Climate Change Uncertainty and Skepticism: A Cross-Country Analysis

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Skepticism about climate change and uncertainty about the severity of its impacts varies between the US and UK; less information is available for other countries.

- **Skepticism and uncertainty are related but different aspects of climate change perceptions**. In the literature, skepticism often relates to whether people believe climate change is happening, whereas uncertainty refers to causes and impacts.
- Whitmarsh (2011) presented the **Skepticism Scale** and found that UK respondents believe that climate change is caused by humans, but are skeptical about and uncertain as to the severity of the impacts.[1]
- In cross-country surveys between the US and UK, respondents show **varying levels of uncertainty towards the causes of climate change**. In other international studies, knowledge about climate change causes and impacts is lower in developing countries, but respondents in these countries tend to believe climate change is a greater threat than those in developed countries.[2]
- Research has noted several reasons for differing levels of skepticism – **political affiliation**[1,3], **socio-economic status**[4], and **worry about other relevant issues within the country context** (i.e national security, economy, etc.)[1].

This research tests the validity of Whitmarsh's skepticism scale and tests whether skepticism varies between countries.

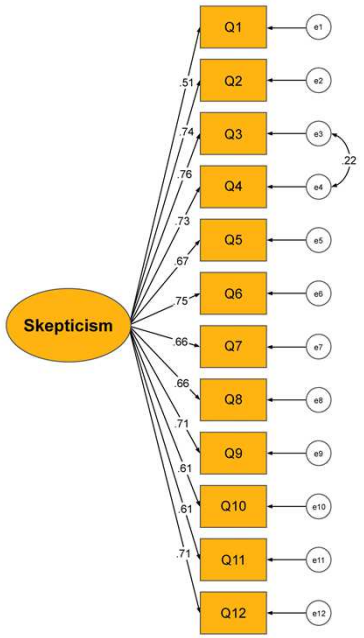
- Based on the literature, we hypothesize that **respondents in various countries have different levels of skepticism toward climate change.** This study provides additional insight into **cross-cultural perceptions of climate change** and the skepticism that surrounds the topic in different countries.

We used confirmatory factor analysis to assess the construct validity and internal reliability of the Skepticism Scale; we used ANOVA to evaluate skepticism levels between eight countries.

- ASU's Global Ethnohydrology Study (GES) is a multi-year, multi-site study focused on local water and climate change knowledge (https://shesc.asu.edu/research/projects/global-ethnohydrology-study). This research utilizes GES data collected in 2012, at **8 country sites**. The total sample size used for this analysis is **572**; Australia = 69, China = 49, Fiji = 76, Mexico = 53, New Zealand = 72, Switzerland = 51, UK = 139, US = 63.
- The GES 2012 protocol included Whitmarsh's Skepticism Scale[1]. A **confirmatory factor analysis** was conducted to test the validity and reliability of this scale to measure skepticism accurately.
- An **ANOVA and Post-Hoc Tests** provided the ability to compare means between countries and analyze cross-country similarities and differences in skepticism levels.

Whitmarsh's Skepticism Scale provides a *reasonably good fitting model to our data* for measuring skepticism of climate change for our sample.

Respondents were asked to respond to the following, and indicate how much they agree (=5) or disagree (=1) with the statements (3 = neither agree or disagree)	Mean	Std. Deviation
1. The media is often too alarmist about issues like climate change	3.17	1.08
2. It is too early to say whether climate change is really a problem	2.46	1.17
3. The evidence for climate change is unreliable	2.49	1.11
4. There is too much conflicting evidence about climate change to know whether it is actually happening	2.78	1.17
5. Climate change is just a natural fluctuation in earth's temperature	2.80	1.13
6. I am uncertain about whether climate change is really happening	2.40	1.13
7. Floods and heat waves are not increasing, there is just more reporting of it in the media these days	2.44	1.09
8. Claims that human activities are changing the climate are exaggerated	2.54	1.14
9. I do not believe climate change is a real problem	2.07	1.07
10. Climate change is too complex and uncertain for scientists to make useful forecasts	2.65	1.07
11. Many leading experts still question if human activity is contributing to climate change	2.80	1.06
12. Too much fuss is made about climate change	2.35	1.13



Model Fit Indices

x^2/df	df	p	NFI	CFI	PNFI	RMSEA	SRMR
2.807	53	.000	.952	.969	.765	.056	.0301

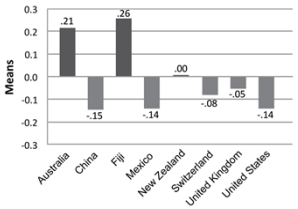
Notes about Model Fit Indices

x^2/df	– Relative Chi-Squared	[good fit range 2<5; 3:1]
NFI	– Normed Fit Index	[good fit <.95]
CFI	– Comparative Fit Index	[good fit <.95]
PNFI	– Parsimonious Normed Fit	[good fit range .5<.9]
RMSEA	– Root Mean Square Error of Standardization	[good fit range <.5 or <.7]
SRMR	– Standardized Root Mean Square Residual	[good fit <.05]

Cross-country analysis shows differences in agreement or disagreement to the skepticism scale, and identifies clusters of similarities in skepticism level.

ANOVA **F-Value = 6.769** **p-Value < .001**

Skepticism Means by Country



Note: Scale has been transformed and normalized to a mean = 0

Post-Hoc Tests

Tukey HSD	Groups in Homogenous Subsets		
	1	2	3
China[1]	-.15		
Mexico[1]	-.14		
US[1]	-.14		
Switzerland[1]	-.08		
UK[1 & 2]	-.05	-.05	
New Zealand[1, 2, & 3]	.00	.00	.00
Australia[2 & 3]		.21	.21
Fiji[3]			.26
Sig.	.679	.058	.090

Scheffe	Groups in Homogenous Subsets		
	1	2	3
China[1]	-.15		
Mexico[1]	-.14		
US[1]	-.14		
Switzerland[1 & 2]	-.08	-.08	
UK[1, 2, & 3]	-.05	-.05	-.05
New Zealand[1, 2, & 3]	.00	.00	.00
Australia[2 & 3]		.21	.21
Fiji[3]			.26
Sig.	.891	.148	.102

[1] statistically similar levels of skepticism; [2] statistically similar levels of skepticism; [3] statistically similar levels of skepticism

This research indicates that countries seem to differ in their level of skepticism

- These results support the hypothesis that respondents in different countries have **differing levels of skepticism** about climate change.
- These preliminary results suggest that respondents in **Fiji and Australia agree more with the skepticism statements**, indicating that these two countries may be more skeptical than others surveyed.
- Post-hoc tests show **3 distinct groups of countries**, indicating respondents in certain countries have statistically similar levels of skepticism compared to others**.**
  - **Tukey**: China, Mexico, US, and Switzerland show statistical similarities in their levels of skepticism; Fiji respondents are statistically different than all other countries. New Zealand shares similarities with all 3 country clusters.
  - **Scheffe**: China, Mexico, and US show statistical similarities; Fiji is statistically different. UK and New Zealand respondents share similarities with all 3 country clusters.
- At this point, it is **unclear what is driving the similarities and differences between levels of skepticism**. Follow-up analysis is required to examine why levels of skepticism differ cross-culturally.

Next Steps

- **Establish Measurement Equivalence:** the protocol was administered in **3 languages**: **English** (Australia, Fiji, New Zealand, Switzerland, UK, and US), **Spanish** (Mexico), and **Mandarin** (China); establishing measurement equivalence for the tool could allow for more concrete conclusions about language-group comparisons, and eliminate or confirm the concern about methodological differences in skepticism.
- **Examine cross-cultural risk perceptions and policy attitudes about climate change**, using quantitative and qualitative data, to provide better understanding of country differences in climate change beliefs.

References

[1] Whitmarsh, Lorraine. "Scepticism and uncertainty about climate change: dimensions, determinants and change over time." *Global Environmental Change* 21:2 (May 2011): 690-700.

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[4] Poortinga, Wouter, Alexa Spence, Lorraine Whitmarsh, Stuart Capstick, and Nick F. Pidgeon. "Uncertain climate: An investigation into public skepticism about anthropogenic climate change." *Global Environmental Change* 21:3 (August 2011) 1015-1024.

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