

Correlation Between Climate Change and Dysphoria in Primary Care

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ABSTRACT

Background: Concern about climate change may affect mental health. We evaluated the relationship between primary care patients' attitudes toward climate change and dysphoria.

Methods: In 2013, we surveyed 571 adult primary care patients in southern Wisconsin. Attitudes toward climate change were measured using a 46-point composite of 9 questions. Dysphoria was measured using a 13-point composite summing the Patient Health Questionnaire (PHQ-2) and the Generalized Anxiety Disorder scale (GAD-2).

Results: Patients frequently reported concern about climate change and 22.5% experienced dysphoria. A significant, positive correlation existed between the composite climate change score and the dysphoria score ($r=0.345$; $P<0.001$).

Conclusion: Primary care patients are concerned about climate change and this concern is positively related to dysphoria. The level to which dysphoria is due to climate change should be elucidated.

of health.³ Little is known, however, about associations between emotional distress and attitudes toward global warming.

The purpose of this 2013 study was to evaluate the relationship between concern about global climate change and dysphoria among adult primary care patients. We tested an a priori hypotheses that dysphoria was associated with recognition of a changing climate, frustration over the lack of action on global warming, and a sense of remorse or dread about the future. The data, however, precede 2 presidential elections and the entry and subsequent withdrawal of the United States from the Paris Agreement on climate change. Accordingly, they provide a baseline for future comparison.

BACKGROUND

Global temperatures in recent decades were higher than any comparable period in the last 400 years. The continued rising trend is mostly attributed to human activity.¹ Moreover, global warming is widely accepted as a major public health concern.²

Direct exposure to extreme weather can lead to posttraumatic stress disorder and other adverse mental health outcomes due to disruptions in social, economic, and environmental determinates

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METHODS

Definitions

Climate Change refers to any significant change in climate measurements lasting for an extended time period, including major changes in temperature, precipitation, or wind patterns that occur over several decades or longer.

Dysphoria refers to a mixed state of emotional distress, presenting as inner tension, irritability, aggression, and/or hostility.⁴

23-Item Survey Instrument

We developed 9 attitudinal questions pertaining to climate change based on informal queries with interested individuals, as well as a review of recent literature dealing with climate change and health. Responses to 5 questions predicated by, "In the last 6 months, how often have you been aware of the following?" were indicated on 6-point Likert scales extending from 0 ("Not at all") to 5 ("All the time"). Responses to 4 questions predicated by, "To what extent..." ranged from 0 ("Not at all") to 5 ("A great deal"). Two additional

Table 1. Demographics of Sample and Relation to Affirmation of Climate Change^a

	No. of Respondents (%)	Affirming Climate Change	Univariate Factor vs CC χ^2 , sign	Multivariate Binary Logistic Regression Odds Ratio, [95th %CI], sign
Clinical site			7.42, 0.060	1.00 [0.65-1.53] 0.996
Urban (2)	305 (53.4)	91.0%		
Suburban (1)	146 (25.6)	85.3%		
Rural (1)	120 (21.0)	81.7%		
Age range	18-96 years		13.04, 0.071 ^b	1.24 [0.91-1.69] 0.170 ^b
Mean \pm	46.8 \pm 17.2			
Sex			3.54, 0.170	0.45 [0.18-1.16] 0.098
Female	357 (66.1)	89.7%		
Male	183 (33.9)	84.2%		
Parent of child(ren)			3.90, 0.048	0.73 [0.22-2.50] 0.621
Yes	380 (70.8)	85.8%		
No	155 (28.9)	92.1%		
Race			0.05, 0.820 ^c	0.11 [0.01-1.26] 0.076 ^c
Asian	15 (2.9)	86.7%		
Black	66 (12.6)	84.6%		
Native American	4 (0.8)	100%		
Pacific Islander	1 (0.2)	100%		
White	422 (80.5)	87.4%		
Other	16 (3.1)	100%		
Ethnicity			0.39, 0.533	0.00 [0.00-∞] 0.999
Hispanic	31 (7.5)	93.6%		
Non-Hispanic	378 (92.0)	90.1%		
Income quintile			1.61, 0.803	1.32 [0.90-1.93] 0.156
1st: <\$19,000	119 (24.3)	86.7%		
2nd: \$19K - \$33,999	80 (16.3)	91.9%		
3rd: 34K - \$53,999	91 (18.6)	88.5%		
4th: 54K - \$83,999	102 (20.8)	86.0%		
5th: \geq \$84,000	98 (20.0)	87.6%		
Education status			9.88, 0.042	1.15 [0.69-1.92] 0.594
< High school (HS)	25 (4.6)	81.8%		
High school diploma/GED	115 (21.3)	82.7%		
Some college	173 (32.0)	84.5%		
College (BA/BS) degree	148 (27.4)	91.2%		
Post-baccalaureate study or degree	80 (14.8)	94.8%		
Political affiliation			95.01, <0.001	0.39 [0.27-0.55] <0.001
Very liberal	82 (15.8)	95.1%		
Moderately liberal	112 (21.6)	97.3%		
Slightly liberal	52 (10.0)	97.8%		
Moderate	157 (30.3)	89.5%		
Slightly conservative	39 (7.5)	86.1%		
Moderately conservative	56 (10.8)	57.1%		
Very conservative	21 (4.1)	45.0%		

^aResults pertaining to affirmation of human causation of climate change are not presented.

^bAges were grouped by decade.

^cRacial affiliations were collapsed into white vs nonwhite.

yes/no questions forced responses to: “Is global climate change (Global Warming) occurring?” and “Is global climate change due to human activities such as the burning of fossil fuels (coal, oil)?”

To establish a metric for dysphoria, we used reduced versions of the 9-item Patient Health Questionnaire (PHQ) and the 7-item Generalized Anxiety Disorder (GAD) scale. The PHQ-2 and GAD-2 are screening tools—validated in primary care—that assess symptoms of depression and anxiety.⁵ We identified dysphoria by summing the scores of the 4 individual items on the PHQ-2 and GAD-2, which resulted in a composite dysphoria score (Dys-4) that ranged from 0 to 12 points.

Demographic questions defined respondents by age, sex, race, ethnicity, having children, 5 levels of educational attainment, 5 levels of household income based on Wisconsin quintiles, and 7 levels of political leaning extending from “Very Liberal” to “Very Conservative.”

This cross-sectional study was reviewed and determined exempt by the University of Wisconsin Health Sciences Minimal Risk Institutional Review Board.

Survey Population

We conducted convenience sampling of adult patients in the waiting rooms of 4 primary care clinics affiliated with the University

of Wisconsin Department of Family Medicine and Community Health. The clinics were located in urban (2 sites), suburban (1), and rural (1) areas within Dane County, Wisconsin. Participation was voluntary and anonymous. Eligible participants had to speak English, and be 18 years or older and cognitively unimpaired. Study coordinators approached patients and asked them to complete the 2-page survey. Data were collected without personal identifiers. All surveys were completed during June and July 2013, a period characterized by fairly average temperatures and precipitation.

Data Analyses

We relied on descriptive statistics for initial response evaluations and used chi-square and binary logistic regression⁶ to assess the relationship between demographics and recognition of climate change driven by human activity. Responses to the climate change questions were compared using analysis of variance. We then summed the responses in a single score with a value from 0 to 45. We used Spearman's rank correlation⁶ to compare the climate change composite scores (CCCS) to the Dys-4.

RESULTS

Response Rates and Demographics

Seventy-eight percent (571/728) of the patients approached completed the survey. Reasons for refusal included feeling too ill, being unwilling to complete a survey, "not having glasses," and having limited English language skills.

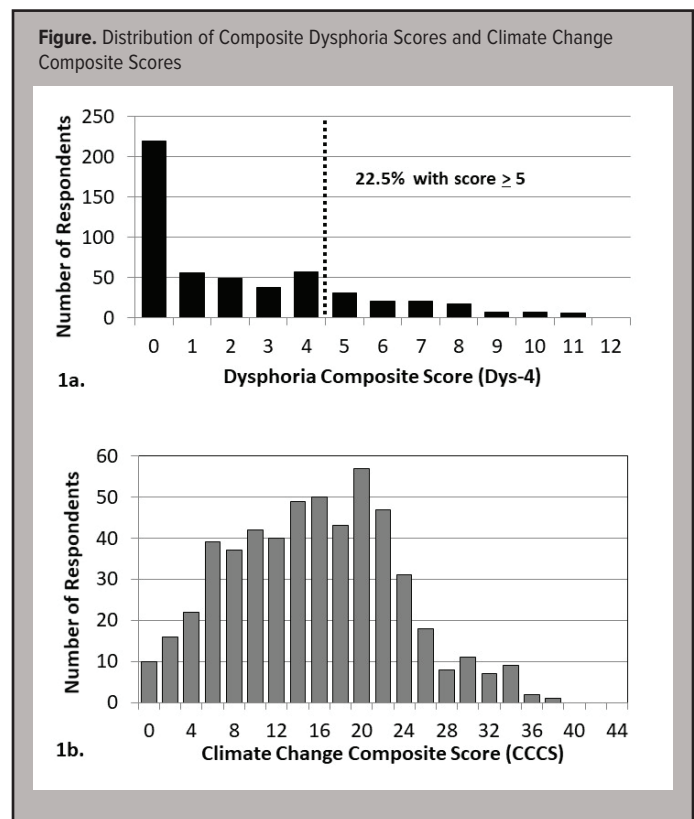
The sample included a broad age range, extending from 18 to 96 years with a mean of 46.8 ± 17.2 (\pm SD) years (Table 1). A majority (70.8%) of respondents were parents. The racial and ethnic profile of our sample was between Wisconsin and United States averages. Income status of participants closely matched income quintiles for Wisconsin. Educational attainment was somewhat higher than national and state averages. Political affiliation was slightly more liberal (mean = 3.41; 4.0 = moderate).

Dysphoria in Primary Care

Responses to the PHQ-2 and GAD-2 were skewed with means (\pm SD) and medians of 1.21 ± 1.58 ; 0 and 1.37 ± 1.72 ; 1, respectively. Using screening cut-offs of 3 points,⁷⁻⁸ 17.8% scored positively for depression and 19.5% for anxiety. The Dys-4 ranged from 0 to 12 points with a mean (\pm SD) and median of 2.58 ± 3.12 and 1 (Figure 1a). Using a screening cutoff of 5 points (either PHQ-2 ≥ 3 or GAD-2 ≥ 3), 22.5% of patients scored positively for dysphoria. The results are similar to the rate of anxiety disorders seen in primary care populations.⁹

Affirmation of Climate Change

Most patients (87.6%) agreed that climate change is occurring. Moreover, most (82.3%) agreed that climate change is due to human activities. When assessed with univariate statistics, parenthood ($P=0.048$), higher education ($P=0.042$), and liberalism ($P<0.001$) were associated with affirmation of climate change and global



warming (Table 1). Significant predictors for human causation were urban clinic affiliation ($P=0.025$), younger age ($P=0.026$), female sex ($P=0.023$), and liberal political identification ($P<0.001$).

Attitudes Toward Climate Change

The mean scores, on the 0 to 5-point scale, of climate change attitudinal questions varied from 1.25 ("Have you noted any health effects in you or your family members from climate change?") to 2.58 ("Paying more attention to changes in climate") (Table 2). Significant differences existed among the mean scores of the 9 questions (ANOVA; $P<0.001$). The value of CCCS ranged from 0 to 38 points with a mean (\pm SD and median of 15.1 ± 7.8 and 15). The distribution of the CCCS approximated a normal distribution (Kolmogorov-Smirnov: $P>0.15$) and is depicted in Figure 1b.

Relationship Between Attitudes Toward Climate Change and Dysphoria

Affirmation of climate change was not associated with positive screens for depression (PHQ-2 ≥ 3 ; $\chi^2=0.178$, NS) or anxiety (GAD-2 ≥ 3 ; $\chi^2=0.441$, NS). Likewise, attribution to human activity was not associated with screens for depression ($\chi^2=0.625$, NS) or anxiety ($\chi^2=0.054$, NS). The correlation between CCCS and Dys-4 was positive and highly significant ($r_s=0.345$; $P<0.001$).

DISCUSSION

Within a diverse set of primary care patients, we demonstrated a positive and highly significant association between an individual feeling concerned about climate change and experiencing dyspho-

Table 2. Survey Questions Pertaining to Attitudes Toward Climate Change and Global Warming in Order of Mean Response Level

Question	Mean ± SD	Median Response	% Indicating Frequently or More Often
Have you noted any health effects in you or your family members from climate change?	1.25 ± 1.34	1	16.7
Feeling sorry about or having remorse for the future	1.35 ± 1.27	1	16.8
Trying not to think about global warming	1.37 ± 1.251	1	13.4
Worrying about or dreading the future	1.59 ± 1.28	1	19.1
Noticing a loss of some seasonal climatic cues	1.78 ± 1.35	2	27.3
Are you aware of environmental changes in your community or state due to climate change?	1.79 ± 1.41	2	27.7
Are you concerned with global climate change?	2.42 ± 1.49	2	46.5
Are you troubled by the lack of action on climate change by leaders?	2.49 ± 1.65	2	49.3
Paying more attention to changes in climate	2.58 ± 1.30	3	54.9

ria. At the same time, patients with positive screens for depression or anxiety were no more likely to affirm global warming or human causation of global warming than patients with negative screens.

We are unable to distill causation from this correlative study. The results suggest that patients with dysphoria may be more likely to have enhanced awareness and concern over global warming or, conversely, patients with heightened awareness and concern over global warming may become dysphoric. Both scenarios are potentially of clinical importance, thus necessitating health assessments and mitigation efforts for the mental health consequences of climate change.

Limitations

Major limitations exist within this exploratory study. The data are from 2013, thus setting a baseline that should be reexamined. We sampled a convenience population that was highly constrained in terms of time and location—patients presenting to clinics affiliated with the University of Wisconsin and located within Dane County, Wisconsin. Dane County tends to be more liberal than surrounding areas. When all liberal-leaning respondents were removed from analyses, however, the correlation between CCCS and Dys-4 persisted ($r_s = 0.414$; $P < 0.001$), suggesting that the relationship was independent of political leaning.

There were also limitations within the survey instrument. We did not define key terms for participants, so understanding of climate change and global warming may vary among individuals. We did not validate the climate change attitudinal questions. Although weather patterns during the summer of 2013 were near average, responses to climate change questions could have been influenced by the intense heat and drought across Wisconsin during the previous summer. As is common within survey research, there can be response bias.

CONCLUSION

We initiated this study suspecting there were individuals negatively affected by the current and projected consequences of global climate change. From a population of adult primary care patients, we discovered high levels of concern regarding climate change and inaction on mitigation efforts by leaders (46.5% and 49.3%, respectively, indicating these concerns frequently or more often).

We also found a significant correlation between patient concerns and dysphoric mood, as detected by validated primary care screening tools. As global warming increases and inaction continues, more dedicated assessments of its consequences on all aspects of human health, including mental health, are needed.^{2,3,10}

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