.^{54,55} Nor are these dynamics unique to the Philippines: similar attribution frames and networks operate at the global level, further shaping climate discourse and action.^{24,35} Below, we discuss each attribution in turn, outlining how different actors and institutions construct these understandings of climate change and their potential implications for action.

Scientific Attributions

Scientific attributions are the most prominent explanations underlying climate initiatives, particularly at the transnational level. This stems in large part from the agenda set by UN Intergovernmental Panel on Climate Change (IPCC). As the leading international authority on climate change, the IPCC plays a critical role in constructing, framing, and disseminating dominant narratives regarding the causes and consequences of, as well as solutions to, climate change. As a body tasked with providing “policymakers with regular assessments of the scientific basis of climate change,” the IPCC synthesizes research that establishes human-made greenhouse gas emissions as the primary cause of climate change.^{6,36} In turn, governments, international organizations, the media, and civil society actors routinely invoke scientific consensus to communicate the urgency of climate change and legitimize calls for pro-climate policy and action, captured, for instance, in the global climate movement’s rallying slogan “Trust the Science.”^{4,6} Thus, scientific attributions remain the dominant framework through which climate change is understood and addressed in contemporary global governance and action.

In the Philippines, the state has been a central actor in promoting scientific attributions of climate change. Despite authoritarian administrations’—such as Duterte’s—silencing dissent from environmental activists, the Filipino state has actively institutionalized scientific understandings of climate change at the center of its policy response.³⁷ In the 1990s, the Philippines established the Climate Change Task Force, making it one of the first countries in the world to formally institutionalize climate change initiatives.³⁸ Since then, climate science has remained central to public policy: for example, the Philippine Department of Education’s 2013 curriculum guide explicitly requires instruction on the scientific causes of climate change.^{39,40}

Spiritual (Mother Earth-based) Attributions

In addition to scientific frames, Indigenous and local interpretations of climate change highlighting interconnectedness between humans and Earth have become increasingly visible in recent years. As a result of decades of lobbying and activism by Indigenous Peoples seeking climate protections that reflect their lived realities,^{41,42} the IPCC has begun advocating for the integration of Indigenous and local knowledge systems to design global climate solutions.⁴³

Like scientific attributions, spiritual attributions of climate change are not merely descriptive: by framing environmental disruption as a consequence of human transgression against a cosmic order, they too locate responsibility, and thus the possibility of remedy, in human hands. Environmental disasters, in this frame, are seen as consequences of neglecting Mother Earth, while protection from hazards is viewed as a reward for environmental stewardship.^{8,9} Despite invoking the higher power of Mother Earth, these narratives ultimately place responsibility on human stewardship, framing climate change as anthropogenic.

In the Philippines, spiritual knowledge frames are recognized and promoted at different levels. The 2023–2050 National Adaptation Plan,⁴⁴ developed by the national Climate Change Commission,

identifies Indigenous approaches to conservation as a “key component” of the plan. The NAP explicitly emphasizes the importance of drawing upon “scientific and/or indigenous knowledge, and other knowledge types” (p.20).⁴² Indigenous organizations such as *Katribu*, the country's largest alliance of Indigenous Peoples, and *Tebtebba*, the Indigenous Peoples' International Centre for Policy Research and Education, have long advocated for the integration of Indigenous knowledge, environmental stewardship, and traditional resource management into climate solutions.^{45,46} Because ancestral lands are seen as sacred and deeply intertwined with Indigenous identity, ecological stewardship reflects not only environmental practice but also broader moral and spiritual worldviews.⁴⁴

Critically, these spiritual and local understandings do not preclude scientific ones; the leaders of the *Ifugao* people, for example, explicitly embrace climate science as “an additional tool in our arsenal” for addressing climate change.⁴⁷ Environmental NGOs similarly bridge scientific and local forms of knowledge. Citizen science initiatives encourage public engagement through disaster mapping, biodiversity conservation, and the integration of local ecological observations with scientific monitoring to strengthen climate adaptation and resilience.^{8,48,49} Other NGOs combine scientific methods with community experience and moral claims to advocate for environmental protection at the national level.⁵⁰ These examples show that, in the Philippines, different ways of understanding climate change are merged, rather than pitted against each other, in pursuit of creating effective climate measures.

Religious Attributions

A third attribution understands climate change through a religious, and in the Philippine context, a predominantly Christian lens. This frame interprets climate disasters as a moral consequence of human wrongdoing: extreme weather and environmental degradation are read as expressions of divine judgement or retribution for immoral conduct.

As with the spiritual frame, the religious interpretation is explicitly anthropogenic in its attribution: it is immoral human behavior that is understood to trigger divine response, and human behavior, in turn, that can avert it. Moreover, rather than any climate-irrelevant immoral behavior, religious institutions, and the Catholic Church in particular, have increasingly linked this moral framing to explicit calls for individual and collective responsibility in the face of environmental crisis.^{9,51}

In the Philippines, the Catholic Church represents a central actor in shaping climate understandings. In its 1988 pastoral letter *What Is Happening to Our Beautiful Land?*, the Catholic Bishops' Conference of the Philippines (CBCP) identified environmental degradation as a moral issue.⁵² This commitment was reinforced globally in 2015 with the publication of Pope Francis's *Laudato Si'*, which framed climate change as both an environmental and moral crisis while calling for “swift and unified global action”.³ Building on this encyclical, the Filipino Catholic Church has expanded its environmental advocacy by interpreting climate change through a theological lens, framing ecological stewardship as a moral obligation to protect God's creation, promote the common good, and reduce the suffering of climate-

vulnerable populations.⁵³ In the eyes of the Church, environmental degradation is not merely a policy failure; it constitutes an ecological sin.⁵¹ Institutionalizing these commitments, the CBCP now encourages Catholic schools to incorporate the *Laudato Si'* framework into their curricula, while local bishops and churches work to reduce their own environmental footprint through measures such as fossil-fuel divestment and renewable energy adoption.^{3,51}

Importantly, the CBCP does not present faith and science as competing explanations. Rather, it explicitly affirms “the prevailing science of climate change” and invokes the authority of the IPCC.⁵² At the same time, through its advocacy for Indigenous communities disproportionately affected by climate change, the CBCP also draws upon spiritual imagery, declaring that “Mother Earth cries for justice” and calling on humanity to “reestablish our sacred relationship with nature”.⁵³

OUR STUDY

As demonstrated above, multiple institutions establish a long history of overlapping scientific, spiritual, and religious climate narratives in the Philippines, each mobilizing distinct constituencies while converging on calls for public action. It is within this context that we examine the relationship between climate attribution and climate action. Existing research has largely approached this question through a Western-focused analytic lens and within Western empirical settings, implicitly treating scientific understandings as the benchmark—if not the sole legitimate form—of climate knowledge. This focus risks overlooking other knowledge frameworks and ways of attributing climate change that operate elsewhere and limits our understanding of pro-climate action.

In this study, we begin to address these gaps. By evaluating and comparing the link between each of our three attribution types—scientific, spiritual, and religious—and climate action within a non-Western setting characterized by the presence of multiple climate attributions, we diversify what is understood as anthropogenic climate attributions. We expect that, so long as a given attribution identifies human activity as the underlying cause, it encourages climate action, even when it is expressed through religious or spiritual rather than scientific frameworks. This framing allows us to revisit the knowledge-deficit model. Whereas that model conceptualizes climate knowledge largely in terms of scientific understanding, we argue that knowledge should be understood to include any culturally meaningful frame or epistemology that helps individuals make sense of anthropogenic climate change.

In line with these expectations, as well as the strong foundation for each of our three anthropogenic attribution types in the context of the Philippines, we anticipate:

H1

Endorsement of scientific attributions is associated with greater willingness to take climate action.

H2

Endorsement of spiritual attributions is associated with greater willingness to take climate action.

H3

Endorsement of religious attributions is associated with greater willingness to take climate action.

In contrast to anthropogenic attributions, we also consider one non-anthropogenic explanation as a basis of comparison. In line with existing literature and our proposed theoretical framework, we expect:

H4

Endorsement of non-anthropogenic attributions is unrelated to willingness to take climate action.

DATA AND METHODS

Survey Design

To evaluate our hypotheses, we conducted an original, large-scale online survey of (N = 1500) fielded in the Philippines between March 25 and April 12, 2023. Prior to rollout (October 2023), the WZB Research Ethics Committee approved the study.^a In collaboration with the research team, Rakuten Insight Global—a market research company specializing in the Asia-Pacific region—recruited adult participants (age 18+) and programmed the survey using its internal software. All participants provided informed consent prior to beginning the survey.

We took several steps to ensure data quality. To generate relatively balanced distributions across each variable, we included independent quotas for gender (50% male, 50% female) and age (20% each for ages 18–24, 25–34, 35–44, 45–54, and 55+). Within question blocs, randomized items prevented order bias, while straight-liner checks identified cases of potential satisficing. Because repeated selection of the same response option may reflect genuine and consistent climate attitudes, we retain straight-liners in the primary analyses and examine them further in a robustness check. We also flagged speeders, who were automatically removed from the sample. Finally, by allowing respondents to complete the survey in English or Tagalog—the two most widely spoken languages in the Philippines—we increased linguistic accessibility and reduced potential language-related bias. Rakuten translated the Tagalog version, which was then reviewed for accuracy by bilingual Filipino Tagalog speakers. After pre-test and feedback, we surveyed 10% of the target sample in a soft launch pilot. Upon verifying data quality and technical execution, we proceeded with the full rollout.

Sample Characteristics

Of the 1500 valid survey responses, 1000 cases appear in the final analysis. Because this study focuses on competing explanations for climate change, respondents must first accept the premise that climate-related events are becoming more frequent or severe. Accordingly, we excluded the 228 respondents who disagreed that “events such as floods, typhoons, and droughts are occurring more frequently.”^b

Standard listwise deletion on missing variables eliminated another 272 cases. Missingness on all variables used in the analysis was less than 5%—a threshold below which bias is generally considered negligible.⁵⁶ Table 1 presents our final sample characteristics alongside corresponding census estimates.

Table 1
Sample Characteristics.

Variable	Statistic	Sample	Population benchmark	Source
Gender	% male	51.20	49.90	1
	% female	48.80	50.10	
Age	Median	39.00	38.54	1
Age groups*	% 18–24 (20–24)	18.80	14.38	1
	% 25–34	21.80	25.98	
	% 35–44	18.70	20.81	
	% 45–54	20.50	16.38	
	% 55+	20.20	22.44	
Education*	% High school or less	10.00	62.10	1
	% College/vocational	78.60	37.17	
	% Masters/PhD	10.50	0.50	
	% Other (Not reported)	0.90	--	
	% Not Reported	--	0.30	
Religious Affiliation	% Catholic	24.30	21.20	1
	% Not Catholic	75.70	78.80	
Region	% NCR/Metro Manila	36.80	13.24	1
	% Luzon	38.90	43.69	
	% Visayas	13.80	18.69	
	% Mindanao	10.50	24.37	
Language Use†	% households using primarily Tagalog	--	39.9	1
Survey Language	% English	45.50	--	--
	% Tagalog	54.50	--	
Subjective Class	% Lower	7.80	22.0	2
	% Working	30.20	37.0	
	% Lower-middle	38.50	26.0	
	% Middle-middle	--	10.0	

Variable	Statistic	Sample	Population benchmark	Source
	% Upper-middle	22.50	4.0	
	% Upper	1.00	1.0	
Political orientation	% Conservative	9.10	12.3	3
	% Moderate	59.30	57.5	
	% Liberal	31.60	5.7	
	% Unsure	--	24.5	
Religiosity (1–10)	Mean (SD), 1–10	8.03 (2.20)	--	--
	% reporting religion is “very important”	--	88.0	4

Notes:

1 = 2020 Census of Population and Housing (CPH 2020). <https://psa.gov.ph/statistics/population-and-housing/stat-tables>.

2 = Albert, Jose Ramon G., Angelo Gabrielle F. Santos, and Jana Flor V. Vizmanos. 2018. “Profile and Determinants of the Middle-Income Class in the Philippines.” Philippine Institute for Development Studies. Discussion Paper Series. <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1820.pdf>

3 = Dulay, Dean and Arguelles, Cleve V. 2026. “The Contemporary Filipino Voter: Factionalism, Demographics, and Vote Choice.” *Journal of Current Southeast Asian Affairs* 0(0).

4 = Evans, Jonathan, Kirsten Lesage, William Miner, Kelsey Starr and Manolo Corichi. 2025. “Believing in Spirits and Life After Death Is Common Around the World.” Pew Research Center. <https://doi.org/10.58094/tk92-mf49>.

* Denotes census estimates based on persons aged 20 and older because of the age structure available in the Census data.

† Denotes households estimates; CPH 2020 only tabulates religious affiliation at the household level.

Unless noted above, Census estimates reflect 18 + populations.

Population estimates are provided for comparison where comparable benchmarks are available. Subjective class estimates are drawn from the Philippine Institute for Development Studies (2) because class is not collected in the Census. Political orientation is likewise not collected in the Census and is benchmarked against estimates from a nationally representative survey (3). Population estimates may therefore differ in question wording, measurement, categories, sampling frame, and year from the present study and should be interpreted as approximate benchmarks rather than direct measures of representativeness. We include Language Use (1) and Pew estimates of religiosity (4) as insightful yet reference against which to evaluate survey language and religiosity values in our sample, respectively.

[Table 1 here]

As is true of many online survey samples, our sample is more liberal and educated than the target population.^{57,58} Approximately 30% of sample respondents identify as liberal, compared to 5% in a

population-based survey. This comparison should be interpreted with caution, however, as population estimates include a sizeable proportion (24.5%) of respondents who are “unsure” of their political orientation. Additionally, 78.6% of sample respondents hold a college degree, compared to 37% of the population; among typical Filipinos, a high school education or less is most common. Finally, the sample skews somewhat wealthier than population estimates, perhaps reflecting its higher levels of educational attainment.

At the same time, other demographics closely approximate Census estimates. Our religious variables, as well as our gender and age distributions are particularly coherent. Discrepancies in regional representations are relatively modest; Mindanao is slightly overrepresented, while Metro Manila is slightly underrepresented. Thus, although our sample does not achieve the representativeness of an in-person probability survey, it provides reasonable coverage of the population.

Our survey also offers important substantive advantages for studying climate attitudes in the Philippines, despite its limitations in representation. By designing an original survey questionnaire, we can examine complex dimensions of climate attitudes and action that large-scale cross-national surveys (e.g., WVS, ISSP) do not capture. Because the Philippines boasts high rates of mobile network coverage (99%) and internet penetration (84%), we can also field the survey online. This allows us to access geographically dispersed and otherwise hard-to-reach Global South populations with greater ease compared to in-person probability sampling.⁵⁹ Our research design therefore strikes a deliberate balance: although the sample places limits on population-level inference, our online survey design provides broad population coverage while enabling us to investigate questions that existing representative surveys cannot readily address in a cost-effective manner.

Dependent Variables

Consistent with prior research, we conceptualize climate action as a multidimensional construct encompassing private individual behaviors, collective public engagement, and support for climate-related economic policy.⁶⁰ Accordingly, we measure respondents’ willingness to engage in eleven different pro-climate behaviors (1 = not at all willing; 6 = very willing), asking: “*To reduce the effects of climate change, how willing would you be to do the following?*” From these items, we create four mean indices for **Individual, Collective, and Economic Policy** forms of action, as well as an **Overall** climate action index.^c In distinguishing these forms, we avoid treating climate action as a monolithic construct while capturing the diversity of behaviors through which individuals respond to climate change. Cronbach’s alpha values indicate moderate to strong internal consistency across the four measures.^d Table 1 summarizes each index and its constituent survey items.

Table 1
Dependent Variables and Associated Survey Items.

<i>“To reduce the effects of climate change, how willing would you be to do the following?”</i>		
Action Type:	Survey Item (1 = not at all willing; 6 = very willing):	Cronbach’s α:
Overall (11)	All items	0.81
Individual (3)	Recycle	0.51
	Avoid driving cars and motorcycles	
	Avoid flying	
Collective (4)	Take part in a protest or demonstration for an environmental cause	0.68
	Sign a petition for an environmental cause	
	Give money to an environmental organization or movement	
	Vote for political candidates that prioritize addressing climate change	
Economic Policy (4)	Pay higher prices	0.78
	Pay higher taxes	
	Accept cuts in my standard of living	
	Accept reduced economic growth in my country	

Independent Variables

To operationalize each of our three attribution frames, we construct a novel survey question capturing the extent to which respondents attribute climate disasters to various causes: *“Next, we would like to ask you about what you think causes climate change, if at all. Some believe that events such as floods, typhoons, and droughts have become more frequent and intense in the last few years as a result of climate change, while others disagree”* Respondents then evaluate their agreement with a series of statements, each reflecting a different interpretation. All items are measured on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), with higher scores indicating stronger endorsement of the frame. Although the measures are analyzed continuously, scores of 4–6 can be interpreted as endorsement, and scores of 1–3 as rejection.

Four statements in this battery capture our key attribution frames: Scientific, Spiritual, Religious, and Natural Change (Table 2). Although grounded in distinct worldviews, all three anthropogenic attributions share a common premise: they explicitly attribute climate change to human behavior. The **Scientific** frame reflects mainstream conceptions of climate change as a product of human-driven emissions.⁴ The **Spiritual** frame emphasizes human disruption of the natural balance of Mother Earth, invoking values of reciprocity and ecocentrism that position humans as part of, rather than dominant over, the broader

ecological system.⁸ Finally, the **Religious** frame invokes moralistic interpretations, viewing climate change as divine punishment for human wrongdoing.⁹ Our fourth attribution, **Natural Change**, distinguishes our three anthropogenic interpretations from conventional measures of attribution skepticism, thus serving as a useful benchmark against which to evaluate them. Unlike the other frames, this measure does not offer a human-centered explanation. Instead, it attributes climate-related disasters to natural processes. Thus, whereas the latter three attributions differ in *how* they understand the relationship between humans and climate change, the former makes sense of climate change independent of human activity.

Table 2
Climate Attributions and Associated Survey Items.

<i>“Next, we would like to ask you about what you think causes climate change, if at all. Some believe that events such as floods, typhoons, and droughts have become more frequent and intense in the last few years as a result of climate change, while others disagree. To what extent do you agree or disagree with the following statements?”</i>	
Attribution	Survey Item: “Events like this....”
Scientific	Are the result of human-produced emissions.
Spiritual	Occur because humans upset the natural balance of Mother Earth.
Religious	Occur because God is punishing immoral human behavior.
Natural Change	Occur due to a natural change in the Earth's climate.

Control Variables

We control for several individual attributes associated with climate action, including **Gender, Age, Education, Subjective Class, Religiosity, Religious Affiliation**, and **Political Orientation**. These variables account for documented differences in climate action across demographic groups. We treat age, education, class, and religiosity as continuous, and the rest as categorical. To capture Religiosity, respondents evaluate on a 1 to 10 scale how much guidance religion provides in their everyday life. Religious Affiliation is coded as a binary indicator for Catholicism. We include both measures of religion in our analysis given the predominance of religious worship in the Philippines, as well as the Catholic Church’s prominent role in environmental advocacy and public discourse.

Beyond demographics, **Region** controls for potential geographic differences in climate beliefs driven by regional variations in climate risk and cultural dynamics.⁶¹ Additionally, because language can shape how people interpret and express ideas, survey language may influence climate attitudes.⁶² In the Philippines, English is associated with prestige, education, and globalization, while Tagalog is more closely tied to Filipino identity and everyday communication.⁶³ We therefore account for survey **Language** to capture potential differences in how respondents interpret questions about climate change,

global institutions, and individual and collective responsibility. **Climate Exposure** and **Climate Concern** further control for the potential albeit inconsistent link between perceived climate risk and severity and willingness to act.^{64,65} The former captures respondents' subjective assessment of the extent to which their region was affected by extreme weather events over the previous twelve months (1 = not at all; 5 = a great deal); the latter captures how serious they perceive climate change to be at present (1 = not at all serious; 10 = extremely serious). Finally, the survey incorporated a randomized informational treatment in which one-half of respondents were exposed to a map depicting the effects of climate change. While preliminary analyses suggest treatment had no statistically detectable effect on the climate action outcomes examined here, **Treatment** assignment (map/no map) accounts for residual influence of the manipulation. Appendix 1 provides descriptive statistics for all variables.

Analytical Method

To analyze these data, we use multiple linear regression. Postestimation VIF estimates fall below the conventional threshold of 5, and no pairwise correlations exceed 0.70 in our correlation matrix (Appendix 2), suggesting no evidence of problematic collinearity.⁶⁶ Although RVF plots identified one potentially influential case, sensitivity analyses indicated no substantive changes upon exclusion. We therefore retain the case in the final sample. As with all cross-sectional analyses, our results indicate associations rather than causal relationships. We therefore do not aim to establish whether endorsing a particular attribution causes action. Rather, we examine whether and how strongly different anthropogenic interpretations of climate change correspond with a willingness to act; we take associations between the two to indicate the salience of climate action, even among those who conceive of anthropogenic climate change using alternative epistemologies.

a This committee ensures compliance with ethical guidelines set forth by the WZB, the Leibniz Association, and the DFG. See <https://www.wzb.eu/en/the-wzb/research-ethics> for more information about WZB's ethics approval process.

b Denialism is negatively correlated to all other (climate change endorsing) epistemic frames, validating this decision.

c Although exploratory factor analysis indicates that all eleven items load onto a single latent dimension (eigenvalue=3.24; 87.2% of variance explained), we retain these theoretically motivated subscales to distinguish among conceptually distinct forms of climate action identified in prior research (Stern 2000).

d While the alpha for Individual Action is relatively low, this likely reflects the heterogeneous nature of everyday climate behaviors, which range from low-cost habitual practices (e.g., recycling) to higher-cost lifestyle changes (e.g., reducing air travel). Indeed, the distribution for recycling is relatively skewed, with 79% of our sample are "extremely willing" to recycle (compared to less than 20% for driving and flying).

RESULTS

We begin with univariate patterns for our four attributions (Fig. 1). Whereas the distribution for religious attributions is relatively balanced, endorsement of the scientific, spiritual, and natural change attributions is right-skewed. Support for scientific and spiritual attributions is particularly high; approximately 95% of respondents indicate some level of endorsement. While less drastic, over 50% of respondents endorse religious attributions as well. Together, these trends indicate widespread acceptance of all three of our anthropogenic attributions, validating our case selection. Interestingly, just under 80% of respondents also support the natural change attribution, with only 70 respondents endorsing this interpretation alone. It appears that anthropogenic and non-anthropogenic frameworks are not mutually exclusive in the eyes of our respondents. Do they, however, all correspond with propensity to act?

Figure 2 examines this question, plotting bivariate associations between each attribution and overall climate action.^e Each panel displays binned observations at each level of attribution endorsement, along with a best-fit line. Although all four attributions are positively associated with action, the relationships are relatively weak. Notably, Natural Change is the least strongly associated with action ($r = 0.10$), while Religious is the most (0.21). These results are consistent with existing literature positioning non-anthropogenic explanations as less conducive to climate action, as well as our expectation that interpretations emphasizing human responsibility—diversely conceived—are more closely associated with willingness to act. Next, we assess whether these patterns persist alongside additional covariates.

Table 3 presents four regression models—one for each action type. Because respondents may endorse multiple attributions simultaneously, we include all four attributions in each model. In doing so, we distinguish the unique association between a given attribution and action, net of its overlap with the others. The first number in each cell is the regression coefficient; the second is the standard error.

Across our models, we find a consistent association between anthropogenic attributions and willingness to act. Figure 3 summarizes these results by plotting the coefficients and 95% confidence intervals for each attribution across the four action domains. From this plot, three broad patterns emerge. First, anthropogenic attributions are, on the whole, positively associated with willingness to act across *most* but not *all* action domains. Second, Natural Change is generally not associated with action, unless it is economic in nature. Third, the strength and consistency of these associations vary across attribution and action type, with religious attributions exhibiting the greatest uniformity. We discuss each of these patterns in turn.

Starting with Model 1a, the coefficients for both scientific ($p < .01$) and religious attributions ($p < .001$) are positive and significant, while the coefficient for spiritual attribution reaches marginal significance ($p < .10$). Natural Change fails to reach significance. Because spiritual and scientific attributions are moderately correlated, we examine whether this overlap obscures the association between spiritual attribution and individual action by estimating an additional model that excludes scientific attribution (Appendix 4). In this specification, spiritual attribution reaches conventional levels of significance ($p < .01$), suggesting that its weaker association in the full model may reflect its overlap with scientific

attribution. Together, these results suggest that anthropogenic attributions, regardless of their specific form, are associated with greater willingness to take overall action.

Moving to our action subtypes, this pattern is remarkably consistent for both individual and collective action: the coefficients for all three anthropogenic attributions reach significance while the coefficient for Natural Change does not. This pattern breaks, however, for economic action. Among the anthropogenic attributions, only religious attribution is significantly associated with willingness to take economic action. The coefficient for Natural Change is also significant.

Thus, for three of our four action types, the results support our hypothesized distinction between anthropogenic and non-anthropogenic attributions. Greater endorsement of anthropogenic attributions is associated with greater willingness to take climate action while non-anthropogenic attributions generally are not, in line with H1-H4. Economic action, however, presents an important exception. Here, we find support only for H3 (religious), while H1, H2, and H4 are not supported. Notably, religious attribution is the only frame that reaches significance across all four action types, indicating the most consistent support for H3.

Table 3
Multiple Regression on Action by Type.

Attribution	1a: Overall	1b: Individual	1c: Collective	1d: Economic
Scientific	0.080** (0.029)	0.087** (0.032)	0.119*** (0.034)	0.037 (0.042)
Spiritual	0.052+ (0.028)	0.063* (0.031)	0.085** (0.033)	0.011 (0.041)
Religious	0.090*** (0.015)	0.075*** (0.016)	0.067*** (0.017)	0.125*** (0.022)
Natural Change	0.019 (0.017)	0.001 (0.019)	-0.003 (0.020)	0.056* (0.026)
Female	-0.077 (0.050)	-0.016 (0.055)	-0.051 (0.059)	-0.149* (0.074)
Age	-0.004* (0.002)	-0.002 (0.002)	-0.006** (0.002)	-0.003 (0.003)
Education (ref: HS or less)				
College/Vocational	-0.008 (0.085)	-0.087 (0.093)	-0.064 (0.099)	0.109 (0.125)
Masters/PhD	0.156 (0.115)	0.059 (0.127)	0.046 (0.135)	0.339* (0.170)
Other	0.069 (0.276)	0.295 (0.303)	-0.225 (0.323)	0.193 (0.406)
Subjective Class				
Working	0.206* (0.102)	0.140 (0.112)	0.168 (0.119)	0.293+ (0.150)
Lower-Middle	0.217* (0.100)	0.111 (0.110)	0.145 (0.117)	0.367* (0.147)
Upper-Middle	0.258* (0.100)	0.081 (0.110)	0.192 (0.117)	0.455** (0.147)

Attribution	1a: Overall	1b: Individual	1c: Collective	1d: Economic
	(0.107)	(0.118)	(0.126)	(0.158)
Upper	0.158	-0.334	-0.196	0.880*
	(0.269)	(0.295)	(0.314)	(0.396)
Political Orientation (ref: Conservative)				
Moderate	0.110	0.150	-0.003	0.194
	(0.089)	(0.098)	(0.104)	(0.131)
Liberal	0.320***	0.250*	0.310**	0.383**
	(0.095)	(0.104)	(0.111)	(0.140)
Religiosity	0.014	0.010	0.037*	-0.005
	(0.012)	(0.014)	(0.014)	(0.018)
Catholic	0.073	0.040	0.198**	-0.027
	(0.059)	(0.065)	(0.070)	(0.088)
Climate Concern	0.045**	0.058**	0.106***	-0.025
	(0.017)	(0.018)	(0.020)	(0.025)
Climate Exposure	0.061*	0.022	0.043	0.108**
	(0.026)	(0.029)	(0.031)	(0.038)
Region (ref: NCR/Metro Manila)				
Luzon	0.004	-0.001	0.013	-0.001
	(0.058)	(0.064)	(0.068)	(0.085)
Visayas	0.055	0.035	0.065	0.059
	(0.079)	(0.087)	(0.093)	(0.117)
Mindanao	0.033	0.075	-0.018	0.053
	(0.089)	(0.098)	(0.104)	(0.132)
English Language	0.158**	0.174**	0.008	0.298***
	(0.053)	(0.058)	(0.062)	(0.078)
Map Exposure	0.072	0.120*	0.031	0.076

Attribution	1a: Overall	1b: Individual	1c: Collective	1d: Economic
	(0.050)	(0.055)	(0.059)	(0.074)
Constant	1.834***	2.386***	1.698***	1.554***
	(0.262)	(0.288)	(0.307)	(0.387)
R-squared	0.146	0.099	0.175	0.102
N	1000	1000	1000	1000
Note: Standard errors in parentheses *** p < 0.001, ** p < 0.01, * p < 0.05, + p < 0.10				

Looking substantively at the magnitude of these associations using predicted margins (Appendix 5), moving from the lowest to highest endorsement corresponds to an increase in predicted action propensity ranging anywhere from 0.26 to 0.62 points on our six-point action scale—an increase of up to 21%. Across our three anthropogenic attributions, the average increase is largest for scientific (0.48 points), followed by religious (.45), then spiritual (0.39). These changes, albeit modest, are substantively meaningful in the context of our measure. Increased endorsement is not only associated with greater overall action; in some cases, it also shifts willingness to action into the upper portion of the scale. For instance, moving from the lowest to highest endorsement of scientific attribution increases predicted collective action from 3.99 to 4.59.

Pairwise coefficient tests (lincom) evaluate the relative strength of these associations, the results of which are depicted in Fig. 3. Across overall, individual, and collective action, the magnitude of the coefficients for all three anthropogenic attributions do not significantly differ. In other words, human-centered explanations are all equally potent in predicting willingness to act. They are also all significantly stronger than the Natural Change attribution, further distinguishing their salience. For economic action, however, the religious attribution is significantly stronger than its anthropogenic counterparts; it is also the only anthropogenic explanation whose strength exceeds that of Natural Change. Together, these results further confirm the unique link between specifically *anthropogenic* explanations and propensity to act across most types of action, as well as the particular robustness of religious interpretations of climate change.

These results hold even when accounting for demographic and country-level controls, which behave mostly as expected. In line with existing literature, political orientation most consistently predicts willingness to act; across all models, liberals support action more than conservatives. Interestingly, the coefficients for English are positive, among the largest in magnitude, and mostly significant—perhaps reflecting respondents' exposure to global climate campaigns. Additionally, belonging to the lower-class is linked to less action compared to other class categories, while climate concern and exposure are

linked to greater action. No gender differences emerge except for economic action, which women are less willing to pursue. This aligns with gendered notions of the economy as traditionally masculine, decisions about which women are usually excluded.⁶⁷ Future work can expand on this finding. Being religious only matters for collective action, likely reflecting organized religion’s collective nature. Finally, exposure to the climate map only reaches significance for individual action, mostly aligning with prior research on climate imagery.

Exploring Attribution Combinations

Because respondents may endorse multiple explanations simultaneously, we conduct an exploratory analysis of whether different combinations of attributions are associated with different levels of action.^f We consider all three intersections: Scientific-Religious, Scientific-Spiritual, and Religious-Spiritual. Within each, we sort respondents into one of four categories: High-High, High-Low, Low-High, and Low-Low. High endorsers report agreement of 4 or higher, whereas low endorsers report agreement of 3 or lower. Albeit imperfect, these binary classifiers allow us to generate relatively clean categorical profiles of joint endorsement. For each attribution pair, after substituting the appropriate joint variable into our full regression model, we evaluate three contrasts: joint endorsement versus endorsement of Attribution A alone; joint endorsement versus endorsement of Attribution B alone; and endorsement of A alone versus B alone. The first two thus assess whether joint endorsement is associated with greater willingness to act than each attribution alone; the third assesses whether either attribution is more strongly associated with action when endorsed alone.

[Table 4 here]

Table 4
Contrasts of Combined Attributions.

Intersection	Action Type	Column A: H-H vs. H-L	Column B: H-H vs. L-H	Column C: L-H vs. H-L
<i>Scientific-Religious</i>		<i>A1: Both – Science-only</i>	<i>B1: Both – Religion-only</i>	<i>C1: Science-only – Religion-only</i>
	Overall	0.29 ***	0.36 +	-0.07
	Individual	0.20 ***	0.15	0.05
	Collective	0.25 ***	0.40	-0.15
	Economic	0.40 ***	0.48	-0.08
<i>Scientific-Spiritual</i>		<i>A2: Both – Science-only</i>	<i>B2: Both – Spiritual-only</i>	<i>C2: Science-only – Spiritual-only</i>
	Overall	-0.01	0.38 +	-0.37
	Individual	-0.14	0.18	-0.32
	Collective	0.09	0.43 +	-0.34
	Economic	-0.05	0.49	0.44
<i>Religious-Spiritual</i>		<i>A3: Both – Religion-only</i>	<i>B3: Both – Spiritual-only</i>	<i>C3: Religion-only – Spiritual-only</i>
	Overall	0.28 ***	0.28	0.01
	Individual	0.21 ***	0.25	-0.05
	Collective	0.22 ***	0.05	0.17
	Economic	0.40 ***	0.52	-0.13

Notes:

H = high endorsement (4–6); L = low endorsement (1–3).

Values reflect contrasts of predicted margins for each category; results derive from regression with full set of controls.

Columns report the magnitude, direction, and statistical significance of the indicated directional contrast. For example, H–H – H–L tests whether respondents high in both attributions report greater predicted action than respondents high in the first attribution but low in the second. The predicted contrast value indicates the magnitude of the difference; the sign indicates the direction, and the asterisks indicate whether that difference is significant.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$

Table 4 presents the magnitude, direction, and significance of each contrast. Overall, we find some—albeit asymmetrical—evidence linking joint endorsement to greater action. Specifically, joint endorsement of religious and scientific attributions is linked to higher action propensity than scientific

endorsement alone (Column A1). The same pattern holds true for joint spiritual and religious endorsement compared to religious alone (A3). All other joint vs. singular comparisons (A2 & B1-B3) generally yield no significant differences. This includes scientific attributions, which add little to religious or spiritual attributions alone (B1-B2). Finally, we find little evidence that any single attribution consistently produces greater action than another when endorsed alone (Column 3).

Together, these findings suggest that combined attributions are sometimes—but not always—relevant to action. They also align with our theoretical intervention by showing that non-traditional anthropogenic attributions are not merely supplements to a primarily scientific understanding of climate change. In some combinations, they provide an independent basis for willingness to act. In others, the addition of science is irrelevant. Finally, no single attribution consistently outperforms another, suggesting that none should be privileged over the others. Future research can build on these findings by examining the prevalence, drivers, and consequences of joint attribution.

Robustness Checks and Further Research

We conduct a series of robustness checks to validate our claims. First, we examine each action item individually to evaluate consistency with their topical groupings (Appendix 6). Despite some expected variation, the specific action measures generally align with our main findings. Economic actions are particularly robust, as are the coefficients for religious attributions. Perhaps most striking is the loss of significance for collective action, specifically protesting (scientific, spiritual) and signing a petition (spiritual, religious). Scientific and spiritual attributions also drop or lose significance for certain individual actions. These idiosyncrasies suggest that despite general consistency, some frames are only salient for certain subtypes of action. Future work can tease out these differences.

We also test alternate model specifications. To ensure proper treatment of regional variation, we substituted a more granular 16-category classifier, which yielded consistent results. We also reran the analyses using multilevel regression clustered on region. ICC estimates indicate practically nonexistent clustering, and multilevel results align with our findings. Owing to the centrality of Indigenous frames and organizations in the Filipino climate movement, we additionally controlled for Indigenous affiliation—an identity 7.5% of our sample claims. The coefficient for Indigenous was positive and significant for overall and economic action, and results were mostly consistent. Although spiritual attributions lost significance for overall action upon inclusion of our Indigenous dummy, we take this as validation of our assumption that spiritual frames at least partially draw from Indigenous belief systems. Finally, excluding straightliners for both our action and attribution batteries produces substantively similar results with one exception: Natural Change drops to marginal significance for economic action in both specifications, indicating some sensitivity. Together, these checks indicate robustness to multiple factors.

Despite the robustness of our findings, future research can extend our work in five ways. First, our data come from a single country. Although the Philippines offers an unusually rich setting in which to compare scientific, spiritual, and religious attributions, future research should test whether these

dynamics generalize within and across national contexts, ideally through cross-national surveys. Second, our analysis examines a context in which religious and spiritual institutions play an especially prominent role. It would be valuable to examine whether and how different epistemologies similarly resonate with and motivate climate action in contexts where scientific attribution is more institutionally dominant, such as some Western countries. Third, the role of non-anthropogenic attributions warrants further attention. Respondents often endorsed Natural Change alongside anthropogenic attributions, suggesting that non-anthropogenic explanations may not always reflect straightforward climate skepticism. Future research should examine whether these patterns generalize beyond the Philippines and whether non-anthropogenic attributions are best understood as skepticism when endorsed alone rather than alongside anthropogenic explanations. This distinction may be particularly important for understanding economic action, the only form of action associated with a non-anthropogenic attribution. Future studies can further investigate why this pattern emerges. Fourth future survey efforts should expand conventional climate attribution batteries to capture multiple and nontraditional anthropogenic frames. Longitudinal data would be particularly valuable, as our cross-sectional analysis cannot speak to causality. Finally, because we rely on a survey approach, we can only make claims about individuals' *willingness* to act. Experiments, fieldwork, or other methodologies can expand on our findings by examining whether different frame activations are linked to *actual* behavioral change.

e Scatterplots for all other action variables indicate consistent bivariate patterns (Appendix 3).

DISCUSSION

Our central finding is that the key cleavage in climate attributions is not whether an attribution is scientific or non-scientific, but whether it is anthropogenic or non-anthropogenic. All three attributions we examine—scientific, spiritual, and religious—are positively associated with climate action and operate similarly across action types: individuals who accept an anthropogenic understanding of climate change appear willing to act on it, regardless of which frame that understanding takes. In what follows, we draw out three implications of this finding: we propose a possible explanation for why anthropogenic attribution motivates action and consider what this implies for the knowledge-deficit model, diversify our account of anthropogenic attributions, and offer guidance for climate communication and policy.

The Mechanism of Anthropogenic Attribution

Why do human-focused frames in particular encourage action? We suggest that anthropogenic attribution grounds climate change in human agency—positioning humans as agents not only causing climate change, but also capable of mitigating and adapting to it. In modern societies, individuals, organizations, and even states are increasingly constructed as empowered, agentic actors,⁶⁸ consistent with a broader emphasis in environmental politics on individuals and collectives as capable of—and responsible for—contributing to environmental sustainability.^{69–72} This construction shapes practices of environmental stewardship, climate activism, and other forms of pro-environmental action.

Although empowerment is often linked to science education,⁷³ it is not fostered by scientific knowledge and institutions alone: calls to empowered action circulate widely across otherwise disparate institutions. Recognizing this moves us analytically beyond a Western, science-centric frame of reference and expands the set of actors capable of galvanizing climate action beyond scientists and policymakers to include religious and Indigenous institutions as well. Such a perspective opens opportunities for coalition-building across these varied institutions and across movements that a narrower view—one that locates the potential for empowerment in science advocacy alone—would miss.

The Catholic Church is particularly illustrative here. Its consistent linkage of environmental stewardship to individual moral responsibility, together with an established tradition of charitable giving, may help explain why the religious frame, uniquely among the three, predicts support for economic-policy action such as accepting higher taxes or prices.

The same logic clarifies why, in our data, multiple epistemologies operate in conjunction rather than competition to motivate action. Climate action depends less on endorsing scientific explanations specifically than on endorsing any anthropogenic explanation that meaningfully centers human agency and responsibility. As one Church-affiliated climate initiative put it, whatever the source of the message—science, faith, or economics—continued reliance on fossil fuels and prioritization of profit over people and planet will lead to catastrophe.³ In other words, what matters most is not the content of the message but its capacity to attribute responsibility to human action and, in doing so, to incite climate-relevant action—an outcome driven by attributions that center human agency and resonate with individuals' worldviews and experience.

This challenges the existing knowledge-deficit model of climate action. Possessing knowledge matters; which type of knowledge one possesses matters far less—so long as it is anthropogenic and climate-relevant. This is consistent with a broader body of scholarship that treats climate knowledge as encompassing subjective, interpretive, and culturally situated ways of knowing, alongside—rather than in place of—scientific understanding.^{25,35,74} Relatedly, our results reveal little variation across action domains: different attributions appear to operate similarly across different types of action, suggesting that anthropogenic frames function as general motivators of climate action rather than narrowly targeted ones.

Diversifying climate attributions

A second implication concerns our diversification of climate attributions. Our findings caution against conflating non-scientific climate explanations with attribution skepticism; the more consequential distinction is whether a given explanation is anthropogenic, not whether it is scientific. To our knowledge, no prior survey research examines how spiritual and religious explanations drive climate action. By including these attributions alongside scientific ones, we reveal a broader range of climate attributions that can foster climate action.

This distinction carries two further insights. First, disseminating scientific knowledge is not, on its own, sufficient to guarantee action. Second, whether religious or spiritual frames dampen climate concern and action depends on how they are structured. The “God frame”⁷⁵ of climate change as divine punishment can take different forms: it may lead people to view climate impacts as retribution disconnected from any actionable or climate-relevant human cause, leaving little sense that mitigation is possible; or, where the frame retains a link between climate-relevant human conduct and consequence, it may instead support engagement with solutions.⁷⁵

We argue the latter is more consistent with our findings. The religious frame in our data is anthropogenic: it attributes disasters to human “immoral behavior,” preserving the link between human action and consequence, which we argue is necessary for motivating a sense of individual responsibility. In the Philippines, this immoral behavior is not treated as separate from environmental concerns; moral duty is understood to extend to environmental protection, directly linking moral behavior to environmental stewardship and pro-climate action. Non-scientific and scientific understandings of climate change are, in this case, not mutually exclusive; what determines their capacity to motivate action is whether they remain anthropogenic and climate-relevant, not whether they are scientific.

Finally, these anthropogenic attributions do not operate in isolation from one another. Schnegg et al. (p.327),³⁵ for instance, find that Indigenous communities frequently merge scientific explanations and local knowledge in hybrid ways, since both discourses locate responsibility for observed climate-related events in human action, even as they differ in scale: scientists point to emissions concentrated in particular world regions, while Indigenous communities often understand weather as a local phenomenon that “rewards and punishes people for their actions” (p.327).³⁵ This coexistence of attributions^{29,76} is consistent with the joint endorsement we observe, and merits closer empirical attention in other contexts beyond the Philippines or in cross-national surveys. It also points to the role of non-scientific institutions and agents in producing and disseminating climate knowledge, such as social movements, religious institutions, local community leaders, and Indigenous authorities. In focusing on the Philippines, our study suggests that different ways of knowing are cultivated across these institutional settings—as illustrated by the Catholic Church or Indigenous movements working alongside the sciences.

Policy Implications

These findings carry two related implications for climate communication and policy. First, current interventions to increase climate action disproportionately emphasize scientific literacy relative to alternative approaches—creative, interdisciplinary, affective, or otherwise epistemologically varied.⁷ This points to a need for climate communication that engages existing belief systems, remains attentive to context, and fosters dialogue between scientific and alternative epistemologies in order to more effectively galvanize pro-environmental action. Second, our findings suggest that allowing multiple attribution frames to coexist and perhaps even work in concert—rather than privileging one over the other—is an effective way to adapt climate messaging to local realities. Such approaches are especially

important for Indigenous populations, who often reside in ecologically fragile areas, face disproportionate exposure to climate impacts in the Philippines,⁷⁷ and hold knowledge directly relevant to adaptation and mitigation. Taken together, our empirical contributions in this paper clarify one potential mechanism underlying the knowledge-action link: what seems to matter is not the type of knowledge, scientific or otherwise, but whether it identifies humans as responsible agents capable of environmental and climate-relevant action. This reframing carries implications beyond individual attitudes. Because climate attributions are embedded in collective structures such as social movements, religious communities, and scientific institutions, understanding them also means understanding the shared knowledge frameworks from which collective action can emerge. Since addressing climate change requires both individual and systemic change, this distinction matters. Rather than treating science and non-science-based ways of knowing as competing pathways to climate action, our findings invite a view of them as complementary resources, embedded within the institutions and communities through which collective action is ultimately organized.

Declarations

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Author Contribution

(alphabetized) Conceptualization: JK, LS, YNS; Data Curation: JK; Formal Analysis: JK; Funding Acquisition: YNS; Investigation: JK, LS, YNS; Methodology: JK, YNS; Project Administration: YNS; Writing—original draft: AV, JK, LS, YNS; Writing—review & editing: AV, JK, LS, YNS; Software: JK; Visualization: JK

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Data Availability

The data that support the findings of this study are available at <http://dx.doi.org/10.17169/refubium-46495> (Soysal, Yasemin Nuhoglu; Kim, Jessica; Boado, Hector Cebolla; Schimmoller, Laura; Kou, Yi; Palacios, Juan Sebastian Rico. 2024. Climate Skepticism and Action: The Philippines Survey 2024.)

Code Availability:

The replication package for this manuscript can be accessed at: https://osf.io/y3q5e/overview?view_only=63b57c3e66404929b813e6556e8c8fe4

References

1. King, E. 'It's time to stop this madness' - Philippines plea at UN climate talks. *Climate Home News* <https://www.climatechangenews.com/2013/11/11/its-time-to-stop-this-madness-philippines-plea-at-un-climate-talks/> (2013).
2. Adil, L., Eckstein, D., Kuenzel, V. & Schaefer, L. *Climate Risk Index 2026: Who Suffers the Most from Extreme Weather Events?* (2025).
3. Laudato Si' Movement. Who we are. *Laudato Si' Movement* <https://laudatosimovement.org/who-we-are/> (2026).
4. Guenther, L. et al. Social Constructions of Climate Futures: Reframing Science's Harmful Impact Frame Across News Media, Social Movements, and Local Communities. *Environmental Communication* 18, 322–338 (2024).
5. Estrada, F., Botzen, W. J. W. & Tol, R. S. J. A global economic assessment of city policies to reduce climate change impacts. *Nature Climate Change* 7, 403–406 (2017).
6. Calvin, K. et al. *IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* <https://www.ipcc.ch/report/ar6/syr/> (2023) doi:10.59327/IPCC/AR6-9789291691647.
7. Sato, F. E. & Park, J. A systematic review of climate change literacy assessment methods. *The Journal of Environmental Education* 56, 65–83 (2025).
8. Friedrich, T. The Local Epistemology of Climate Change: How the Scientific Discourse on Global Climate Change is Received on the Island of Palawan, the Philippines. *Sociologus* 68, 63–84 (2018).
9. Shah, S. H., Angeles, L. C. & Harris, L. M. Worlding the Intangibility of Resilience: The Case of Rice Farmers and Water-Related Risk in the Philippines. *World Development* 98, 400–412 (2017).
10. Steg, L. Psychology of Climate Change. *Annu. Rev. Psychol.* 74, 391–421 (2023).
11. Bouman, T. et al. When worry about climate change leads to climate action: How values, worry and personal responsibility relate to various climate actions. *Global Environmental Change* 62, 102061 (2020).
12. McCright, A. M. & Dunlap, R. E. The politicization of climate change and polarization in the american public's views of global warming. *The Sociological Quarterly* 52, 155–194 (2011).
13. Van Der Linden, S. The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology* 41, 112–124 (2015).
14. McDonald, R. I., Chai, H. Y. & Newell, B. R. Personal experience and the 'psychological distance' of climate change: An integrative review. *Journal of Environmental Psychology* 44, 109–118 (2015).

15. Andre, P., Boneva, T., Chopra, F. & Falk, A. Globally representative evidence on the actual and perceived support for climate action. *Nat. Clim. Chang.* 14, 253–259 (2024).
16. Hornsey, M. J., Harris, E. A., Bain, P. G. & Fielding, K. S. Meta-analyses of the determinants and outcomes of belief in climate change. *Nature Clim Change* 6, 622–626 (2016).
17. Capstick, S. B. & Pidgeon, N. F. What is climate change scepticism? Examination of the concept using a mixed methods study of the UK public. *Global Environmental Change* 24, 389–401 (2014).
18. Geiger, N., Gasper, K., Swim, J. K. & Fraser, J. Untangling the components of hope: Increasing pathways (not agency) explains the success of an intervention that increases educators' climate change discussions. *Journal of Environmental Psychology* 66, 101366 (2019).
19. United Nations. *The Sustainable Development Goals Report 2016*. (United Nations publication, New York, 2016).
20. Miléř, T. & Sládek, P. The climate literacy challenge. *Procedia - Social and Behavioral Sciences* 12, 150–156 (2011).
21. Brick, C., Bosshard, A. & Whitmarsh, L. Motivation and climate change: A review. *Current Opinion in Psychology* 42, 82–88 (2021).
22. Taube, O., Ranney, M. A., Henn, L. & Kaiser, F. G. Increasing people's acceptance of anthropogenic climate change with scientific facts: Is mechanistic information more effective for environmentalists? *Journal of Environmental Psychology* 73, 101549 (2021).
23. Colombo, S. L. et al. Why Knowing about Climate Change Is Not Enough to Change: A Perspective Paper on the Factors Explaining the Environmental Knowledge-Action Gap. *Sustainability* 15, 14859 (2023).
24. Brüggemann, M. & Rödder, S. *Global Warming in Local Discourses: How Communities around the World Make Sense of Climate Change*. (Open Book Publishers, Cambridge, UK, 2020). doi:<https://doi.org/10.11647/OBP.0212>.
25. Jasanoff, S. A New Climate for Society. *Theory, Culture & Society* 27, 233–253 (2010).
26. Capstick, S., Whitmarsh, L., Poortinga, W., Pidgeon, N. & Upham, P. International trends in public perceptions of climate change over the past quarter century. *WIREs Climate Change* 6, 35–61 (2015).
27. Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S. & Pidgeon, N. F. Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change* 21, 1015–1024 (2011).
28. Rahmstorf, S. *The Climate Sceptics*. https://www.pik-potsdam.de/~stefan/Publications/Other/rahmstorf_climate_sceptics_2004.pdf (2004).
29. Reynolds, T. W., Bostrom, A., Read, D. & Morgan, M. G. Now What Do People Know About Global Climate Change? Survey Studies of Educated Laypeople. *Risk Analysis* 30, 1520–1538 (2010).
30. Leiserowitz, A. et al. *International Public Opinion on Climate Change*. (2023).

31. Stanford University. American Public Opinion on Global Warming. <https://climatepublicopinion.stanford.edu/fundamentals> (2026).
32. Germanwatch. Climate Risk Index 2026. <https://www.germanwatch.org/sites/default/files/2025-11/CRI%2026%20full%20report.pdf> (2025).
33. Bollettino, V. et al. Public perception of climate change and disaster preparedness: Evidence from the Philippines. *Climate Risk Management* 30, 100250 (2020).
34. Kim, J., Nuhoğlu Soysal, Y., Cebolla Boado, H. & Schimmöller, L. Inhibiting or Contributing? How Global Liberal Forces Impact Climate Change Skepticism. *International Journal of Sociology* 54, 530–564 (2024).
35. Schnegg, M., O'Brian, C. I. & Sievert, I. J. It's Our Fault: A Global Comparison of Different Ways of Explaining Climate Change. *Hum Ecol* 49, 327–339 (2021).
36. Rödder, S. & Pavenstädt, C. N. 'Unite behind the Science!' Climate movements' use of scientific evidence in narratives on socio-ecological futures. *Science and Public Policy* 50, 30–41 (2023).
37. Smith, W. Climates of control: Violent adaptation and climate change in the Philippines. *Political Geography* 99, 102740 (2022).
38. De Leon, E. G. & Pittcock, J. Integrating climate change adaptation and climate-related disaster risk-reduction policy in developing countries: A case study in the Philippines. *Climate and Development* 9, 471–478 (2017).
39. Aruta, J. J. B. R. Science literacy promotes energy conservation behaviors in Filipino youth via climate change knowledge efficacy: Evidence from PISA 2018. *Aust. J. environ. educ.* 39, 55–66 (2023).
40. Lucagbo, M. D. C., Cobrador, K. N. B., de Mesa, N. A. M., Ferrera, R. F. M. & Marasigan, J. E. Effects of Education on Climate Risk Vulnerability in the Philippines: Evidence from Regional Panel Data. *The Philippine Statistician* 62, 53–69 (2013).
41. Carmona, R. et al. Analysing engagement with Indigenous Peoples in the Intergovernmental Panel on Climate Change's Sixth Assessment Report. *npj Clim. Action* 2, 29 (2023).
42. Tormos-Aponte, F. The influence of indigenous peoples in global climate governance. *Current Opinion in Environmental Sustainability* 52, 125–131 (2021).
43. IPCC. *Climate Change 2022: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. (Cambridge University Press, Cambridge, UK and New York, NY, USA, 2022). doi:10.1017/9781009325844.
44. Climate Change Commission. *National Adaptation Plan of the Philippines (2023–2050)*. <https://climate.gov.ph/knowledge/ph-nap-2023-2050> (2023).
45. Katribu. Kalipunan ng Katutubong Mamamayan ng Pilipinas. <https://www.katribu.net> (2025).
46. Tebtebba. Climate Change Adaptation and Mitigation. <https://www.tebtebba.org/index.php/programs/climate-change-adaptation-and-mitigation> (2026).

47. UNESCO. Climate resilience rooted in Ifugao traditional knowledge in the Rice Terraces of the Philippine Cordilleras. <https://www.unesco.org/en/articles/climate-resilience-rooted-ifugao-traditional-knowledge-rice-terraces-philippine-cordilleras> (2025).
48. Hiwasaki, L., Luna, E., Syamsidik & Marçal, J. A. Local and indigenous knowledge on climate-related hazards of coastal and small island communities in Southeast Asia. *Climatic Change* 128, 35–56 (2015).
49. Landicho, L. et al. Local knowledge and practices towards the ecological restoration of selected landscape in Atok, Benguet, Philippines. *Biodiversitas* 22, 2785–2794 (2021).
50. Nikol, L. J. & Jansen, K. The Politics of Counter-Expertise on Aerial Spraying: Social Movements Denouncing Pesticide Risk Governance in the Philippines. *Journal of Contemporary Asia* 50, 99–124 (2020).
51. Peracullo, J. The Virgin of the Vulnerable Lake: Catholic Engagement with Climate Change in the Philippines. *Religions* 11, 203 (2020).
52. A call for unity and action amid a climate emergency and planetary crisis. *CBCPNews* <https://cbcpnews.net/cbcpnews/a-call-for-unity-and-action-amid-a-climate-emergency-and-planetary-crisis/> (2022).
53. An urgent call for ecological conversion, hope in the face of climate emergency. *CBCPNews* <https://cbcpnews.net/cbcpnews/an-urgent-call-for-ecological-conversion-hope-in-the-face-of-climate-emergency/> (2019).
54. Philippine Statistics Authority. Religious Affiliation in the Philippines (2020 Census of Population and Housing). <https://psa.gov.ph/content/religious-affiliation-philippines-2020-census-population-and-housing> (2020).
55. Philippine Statistics Authority. Ethnicity in the Philippines (2020 Census of Population and Housing). <https://psa.gov.ph/content/ethnicity-philippines-2020-census-population-and-housing> (2020).
56. Schafer, J. L. Multiple imputation: a primer. *Statistical Methods in Medical Research* 8, 3–15 (1999).
57. Baker, R. et al. Research synthesis: AAPOR report on online panels. *Public Opinion Quarterly* 74, 711–781 (2010).
58. Berinsky, A. J., Huber, G. A. & Lenz, G. S. Evaluating Online Labor Markets for Experimental Research: Amazon.com’s Mechanical Turk. *Political Analysis* 20, 351–368 (2012).
59. Collins, E. et al. Representativeness of Remote Survey Methods in LMICs: A Cross-National Analysis of Pandemic-Era Studies. *SSRN Electronic Journal* <https://doi.org/10.2139/ssrn.4582588> (2023) doi:10.2139/ssrn.4582588.
60. Stern, P. C. New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues* 56, 407–424 (2000).
61. OECD. *OECD Economic Surveys: Philippines 2026*. vol. 2026 (OECD Publishing, 2026).
62. Boroditsky, L. How does our language shape the way we think? https://www.edge.org/conversation/lera_boroditsky-how-does-our-language-shape-the-way-we-think

- (2009).
63. Bagood, E. T. Analyzing Cultural Phenomenon of pride on the use of the Filipino Language Amid English Language Dominance. *Journal of Daoist Studies* 19, 648–661 (2026).
 64. Broomell, S. B., Budescu, D. V. & Por, H.-H. Personal experience with climate change predicts intentions to act. *Global Environmental Change* 32, 67–73 (2015).
 65. Van Valkengoed, A. M., Perlaviciute, G. & Steg, L. From believing in climate change to adapting to climate change: The role of risk perception and efficacy beliefs. *Risk Analysis* 44, 553–565 (2024).
 66. Hair, J. F., Babin, B. J., Anderson, R. E. & Black, W. C. *Multivariate Data Analysis*. (Cengage Learning, 2022).
 67. Agarwal, B. “Bargaining” and Gender Relations: Within and Beyond the Household. *Feminist Economics* 3, 1–51 (1997).
 68. Meyer, J. W. & Jepperson, R. L. The ‘Actors’ of Modern Society: The Cultural Construction of Social Agency. *Sociological Theory* 18, 100–120 (2000).
 69. Steinberg, P. F. From Apocalypse to Empowerment: Reframing Climate Action. *Global Environmental Politics* 24, 105–128 (2024).
 70. Frank, D. J., Hironaka, A. & Schofer, E. The Nation-State and the Natural Environment over the Twentieth Century. *American Sociological Review* 65, 96–116 (2000).
 71. Meyer, J. W. World Society, Institutional Theories, and the Actor. *Annu. Rev. Sociol.* 36, 1–20 (2010).
 72. Frank, D. J., Hironaka, A. & Schofer, E. Environmentalism as A Global Institution. *Am Sociol Rev* 65, 122–127 (2000).
 73. Schreiner, C., Henriksen, E. K. & Kirkeby Hansen, P. J. Climate Education: Empowering Today’s Youth to Meet Tomorrow’s Challenges. *Studies in Science Education* 41, 3–49 (2005).
 74. Callison, C. *How Climate Change Comes to Matter: The Communal Life of Facts*. (Duke University Press, Durham and London, 2014).
 75. Wolf, J. & Moser, S. C. Individual understandings, perceptions, and engagement with climate change: insights from in-depth studies across the world. *WIREs Climate Change* 2, 547–569 (2011).
 76. Capstick, S., Whitmarsh, L., Poortinga, W., Pidgeon, N. & Upham, P. International trends in public perceptions of climate change over the past quarter century. *WIREs Climate Change* 6, 35–61 (2015).
 77. Climate Change Commission. From tradition to action: Integrating indigenous knowledge into climate adaptation plans. <https://climate.gov.ph/news/938> (2024).

Figures

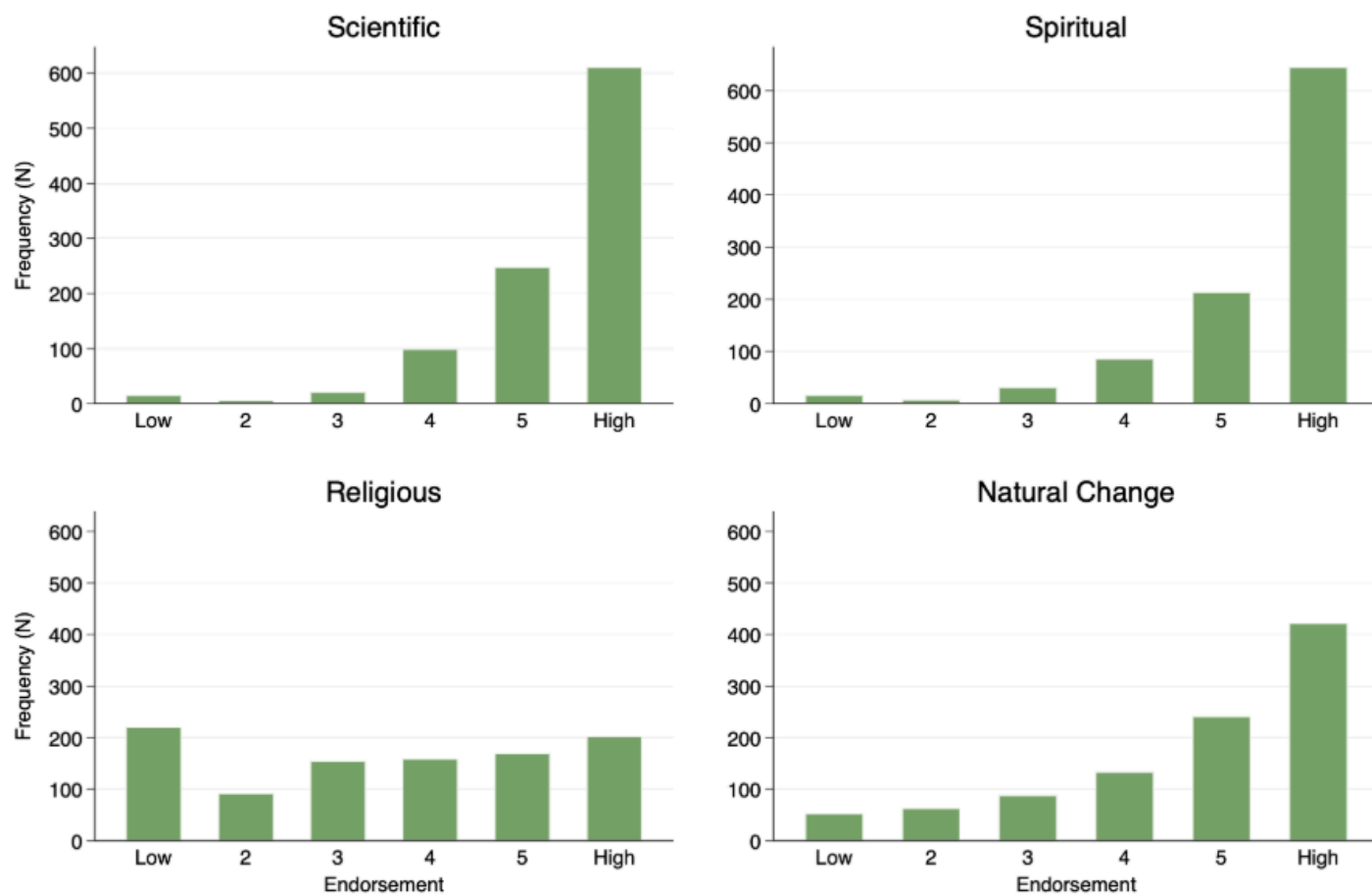


Figure 1

Endorsement Distribution by Attribution.

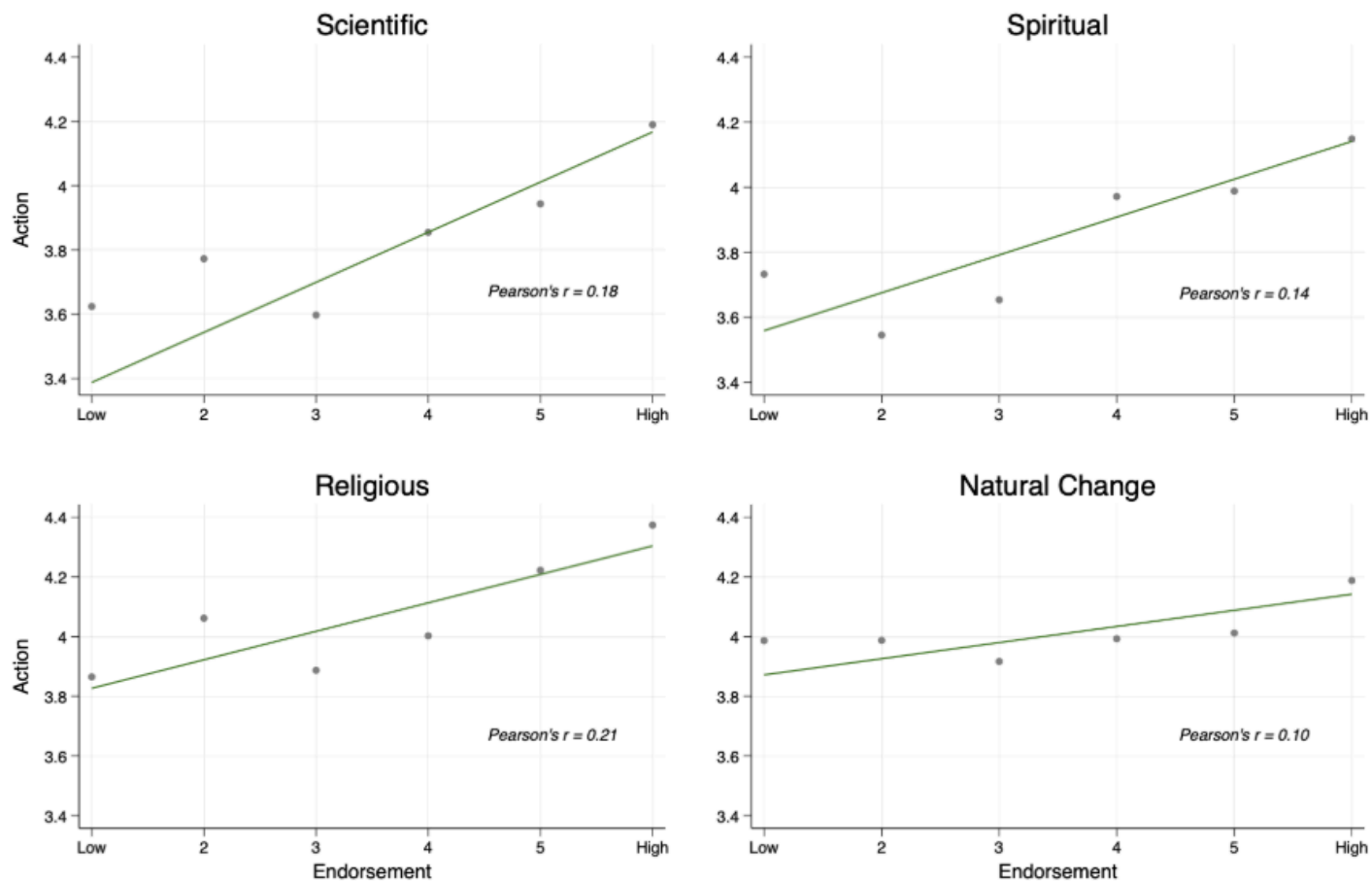
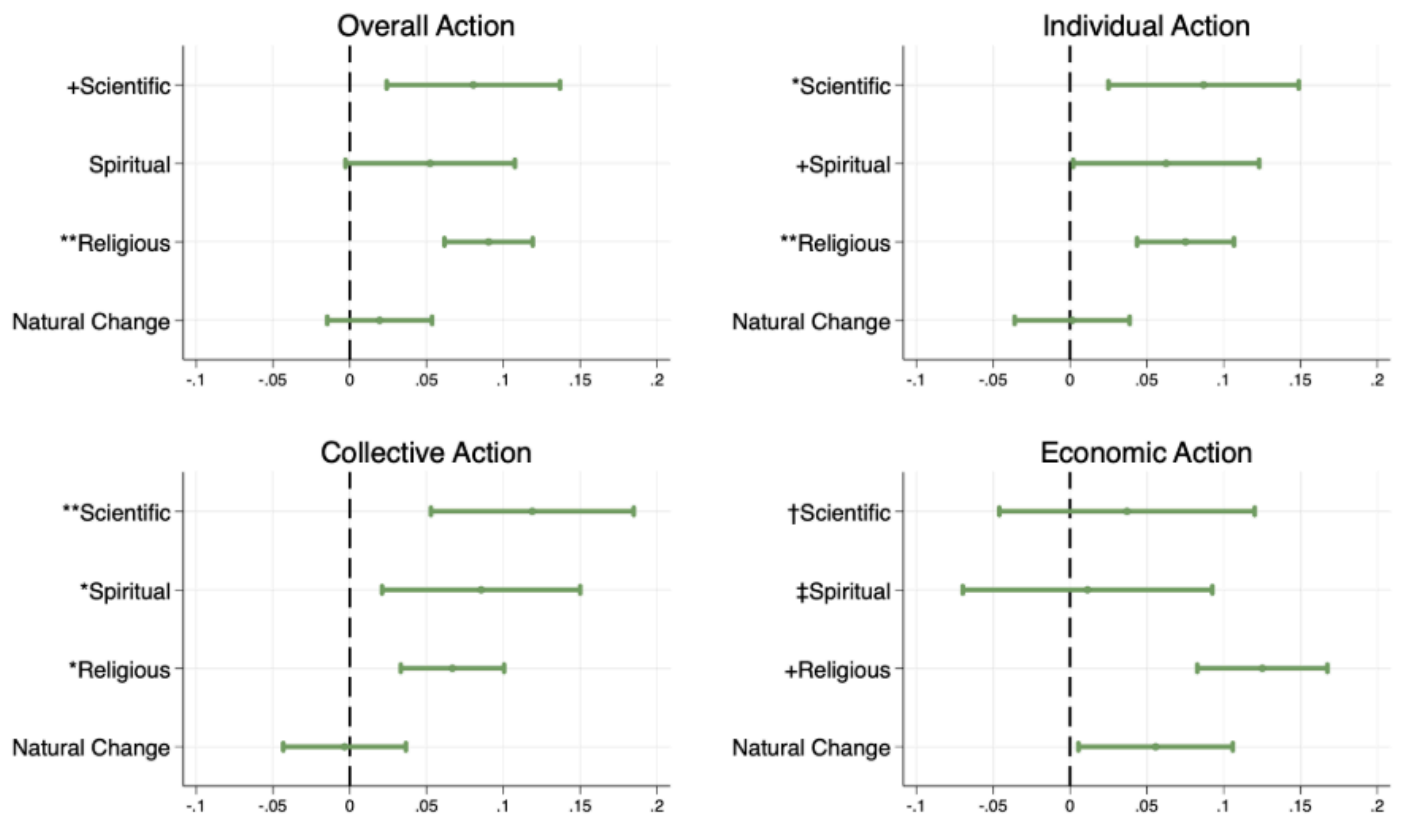


Figure 2

Bivariate Associations: Climate Attributions and Climate Action Propensity.



Note: 95% confidence intervals depicted.
 Estimates generated from regression including all controls, held at their means.
 *** p<0.001, ** p<0.01, * p<0.05, + p<0.10 indicates difference between anthropogenic attributions and Natural Change
 † p<0.10, ‡ p<0.05 indicates difference between Religious vs. anthropogenic attributions

Figure 3

Coefficient Plots by Action Type.

Supplementary Files

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