Local Climate Worry and Support for CO_2 Regulation

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Abstract

This paper examines how local concern about global warming and exposure to climate information in the media relate to support for regulating carbon dioxide (CO_2) across U.S. counties, using 2024 Yale Climate Opinion Maps estimates merged with basic structural data.(Leiserowitz et al. 2024; Howe et al. 2015) Ordinary least squares models show that county-level climate worry is very strongly associated with support for CO_2 regulation, while media exposure has a smaller but still positive conditional association and population size adds little once attitudes are controlled. These results speak to debates in science and technology studies (STS) and international relations (IR) about the politics of public consent for satellite-based climate monitoring and expert-led environmental governance.(Research on Environmental Decisions 2009)

1 Introduction

Climate governance increasingly relies on satellite and Earth observation systems to monitor emissions, detect land–use change, and verify states' compliance with international agreements. Yet the effectiveness of these techno-scientific monitoring regimes ultimately depends on public support for the domestic policies they underpin, such as regulating carbon dioxide (CO_2) as a pollutant. Public attitudes thus shape the political space in which expert

knowledge and remote sensing infrastructures can be translated into binding rules and enforcement.(Research on Environmental Decisions 2009)

A large literature in climate communication and environmental psychology underscores the role of affect, worry, and perceived risk in shaping climate engagement and policy preferences.(Research on Environmental Decisions 2009) Recent work on eco-anxiety further highlights that strong emotional responses to climate change can be simultaneously motivating and distressing, varying from constructive concern to more fatalistic outlooks.(Runkle et al. 2025) Against this backdrop, local "worry" about global warming can be interpreted as an aggregate signal of how seriously communities take climate risks, with potential implications for their willingness to support mitigation policies.

This paper asks which county–level factors are associated with support for regulating CO_2 in the United States. Using 2024 Yale Climate Opinion Maps estimates, the analysis focuses on three types of predictors: local exposure to climate information in the media, the share of residents who report being worried about global warming, and county population size as a basic structural indicator.[1] Ordinary least squares models show that local climate worry is very strongly associated with support for CO_2 regulation, media exposure has a smaller but still positive conditional association, and population size adds little once attitudes are taken into account. These findings suggest that the social foundations of acceptance for Earth observation–enabled climate governance lie more in affective orientations to climate risk than in simple differences in scale or demography across localities.

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[1]County–level percentages for support, worry, and media exposure are taken from the YCOM public data file.(Leiserowitz et al. 2024)

2 Data and Methods

2.1 Data and variables

The empirical analysis uses county–level estimates from the 2024 release of the Yale Climate Opinion Maps (YCOM), which provide modelled percentages of U.S. adults who hold specific beliefs and policy preferences about global warming.(Leiserowitz et al. 2024; Howe et al. 2015) The YCOM estimates are generated by downscaling repeated national surveys with a multilevel regression and post-stratification model that incorporates demographic and geographic characteristics, enabling comparison across all U.S. counties.(Howe et al. 2015) From this dataset, the dependent variable is *Support for regulating CO₂*, measured as the estimated percentage of residents in each county who say that carbon dioxide should be regulated as a pollutant (`regulate_num`).[2]

Two main explanatory variables capture local information environments and affective orientations toward climate change. First, *Media exposure* (`mediaweekly_num`) is the county–level percentage of adults who report hearing about global warming in the media at least once a week. Second, *Climate worry* (`worried_num`) is the percentage who say they are worried about global warming. A third predictor, *Population size* (`population_num`), is constructed by converting the county population field in the YCOM file to a numeric variable and is used as a simple structural control for county scale.[3]

2.2 Model specification

The analysis proceeds in three ordinary least squares (OLS) models estimated across all available counties. The baseline specification relates support for CO_2 regulation to media

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[2]The original variables in the public YCOM file are stored as character strings and are converted to numeric proportions in the analysis.(Leiserowitz et al. 2024)

[3]Population size is treated as a continuous predictor; preliminary models treating it as a factor greatly inflated model complexity without improving fit.

exposure alone,

$$\text{regulate}_i = \beta_0 + \beta_1 \text{mediaweekly}_i + \varepsilon_i,$$

which captures the bivariate association between information exposure and policy support at the county level. A second model adds climate worry to assess whether the media–support relationship persists once affective orientations are taken into account,

$$\text{regulate}_i = \beta_0 + \beta_1 \text{mediaweekly}_i + \beta_2 \text{worried}_i + \varepsilon_i.$$

The third model introduces population size as a structural covariate,

$$\text{regulate}_i = \beta_0 + \beta_1 \text{mediaweekly}_i + \beta_2 \text{worried}_i + \beta_3 \text{population}_i + \varepsilon_i.$$

All models are estimated in R using the `lm()` function, with variables expressed as percentages at the county level.[4] Model fit is evaluated using R^2 and residual diagnostics, and coefficients are interpreted as changes in percentage–point support for CO_2 regulation associated with one–unit changes in each predictor, holding other covariates constant.

3   Results

3.1   Bivariate relationship between media exposure and support

The baseline model regresses county–level support for regulating CO_2 on weekly media exposure alone. The estimated slope for `mediaweekly_num` is 0.69 (Std. Error 0.02, $p < 0.001$), indicating that a ten–percentage–point increase in the share of residents who hear about global warming in the media at least weekly is associated with roughly a 6.9 percentage–point increase in support for regulation.[5] Media exposure alone explains about 29%

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[4]Data preparation and estimation are implemented in R using base functions and `ggplot2` for visualisation.

[5]Model 1: $\hat{\beta}_1 = 0.687$, Residual SE = 4.64, $R^2 = 0.29$.

of the cross–county variation in support, suggesting a substantial but far from exhaustive role for information environments.

3.2 Climate worry as the main predictor

When climate worry is added in Model 2, the picture changes sharply. The coefficient on `worried_num` is approximately 0.62 (Std. Error 0.01, $p < 0.001$), so that a ten–point increase in the share of residents who report being worried about global warming is associated with about a 6.2 percentage–point increase in support for CO_2 regulation, holding media exposure constant.[6] The coefficient on media exposure falls to about 0.09 but remains positive and statistically significant, implying a modest conditional association once worry is accounted for. Together, media exposure and climate worry explain roughly 83% of the variance in county–level support, and a scatterplot with a fitted line shows a tight, nearly linear positive relationship between worry and support.[7]

3.3 Limited role for population size

Model 3 introduces county population as a simple structural control. The estimated coefficient on `population_num` is extremely small (about 3.0×10^{-9}) and statistically indistinguishable from zero, while the coefficients on media exposure and climate worry remain essentially unchanged in magnitude and significance.[8] The overall fit of the model is virtually identical to Model 2, indicating that population size adds little explanatory power once local affective orientations and media exposure are taken into account. A predicted–values plot based on Model 3 shows a gently rising linear relationship between media exposure and support when worry and population are held at their mean values, underscoring the relatively modest conditional effect of media compared to climate worry.[9]

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[6]Model 2: $\hat{\beta}_{\text{worried}} = 0.624$, Residual SE $= 2.27$, $R^2 = 0.83$.

[7]See Figure 1 for the relationship between `worried_num` and `regulate_num`.

[8]Model 3: $\hat{\beta}_{\text{media}} = 0.091$, $\hat{\beta}_{\text{worried}} = 0.624$, $\hat{\beta}_{\text{population}} \approx 0$; $R^2 = 0.83$.

[9]See Figure 2 for predicted support across media exposure at mean levels of worry and population.
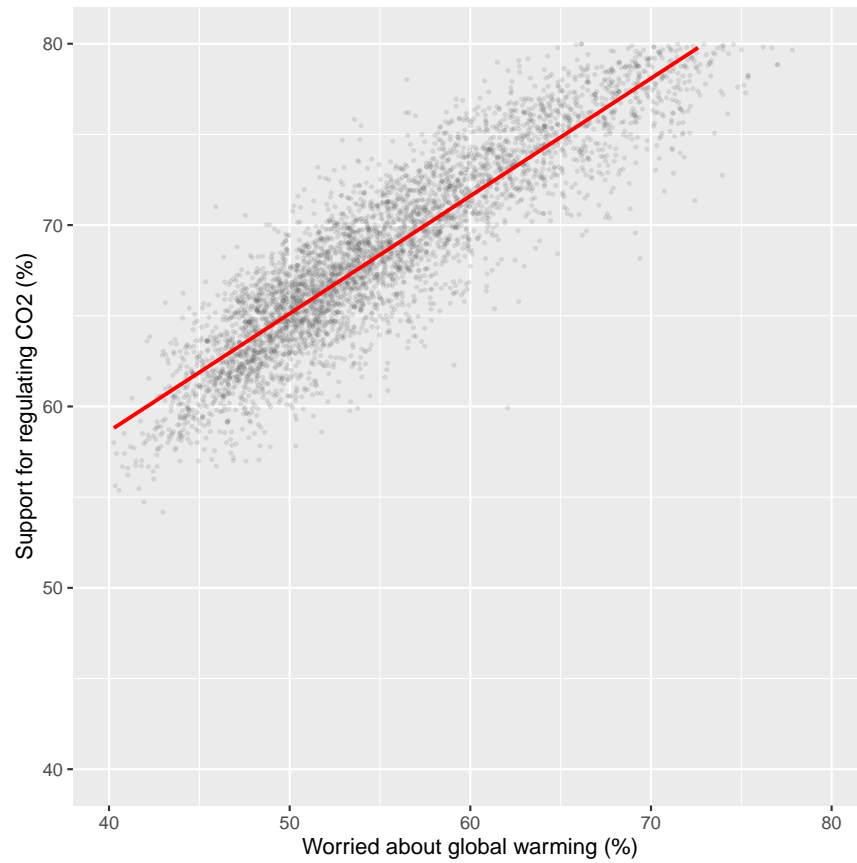
Figure 1: County-level support for regulating CO_2 as a pollutant by share of residents who are worried about global warming (Model 2).
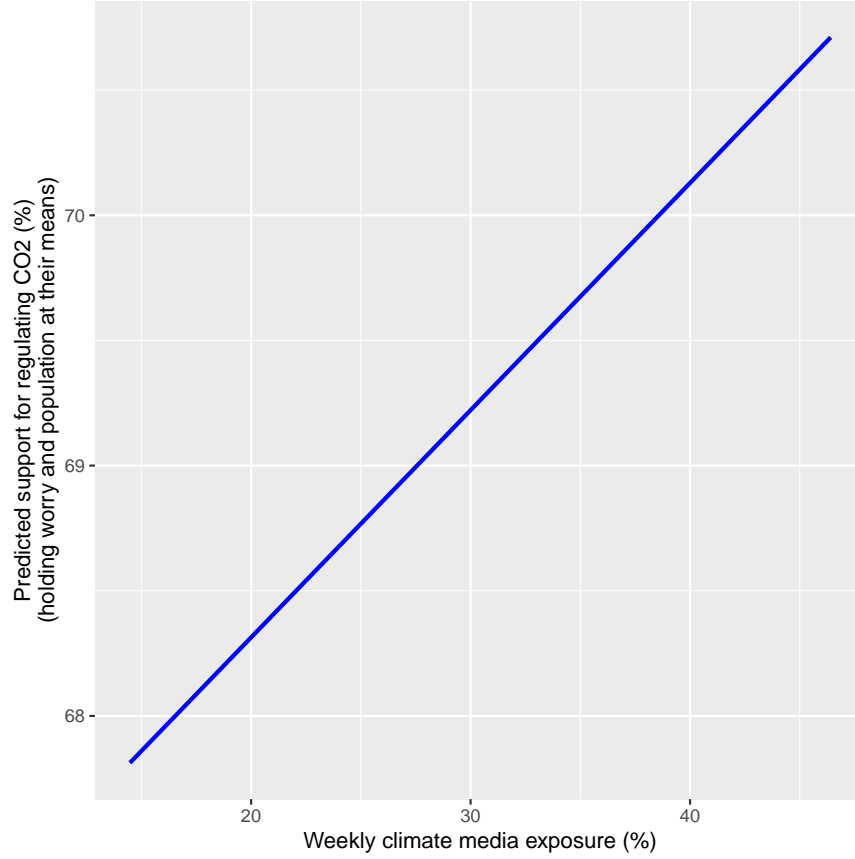
Figure 2: Predicted support for regulating CO_2 across weekly climate media exposure, holding climate worry and population at their means (Model 3).

4   Discussion

The analyses show that local affective orientations toward climate change are tightly linked to support for a core mitigation policy, while structural size plays a negligible role. At the county level, the share of residents who report being worried about global warming almost one–for–one tracks support for regulating CO_2, and this relationship alone accounts for the bulk of the explainable variation in policy support. Conditional on worry, greater exposure to climate information in the media is associated with only modest additional increases in support, and once attitudes and exposure are controlled, population size contributes virtually nothing to model fit.

These patterns resonate with broader research on climate communication, which finds that messages emphasising concrete risks and affective engagement are often more predictive of support for climate policy than purely informational appeals.(Research on Environmental Decisions 2009) At the same time, work on eco-anxiety suggests that high levels of concern can tip into distress or fatalism for some individuals, underscoring that the quality and framing of engagement matter alongside its intensity.(Runkle et al. 2025) The county-level results here are consistent with the view that communities where concern remains engaged rather than paralysing provide more fertile ground for ambitious mitigation measures.

For debates in STS and IR about Earth observation–enabled climate governance, the findings imply that the legitimacy of satellite-based monitoring infrastructures is deeply conditioned by local emotional geographies. Counties where a larger share of residents are worried about global warming are far more supportive of regulating CO_2, creating more favourable conditions for the domestic implementation of monitoring–intensive climate policies. Conversely, low–worry counties may resist the same policies even when exposed to similar levels of media coverage, highlighting the limits of information alone in building consent for techno-scientific governance arrangements.(Research on Environmental Decisions 2009) Future research could extend this analysis by incorporating additional structural variables, alternative measures of local media ecosystems, or longitudinal YCOM releases to examine how changing climate risks and discourses reshape public support over time.(Leiserowitz et al. 2024; Howe et al. 2015)

References

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