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People in U.S. Cities Worried about Climate Change Discuss Nature Less Negatively Online

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Abstract

In this mixed-methods, exploratory study, we map how people in cities with varying levels of worry about climate change discuss nature in conversations on reddit.com. Previous research has begun to document ways people discuss climate change online. This study expands upon this work by testing for differences in nature-talk generally across the United States and with the goal of shedding light on less obvious psychological responses to climate worry. We searched the subreddits of $N = 81$ major cities in the United States and identified $N = 1593$ threads about nature ($M = 718$ words/thread) and paired that data with information on climate worry from the Yale Program on Climate Change Communication. Quantitative tests showed a negative correlation between a city's percentage of people "somewhat or very worried" about climate change and negative tone and emotion in nature-related threads. Inductive qualitative analyses identified themes that made up these more negative conversations in less worried cities. In less worried cities, themes regarding the "hassles of nature" and literal and figurative "contamination of nature" drove negativity. In more worried, less negative cities, a theme of "cheerful problem solving" emerged. We also observe a regional pattern in which areas with more exposure to the effects of climate change (the coasts and the South) use less negative language about nature than those more insulated from those effects (the Midwest and the Plains). These results help us understand more about psychological responses to the threat of climate change, which has implications for slowing its progression as well as managing its impacts.

Introduction

Climate Change and its Psychological Effects

Human-driven climate change is happening (National Oceanic and Atmospheric Administration [NOAA], 2025). Across the globe, including the geographically diverse United States, average temperatures are rising and creating increasingly volatile weather conditions (NOAA, 2025). Drought and flooding have become more severe, food production is being put under stress, existing infrastructure is at risk of destruction, and human health is in jeopardy (NOAA, 2025). In response, many have grown increasingly worried about global warming and its negative effects. While knowledge about climate change varies considerably by geography (Knight, 2016; Lee et al., 2015; Lee et al., 2025; MacKay et al., 2026), a strong majority of people in the United States now express concern about climate change and its potential harm to humans, animals, and the environment (Yale Program on Climate Change Communication, 2025).

The ways in which people think about and ultimately respond to these worries have serious implications for managing the physical and psychological impacts of climate change. Research in the areas of geographical, environmental, and sustainability psychology has blossomed in the past several decades and documents some of the deep and often hidden connections between the natural world and a variety of psychological variables. For example, researchers have charted how Big Five personality traits vary by region, topography, and pathogen prevalence (e.g. Götz et al., 2020; Rentfrow, 2010; Rentfrow et al., 2008;

Rentfrow & Jokela, 2016; Schaller & Murray, 2008), how weather impacts behavior (e.g. Harley, 2019; Phithakkitnukoon et al., 2012), and how aspects of the natural world, like climate, are associated with regional measures of variables like creativity and freedom (Van de Vliert, 2013; Van de Vliert & Murray, 2018).

Evidence of climate change itself also has psychological effects. Climate events like extreme weather (Obradovich et al., 2018) and anxiety about the future of the natural world are associated with emotional impairment and psychological distress. They are also associated with varying levels of eco-activism and environmental values (Clayton & Karazsia, 2020; Cosh et al., 2024; Whitmarsh et al., 2022). Whitmarsh et al. (2022) found that those with high climate anxiety had higher nature relatedness, and Helm et al. (2018) found that ecological stress was associated with biospheric values. And a recent meta-analysis found that eco-anxiety was sometimes associated with taking action to slow or stop climate change, and other times was associated with a sense of "behavioral paralysis" (Davì et al., 2026). It is clear we need a deeper understanding of the underlying psychology of climate concern, for scientific understanding, for the good of people, and for the health of the planet.

Nature and the Outdoors in Online Conversations

Observing how people talk about nature in online forums is an excellent tool with which to approach this issue. It can give us insight into the relationship between a community's conceptualizations of nature and its climate concerns. Environmental communication is not only pragmatic, but also "constitutive," or creative of a shared culture or sense of what nature is or should be (Pezzullo & Cox, 2025). Online forums are an especially rich place to view both exchanges of practical information about nature as well as the development of shared understandings of nature, the outdoors, and the non-human world in general. A summer thunderstorm can be scary, cozy, or romantic. A deer can be cute, destructive, or something to fear when driving at night. A walk in the woods at night can be exciting, terrifying, peaceful, or just buggy. How a community of people discusses elements of nature reveals how they think about and relate to them. It may also have implications for their willingness to take environmental action (Lee et al., 2025; Lenti et al., 2025).

Reddit.com is a promising forum from which to collect such conversations. On this platform, we can visit the "communities" of 81 major U.S. cities and observe unfolding conversations, from initial posts to comments to comments on comments (Parsa et al., 2022). In this way, we can witness the "constitution" of the communities' conceptualizations of nature in real-time (Fariello & Jemielniak, 2025) and grasp something of the culture of a particular locale through the way the forum participants interact. Reddit is also an appealing data source because, while some recent work has begun to use it to understand community-specific responses to climate crises (Lenti et al., 2025; MacKay et al., 2026), it is relatively underutilized in research compared to other platforms (Litherland & Wood, 2026; Treen et al., 2022). It also seems to allow for less polarized conversation than other platforms (Chowdhary et al., 2025; Treen et al., 2022), such as (the former) Twitter (Williams et al., 2015).

The Current Study

In this mixed-methods, exploratory study we endeavor to better understand how nature itself might be discussed differently depending on a community's worry about the changing climate. Overarching patterns across nature-related conversations in different geographic locations might provide important clues about a community's joys, sorrows, and anxieties around the non-human world and hint at how climate-related worry is shaping them and their daily lives. Our research, a blend of quantitative tests and qualitative interpretation, suggests that those who worry more about climate change discuss nature less negatively online in a variety of interesting ways.

Materials & Methods

Using Reddit to Create Corpus of Online Conversations about Nature

Reddit is an American-created, text-based social media platform composed of forums categorized by topic. These forums, called subreddits, have been created for practically any topic imaginable, with subreddits such as r/funny, r/worldnews, r/NBA, and r/DIY being some of the most popular (Reddit, 2025). There are over 100 million Reddit users around the world, with most accounts originating in English speaking countries; residents of the United States, Canada, the United Kingdom, and Australia make up almost 70% of users (Wikipedia, 2019). Reddit is also one of the most popular social media platforms in the United States. Users partake in the format of upvoting and downvoting individual posts and comments that collectively create threads consisting of original posts, comments, and comments on comments (Pew Research Center, 2024).

There are some discernible demographic characteristics of Reddit users. Notably, Reddit users are significantly more likely to be under 65 years old, male, liberals, and residents of urban and suburban areas compared to users of other social media platforms (Pew Research Center, 2024; Wikipedia Contributors, 2019).

Nearly every major city in the U.S. has its own subreddit on which people can post on any subject allowed by moderators, who vary from subreddit to subreddit. We made use of threads sorted by order of recency, a basic search filter provided on every subreddit, to create a corpus of online conversation about nature and the outdoors that was geographically tagged.

Choosing Cities

Locations were chosen with the goal of creating a diverse dataset that captured the online conversations of as many major American cities as possible. Thus, capital cities from all U.S. states were selected along with the most populous city from each state (if different from its capital city). Then, the top 25 most populous U.S. cities were added if they were not already included on our city list. Any chosen

location that did not have an active subreddit was excluded from our dataset, as was any location with fewer than 3000 users on its subreddit. Only 8 cities were removed. Our final list of $N = 81$ cities can be found in Table 1.

Table 1

List of Cities with Reddit Threads Included in Data Corpus		
Albany	Fort Worth	Olympia
Albuquerque	Harrisburg	Omaha
Anchorage	Hartford	Philadelphia
Annapolis (no climate data)	Helena	Phoenix
Atlanta	Honolulu	Portland
Austin	Houston	Providence
Baltimore	Indianapolis	Raleigh
Baton Rouge	Jackson	Richmond
Billings	Jacksonville	Sacramento
Birmingham	Juneau	Salem
Bismarck	Kansas City	Salt Lake City
Boise	Lansing	San Antonio
Boston	Las Vegas	San Diego
Burlington	Lincoln	San Francisco
Carson City	Little Rock	San Jose
Charleston, WV	Los Angeles	Santa Fe
Charlotte	Louisville	Seattle
Cheyenne	Madison	Sioux Falls
Chicago	Manchester	Springfield
Columbia, SC	Memphis	St Paul
Columbus	Milwaukee	Tallahassee
Dallas	Minneapolis	Topeka
Denver	Montgomery	Virginia Beach
Des Moines	Nashville	Washington, D.C.
Detroit	New Orleans	Wichita
El Paso	New York City	Wilmington
Fargo	Newark	
	Oklahoma City	

Choosing Threads

This article's two authors created our data corpus by reading through the subreddit of each of the cities listed in Table 1 starting in the late spring of 2024. After sorting the threads by recency, we started with the most recent thread and worked backward chronologically, capturing a file of each thread in which the initial post mentioned nature or the outdoors in any way. We stopped when we had twenty nature-related threads in their entirety, including all comments, for each of our cities. In all, we collected $N = 1593$ threads with a mean $M = 718$ words.

Any original post containing a mention of nature or the outdoors (weather, climate, topography, outdoor activities, etc.) was included in the corpus, so the threads' topics range from photos of magnificent views along with captions to complaints about unleashed dogs on public trails to requests for tree or bug identification. Deciding what counted as "nature" or "the outdoors" was more difficult than we originally anticipated, and the first several weeks of our data collection process involved multiple meetings and discussions about what to include in our corpus. For example, we excluded threads that discussed transit ("walked to the train today") unless nature was explicitly mentioned ("enjoyed the beautiful weather on my walk to the train today"). We included threads that mentioned nature in hypothetical, fictional, or historical ways (e.g. "What would it be like if there were a ferry that went across Lake Michigan?"). We also decided to (1) only keep the two most recent threads initiated by any single user and (2) only keep two threads per subreddit on any given natural "current event" that was popular to discuss. In the late spring of 2024, when this corpus was collected, the two main "current events" to which this decision applied were (1) unusually visible northern lights and (2) an unusually high number of cicadas in some regions of the country.

Important to note is that the unit of analysis was the thread, or online conversation itself, not the individual user. The threads are geographically tagged, not the people posting on the thread. The threads themselves became cultural artifacts or, as Heine et al. (2002) put it, "cultural-level indicators" of psychology. This means, of course, that some users may post on a subreddit that do not live in the city in question. Indeed, it was relatively common for people to post in a city's subreddit requesting recommendations for an upcoming visit. We included threads like these in our corpus because, on a philosophical level, they represent the character of the way people that engage with this location's talk about nature and, on a logistical level, the respondents to these types of posts tended to be residents of the city in question. Therefore, these threads provide a worthwhile representation of the nature conversation that residents have in each locale.

Identifying Themes in Threads

Identifying which themes to explore in more depth was an inductive qualitative process refined by quantitative analyses, then refined again with the qualitative work of close reading. We used a combination of human reading and reflection as well as automated linguistic analysis completed using

LIWC (Linguistic Inquiry and Word Count; Boyd et al., 2022b) software to identify the way each location constructed conversation about nature.

More specifically, our process had three steps. First, the two authors spent approximately two months reading and capturing threads, meeting at least twice a week to discuss them, noting themes, questions, and surprises that emerged as we "got to know" each of the cities in our corpus. This initial time of reading and reflection helped us determine which of LIWC's many dictionaries might be appropriate to use for automated linguistic analysis—the second step of our process. Questions of positive/negative tone and emotion words stood out from the beginning, as did themes of risk/danger, beauty/awe, health/wellness, and references to social relationships. In this paper, we focus on the tone and emotion analyses and how they relate to a city's relative worry about climate change, running correlations and regressions testing the associations between a city's worry about climate change and scores from LIWC's proprietary dictionaries measuring positive tone, negative tone, positive emotion, negative emotion, anger, sadness, and anxiety. Finally, once we conducted these analyses, we turned back to a subsample of the threads themselves, reading and analyzing them anew with the information our quantitative analyses provided.

To complete our analyses, we also used data from the Climate Opinion Maps 2024 provided publicly by the Yale Program on Climate Change Communication. These climate opinion maps are built from the responses of $N \sim 32{,}000$ participants of 31 nationally representative samples of American adults, weighted to match U.S. Census norms. More detail about the methods used by the Yale Program on Climate Change Communication can be found at the organization's website, listed with the references (Yale Program on Climate Change Communication, 2025). We collected the percentage of respondents who answered they were "somewhat or very worried about climate change" in listed "Metro Areas" (N = 80; only Annapolis, MD did not have data). Our complete dataset is available from the first author upon request.

Results

Quantitative Results

To begin, we tested whether subreddits of cities more worried about climate change differ in positive tone and negative tone in their subreddit conversations about nature. Results show that a city's worry about climate change did not correlate with positive tone (r=.142; p=.210), but it did negatively correlate with negative tone (r=-.225; p=.045). This indicates that people participating in the subreddits of cities more worried about climate change use less negative language when discussing nature and the outdoors.

The results were similar for positive and negative emotion. According to the LIWC user's manual, the "emotion" dictionaries measure specific emotion words like "happy, joy, sad, and angry." The positive and

negative tone dictionaries are a broader measurement of “sentiment” and include not only emotion words but a broader vocabulary, like “birthday, beautiful, kill, funeral” (Boyd et al., 2022a).

The use of positive emotion words about nature did not differ significantly depending on a city’s worry about climate change (r=.104; p=.357). The use of negative emotion words did, and again, it was negatively correlated with worry about climate change (r=-.342 p=.002). People participating in subreddits of cities more worried about climate change used fewer negative emotion words when they discussed nature.

To understand potential nuances of these findings, we also ran correlations for words indicating anger, sadness, and anxiety. Anxiety-related words were negatively correlated with worry about climate change (r=-.241 p=.031), but anger (r=-.155 p=.171) and sadness (r=-.145 p=.200) words did not show significant correlations. This suggests that people participating in the subreddits of cities more worried about climate change counterintuitively express *less* anxiety in their online posts than those from cities less worried about climate change.

Scatterplots showing the relationships between negative tone and negative emotion are presented in Figs. 1 and 2. Table 2 shows correlations between all variables.

As a validity check, we looked at LIWC scores for “swears,” which might indicate possible stylistic differences in how people write in different cities’ subreddits. We also ran analyses for “words per sentence” and “curiosity,” both of which might indicate differences such as intellectualism or education. None showed statistically significant correlations with worry about climate change.

Table 2

Pearson Correlations (Two-Tailed, with Significance Levels and Confidence Intervals) between City's % Worried about Climate Change and LIWC Variables				
LIWC Variable	*r*	95% CI		*p*
		LL	*UP*	
Positive tone	.142	− .081	.350	.210
Negative tone	− .225	− .424	− .005	.045*
Positive emotion	.104	− .118	.317	.357
Negative emotion	− .342	− .522	− .132	.002**
Anger	− .155	− .362	.067	.171
Sadness	− .145	− .353	.077	.200
Anxiety	− .241	− .437	− .022	.031*
Words per sentence	.169	− .053	.375	.134
Swears	.183	− .038	.387	.104
Curiosity	− .205	− .406	.016	.068
*p<.05; **p<.01				

Map Visualizations

The following are three cartographic data visualizations that we found helpful at multiple steps in our analytical process. Figure 3 shows the percentage of people somewhat or very worried about climate change in each city, Fig. 4 shows city scores for negative tone words, and Fig. 5 shows city scores for negative emotion words. In each, darker circles at the location of a city signify a higher percentage of people worried about climate change, higher scores for negative tone in subreddit threads, and higher scores for negative emotion in subreddit threads, respectively.

In Fig. 3, worry about climate change, we see a pattern of higher concern on the coasts and in the South, making somewhat of a geographical U shape. As a reminder, the dots in Fig. 3 are shaded by quintile. White dots represent the lowest quintile, or least worried cities. Black dots represent the highest, or most worried cities.

Percentage Somewhat or Very Worried about Climate Change (Alaska, Hawai'i, Continental USA)

Map of percentage of respondents in each city who reported they are somewhat or very worried about climate change

Figure 4, which documents cities' scores for negative tone, shows something of the reverse. Cities in the center of the country, especially the Midwest and Plains regions, show higher scores in negative tone. Cities on the coasts tend to show lower scores in negative tone. Again, the dots here are shaded by quintile. White dots represent the lowest quintile, or cities with the least negative Reddit conversations. Black dots represent the highest, or most negative locations.

Percentage Negative Tone Words (Alaska, Hawai'i, Continental USA)

Figure 5, documenting negative emotion scores, also shows higher negativity scores in the Midwest and Plains, but the pattern is not quite as clear. There are high negative emotion cities sprinkled throughout, including on the coasts and in the South. White dots indicate cities with Reddit threads with less negative emotion present; darker dots indicate more negative emotion present.

Percentage Negative Emotion Words (Alaska, Hawai'i, Continental USA)

We used the correlational analyses described above coupled with these visualizations to guide the qualitative analysis described below.

Mixed Methods Results

After reviewing the quantitative findings and studying the cartographic visualizations, we returned to close readings of the subreddit threads to better understand how these tone and emotion differences were constituted in the online discussions. We gathered all 20 threads from the ten "highest worry" cities (climate change worry of 72%-77%) and the ten "lowest worry" cities (climate change worry of 48% to 56%) and engaged in multiple readings of these conversations about nature and the outdoors, using inductive coding to identify common themes that emerged. These cities are listed in Table 3.

Table 3

Table of "Highest" and "Lowest" Worry Cities, with % of People "Somewhat or Very Worried" about Climate Change in Each	
Highest Worry Cities	**Lowest Worry Cities**
San Francisco (77%)	Bismarck (48%)
San Jose (74%)	Birmingham (52%)
Washington, D.C. (73%)	Charleston, WV (52%)
Santa Fe (73%)	Nashville (52%)
Newark (73%)	Cheyenne (54%)
New York City (73%)	Billings (54%)
Boston (73%)	Topeka (54%)
Hartford (72%)	Helena (55%)
El Paso (72%)	Wichita (56%)
Denver (72%)	Louisville (56%)

We see in this list the same general pattern of greater concern about the environment from locations on the coasts and in the South. These regions are especially vulnerable to climate change, so they are areas that have likely had more experience with extreme weather and thus less "psychological distance" (Lee et al., 2015; Spence et al., 2012) from climate change. Cities that are relatively more insulated from climate change – in the Midwestern and Plains regions of the United States – report less worry. We will discuss potentially relevant regional variation in conversational style (e.g. "Are Midwesterners just more neurotic?" "Do people in the Plains use more negative language across *all* types of Reddit threads?") in the Discussion section.

Two dominant themes emerged from our inductive coding process in the threads of the least worried cities, which tended to use more negative tone and more negative emotion words in their posts and comments. First, a dominant theme of *hassles of nature* emerged. These hassles included discussions about topics like pollen allergies, heat and humidity, and bugs and other pests, to name just a few. Second, their posts often included themes of *contamination* of nature. This meant, at times, literal contamination, like pollution in a river in which someone was hoping to enjoy a swim. At other times, it meant figurative contamination, such as reports of crime in a park.

The most worried cities, in contrast, used fewer negative tone and emotion words. Their subreddit threads often included beautiful photos of nature followed by discussion, or lists of recommendations for hikes, swims, or trail runs. The dominant theme that emerged in these threads was *cheerful problem solving*. When difficulties in the outdoors were expressed, the discussion tended toward proactive steps

to address the issue, sometimes tipping into enthusiastic recommendations. Examples follow below for each of these three themes.

Hassles of Nature

Subreddit threads about nature and the outdoors from low worry, high negativity cities were saturated by discussions of the hassles of nature, from bad weather to dirty air to animals in the attic. Some specific examples follow below.

First, here are two examples from Charleston, WV (52% worried; 94th percentile in negative tone; 73rd percentile in negative emotion):

- “Hard to tell what’s pollen and what’s just normal chemical valley air.”
- “I have raccoons that use my attic as a crash pad/baby making room and I’ve never had any pest control company call me back to remove them.”

Next, a conversation from Nashville (52% worried; 83rd percentile in negative tone; 90th percentile in negative emotion) reads, in part:

Original post

"Why did I just get an Air Quality Alert…?”

Sample comments:

- “What do you mean why. We all up in the Nashville Basin and the heat has arrived. Stir fry.”
- “suit up for the humidity”
- “Get ready for a non-stop headache for the next few days.”
- “the humidity here is unbearable, so be ready for that haha”

Two of the twenty posts from Birmingham (52% worried; 73rd percentile in negative tone; 94th percentile in negative emotion) dealt with geosmin in the water, which gives it an earthy taste. After an original poster uploaded an official explanation for the different-tasting water. The replies ranged from neutral to quite negative. To give a few examples:

- “I’m not doubting that this is actually the case (as much as I hate BWWB), but I do find it infuriating it took them a week of complaints to confirm the issue or give any actual information on it.”
- “It took me 60 seconds to figure out with high certainty what the taste/smell was last week when it started at my residence. There is no reasonable scenario where it should take them ‘awhile’ to figure it out and confirm with testing, and then notify the public.”
- “Do you think for one second they are beholden to their customers? lmfao”

The other Birmingham original post simply read, “Anyone know how long we have to live with the dirt water?”

As we will discuss in the “cheerful problem solving” section, high worry cities also acknowledge hassles, but there are fewer complaints about them. While these low worry cities often dwell in the difficulty of nature’s unpleasant side, high worry cities seem to revel in figuring out solutions to these issues.

Contamination of Nature

The other main theme that emerged in low worry, high negativity cities was nature becoming contaminated somehow, either literally or symbolically. To return to Birmingham, consider this conversation in which the original poster asked for public access to a river:

Original post

“do you have any go to public spots where me and my family can access the Cahaba (or even the Coosa) River for an afternoon?”

Sample comments:

- “Wherever you decide to go check the latest water quality report first. Can vary pretty wildly.”
- “I would be careful going out there now. A lot of roudy people with pew pews go out there and act stupid.”

In Wichita (56% worried; 78th percentile in negative tone; 91st percentile in negative emotion), a similar conversation emerged, this time about an outdoor festival.

Original post

“What are your favorite parts of Riverfest?”

Sample comments:

- “Don't go”
- “Don't take your wallet”
- “Last time I went my friend was punched in the head by a random stranger as he was walking with his family. Won’t ever go down there again!”

In Louisville (56% worried; 81st percentile in negative tone; 73rd percentile in negative emotion), the lakes and the parks are also considered “contaminated.”

Original post

“Anyone know if any of the lakes or quarries in the area allow dogs to swim at the beaches?”

Sample comment

“I’d be concerned with water quality there. E. coli is in the water.”

And finally, in a discussion about a long post on the “Cherokee Park Stalker,” a respondent comments: “it sucks that these guys are ruining it for women who just want to walk in peace and enjoy the beautiful park…I have now heard of multiple similar cases like this and it makes me so sad and angry.”

Cheerful Problem Solving

In the high worry, low negativity cities, issues with weather, bugs, animals, and sharing natural spaces with others are acknowledged, but posters and respondents discussed them differently. For example, in Santa Fe (73% worried; 15th percentile in negative tone; 13th percentile in negative emotion) high heat came up several times, but instead of complaints, respondents provided an enthusiastic list of helpful responses. For instance, a post that began with, “I want to be outside all the time but this sun is killing me. Any brands/SPF levels that you all buy and trust and can recommend?” was followed by 52 comments, nearly all sincere and helpful, that included information like favorite types of sunscreen to recommended outdoor stores where one can buy a lightweight, long-sleeved shirt. In another thread from Santa Fe, the original post read: “Swamp cooler or portable AC?”. The responses contained quotes that were almost effusive, such as (bolded words are ours, for emphasis): “We **love** our swamp cooler. The humidity and breeze are **amazing**.”; “A large, well maintained swamp cooler is the **best thing on earth**.”; “I personally **love** swamp coolers. The added humidity is **so nice**, and they bring in fresh air.”

Similarly, in Denver (72% worried; 37th percentile in negative tone; 5th percentile in negative emotion), an original poster asked “Are we already losing the bees? I bought lots of bee friendly native flowers to try to provide for our pollinators but I haven't noticed any bees on them at all.” One hundred sixteen comments followed, nearly all of them reassuring or providing concrete advice on how to protect pollinators.

Contrasting Conversations about Pests

To illustrate the different conversational styles about similar topics, consider these two conversations about a similar problem approached in different ways. First, a thread about cockroaches in Nashville (a low worry, high negativity city):

Original post

“Are the outdoor roaches really bad this year? I live in green hills in an old apartment and I’ve seen 4 outdoor roaches in my house in the past week. I’ve been here for almost a year and I only saw like 6 or 7 before that. When I go outside at night they are just running around with impunity. I’ve lived in middle Tennessee my whole life and never saw one inside. What the hell do I need to do to keep them out?”

Sample comments:

- “yes, wood cockroaches and other outdoor species are very populous this year all across the country because of the especially rainy springtime.”
- “Ortho home defense. Just buy a jug and spray both inside and out on all your door and window frames and the door transoms. We spray as needed but roughly quarterly or every 6 months. Generally speaking, works like a charm.”
- “They're en masse at my apartment complex. I struggle to keep them out of my apartment (much to my cat's displeasure). June beetles, black ground beetles and more spiders than I can shake a stick at. I keep sticky traps in the front room even though we just re-weather stripped the front door.”
- “You are referring to the American Cockroach, we only have two types in Tennessee and if it’s the big ones no need to worry, they just looking for somewhere cooler. If it’s small ones, they are called GFR ‘German Food Roaches’ will need immediate pest control, if you see 1 there are 100s of them and most do an exo skeleton cycle to rid. GFR are generally only around if you are your neighbors are filthy.”

While there is some helpful problem solving here, the conversation tends to the negative, with words and phrases like: “running around with impunity,” “What the hell do I need to do to keep them out?,” “struggle,” “more spiders than I can shake a stick at…” and talk of “filthy” neighbors. The cockroaches are generally portrayed as a pest to be killed off.

Contrast that conversation with this thread from Santa Fe (a high worry, low negativity city) about a snake.

Original post

“Anyone know type of snake?...Found in house. Sorry the pics aren't great.”

Sample comments:

- “Looks to me like a young bullsnake. They are pretty harmless but make a false ‘rattle’ to ward off”
- “Very cute. Let him out in the yard and hope he sticks around. They eat mice, and very rarely rattlesnakes. When I was growing up it was folk wisdom that bullsnakes would keep rattlesnakes away.”
- “Bullsnakes must’ve had a very successful season last year. I have seen more babies out this year than I can remember ever seeing before.”
    - (from the original poster) “I find snakes fascinating, but they just give me the heebies jeebies. I wish they didn't, but such is life. I just need them to stay out of the house.”
- “Whaddup Steve Irwin”
- “Ancient Chinese wisdom says a Snake in the house is a good omen”

- “In the future, try not to pick them up like that and then have them dangle. I've heard it can mess up their spines. Aside from that, looks like your rodent population will be going down! Release into your backyard :)”

In no reply to the snake post did people (other than the original poster who respected snakes but did not want one in their house) speak negatively about the snake or suggest killing it. Most replied with humor and enthusiasm, usually suggesting the original poster was lucky to have found such a fascinating and helpful creature.

Testing for Negative Tone and Emotion in General Threads

We ran one last data collection and set of analyses to examine whether these high worry/low negativity and low worry/high negativity results occurred in posts not necessarily about nature or the outdoors. To test whether the highest worry and lowest worry subreddits discussed general topics differently, we collected five recent posts about *any* topic from each of the 20 highest/lowest worry cities and used it as a mini test corpus. As before, threads were chosen by visiting each city’s subreddit, sorting posts chronologically, scrolling down to the first post posted 12 hours ago or more (to allow times for replies to have been posted), then collecting the first five posts in backward chronological order. This gave us N = 100 threads, 5 from each city, with an average of M = 593 words per thread.

We reran LIWC analyses with this mini corpus, testing for relationships between climate change worry and negative tone, negative emotion, and anxiety. There was no correlation between climate change worry and negative tone (r=.132; p=.190), negative emotion (r=.107; p=.288) or anxiety (r=-.042; p=.680) in this subsample, nor did t-tests show a significant difference between the highest worry and lowest worry cities for negative tone (M=.90 vs. M=.68; p=.226), negative emotion (M=.28 vs. M=.22; p=.340), or anxiety (M=.05 vs. M=.06; p=.643). In fact, for negative tone and negative emotion, the coefficients were positive, the opposite direction from what analyses in the original corpus of nature-related threads showed.

Discussion

Our results suggest that people in cities more worried about climate change discuss nature and the outdoors less negatively than people in cities less worried about climate change. These results echo findings by Whitmarsh et al. (2022) and Helm et al. (2018), suggesting that concern about environmental problems correlates with valuing nature. Furthermore, cartographic visualizations of the data and qualitative analysis of the most and least worried cities suggest something of a regional effect: high worry/low negativity cities tend to be mostly located on the coasts and in the South; low worry/high negativity cities are more often in the Midwest and Plains regions. Finally, inductive coding suggests that conversations from the least worried/most negative cities centered around two themes: the *hassles of nature* as well as literal or symbolic *contamination* of nature. Conversations in the highest worry/lowest negativity cities acknowledge natural hassles and problems but use language that suggests a *cheerful problem solving* approach.

Why do these conversational differences exist? In large geographical datasets like these, many variables are at play when it comes to the ways that people talk to one another online. One possible explanation is that there is a direct psychological link between worry about climate change and a tendency to talk less negatively about nature. It may be that those who become worried about the potential loss or degradation of natural environments might value them more, and those values make their way into language. Recent work on solastalgia and ecological grief has documented that humans have measurable reactions to the degradation of the natural environments around them (see Albrecht et al., 2007; Cunsolo & Ellis, 2018; Galway et al., 2019), and there is a robust body of research on the enhanced value humans place on objects or resources they feel they may lose (Tversky & Kahneman, 1981) or cannot have (Brehm, 1966). It may be, as Joni Mitchell (1970) wrote, a "you don't know what you've got 'til it's gone" effect. People may value nature more and be more willing to tolerate its less pleasant aspects if they are afraid of losing it. This psychological tendency may be amplified in a communication structure like a Reddit thread, in which individuals participate in the same community (both digital and physical), have sometimes overlapping experiences (both digital and physical; Lee et al., 2025), consume overlapping media, and interact around an evocative topic like nature (Kasperson et al., 1988).

There are also competing explanations to consider. For example, it is possible that people in the middle of the country use more negative language generally because of political, cultural, or socioeconomic differences. While we cannot fully dismiss this explanation, previous research on geographical differences in personality would suggest that this is not likely the case. Rentfrow (2010) has used large datasets to explore the way Big Five personality traits vary by U.S. region. Neuroticism and agreeableness would seem likely to be the two traits most associated with negative in tone and emotion in online conversations. Rentfrow finds, though, that the Midwest tends to be *lower* in neuroticism and relatively *higher* than many regions in agreeableness.

This, combined with our analysis of the mini corpus of general, not nature-related threads, indicates that it is not likely that the Plains/Midwest have a generally more negative way of speaking or writing than coastal or southern regions. Future work in linguistic analysis could test for differences in tone and emotion across a variety of topics (e.g. civic engagement, local politics, education, crime, etc.) to further explore whether there are measurable regional differences in the ways people write and respond online depending on the subject discussed. Future experimental work could also test whether priming participants to worry about climate change prompts them to write or talk differently about nature and the outdoors.

Finally, we considered whether states with high negativity scores were experiencing less pleasant nature at the time the original data corpus was collected. Perhaps the cities with higher negativity also had worse weather, for example, or experienced more pests. In other words, maybe nature *was* a bigger hassle, or felt more contaminated, for certain people in certain places when this data was collected. This is also unlikely for two reasons. The original corpus was collected in May and June of 2024. Of all the months of the year, May and June bring some of the most consistently good weather in most of the United States, especially in the Plains and the Midwest. Second, and more importantly, the chronological

range of threads collected for each city varied widely. Some city subreddits were very active, with most of the threads we collected having originated within the May/June timeframe. Others were less active, and we had to reach back months to find twenty threads that mentioned nature or the outdoors. It is not likely that decidedly good (northern lights, sunny days) and bad (pest infestations, storms) occurrences of nature were distributed among each subreddit's unique timeframe of twenty threads in ways that confounded the relationships between our variables of interest.

Implications

This study is exploratory and descriptive, asking whether people in locations with varying worry about climate change discuss differently about nature online. We aim to add to a broad understanding of peoples' psychological reactions to climate change, especially in their perception of the natural world. Implications of the findings are challenging to parse given that there is no "causal arrow" identified, or even hypothesized. Does worry about climate motivate us to ignore the hassles of nature? Or does a generally less negative attitude about the outdoors motivate us to worry about climate change? Perhaps outside factors, those discussed above or other "hidden" variables, drive both.

Our findings do provide interesting context for work that suggests that fear-based climate change messaging is less effective than campaigns that highlight beauty, awe, or connection (O'Neill & Nicholson-Cole, 2009; Weinstein et al., 2015). In our sample, Reddit communities from cities with higher climate worry were the "cheerful problem solvers" when it came to nature-related challenges. Our findings here are not direct evidence for beauty vs. fear-based environmental campaign strategies, but they are intriguing and certainly add to our knowledge of how affect and emotion around nature relate to climate change concern.

Our study also adds to the growing body of research using reddit.com and other online forum sites to study conversations about important issues in a way that takes advantage of the "constitutiveness" of conversation. Observing language exchanged in online forums can shed light on the psychological underpinnings of peoples' deeper beliefs about the natural world. They also provide insight into the culture of these communities, which are digital but also physical, given they are centered around actual geography. The cities studied are real places where people live, play, and make decisions like whether or not to advocate for the natural world and for whom to vote. Understanding how nature is constituted in language in each may reveal new ways of encouraging climate activism.

Finally, these findings are a reminder to those in environmentally-focused disciplines that nature and the outdoors are not viewed as "sunnily" in everyone's minds as they might be in ours. Affect around the natural environment can vary quite a bit. Nature, to some people and at some moments, is a hassle. It can be uncomfortable. It can even be threatening. Those studying how best to use messaging around the natural world for the purposes of motivating climate action should bear this variation in mind.

Limitations

The most important limitation of this work is discussed above. Despite interesting findings that cities in which more people report worry about climate change use less negative language to talk about nature, we cannot know if there is a causal relationship between worry about climate and a more can-do, less negative view of the hassles of nature. However, our results echo previous work on worry about nature and environmental activism and also point to trends that could be fruitful lines of future research.

A few other limitations are important to address. First, even these correlational findings are limited in their generalizability. Reddit is a unique online space from which to collect conversational data with its own limitations. Reddit users are not necessarily demographically representative of the United States as a whole, with a plurality of users under 30 years old and more likely to be male, liberal, and urban (Wikipedia Contributors, 2019). The language used in our sample may not be representative of the language used by the entire United States population and our results should not be overgeneralized.

Furthermore, this study only explored subreddits of cities, not those of states or larger rural areas. Roughly 80% of Americans live in urban areas (U.S. Census Bureau, 2021) so the results are certainly compelling, but the relationship between worry about environmental issues and discussions of the outdoors may be quite different in rural or agricultural areas. It may be that people posting on city subreddits in urban areas have particular or unique ways of discussing issues and responding to questions. It may also be that living in a city means having a fundamentally different relationship with nature than if one lived in the country. Hassles like pests and bad weather may seem more or less threatening. Beautiful moments in nature may feel more rare or precious.

Conclusion

This study provides initial evidence that people who live in cities more worried about climate change discuss nature less negatively online. Their conversations acknowledge that nature can bring challenges but, compared to those in cities less worried about climate change, their discussions focus on solving problems in a can-do, even cheerful way. While we are unable to tease out what, exactly, leads to the association between more climate change worry and less negativity about nature in online communication, these results are intriguing. They open new ways of thinking about how humans psychologically process worry about the natural environment and help us build an understanding about how to harness concern to address it.

Generative AI Disclosure

The authors declare the use of generative AI in the writing process. According to the GAIDeT taxonomy (2026), the following tasks were delegated to GAI tools under full human supervision: Proofreading and editing (only references, punctuation, and spelling). The GAI tool used was: Claude. Responsibility for the final manuscript lies entirely with the authors. GAI tools are not listed as authors and do not bear responsibility for the final outcomes.

Declarations

Author Contribution

The authors worked together collaboratively on all aspects of the project, from study conceptualization, to data collection, to quantitative and qualitative data analysis, to writing and editing, meeting and communicating regularly throughout the process.Brady Jones created all of the tables and figures. Gianna Barbaro did most data curation and cleaning.

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Data Availability

Our data is available upon request.

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Figures

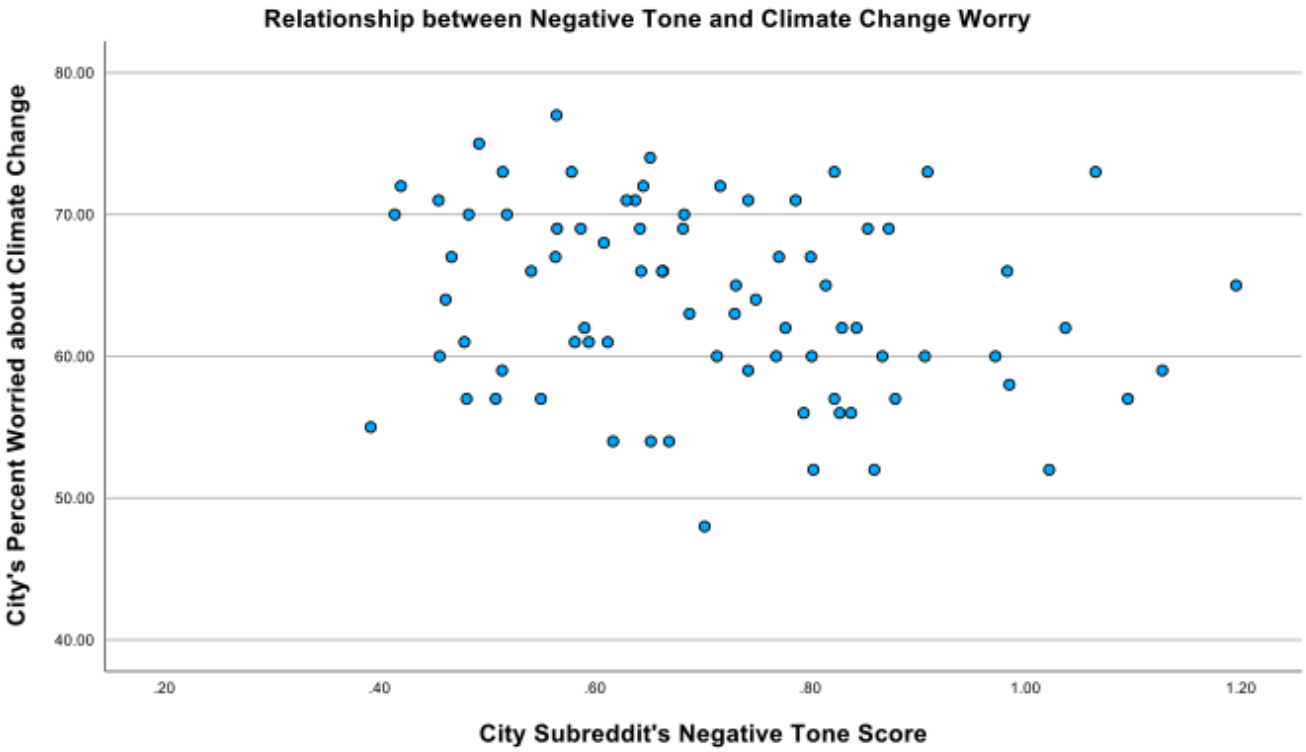


Figure 1

Caption: Scatterplot of relationship between city's percent worried about climate change and city's subreddit negative tone score.

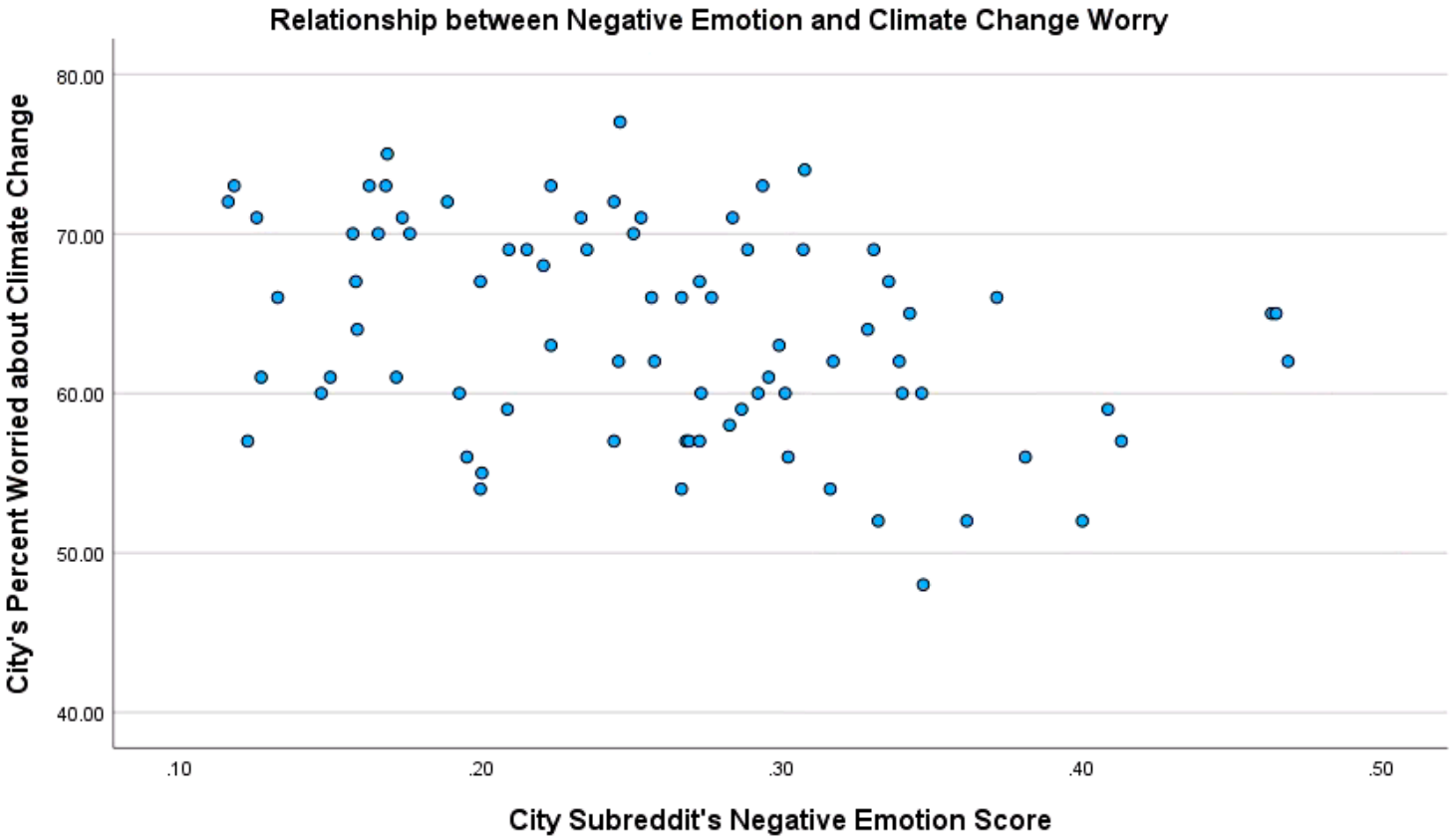


Figure 2

Caption: Scatterplot of relationship between city's percent worried about climate change and city's subreddit negative emotion score.



Figure 3

Percentage Somewhat or Very Worried about Climate Change (Alaska, Hawai'i, Continental USA)

Caption:

Map of percentage of respondents in each city who reported they are somewhat or very worried about climate change.

The dots are shaded by quintile. White dots represent the lowest quintile, or least worried cities. Black dots represent the highest, or most worried cities.

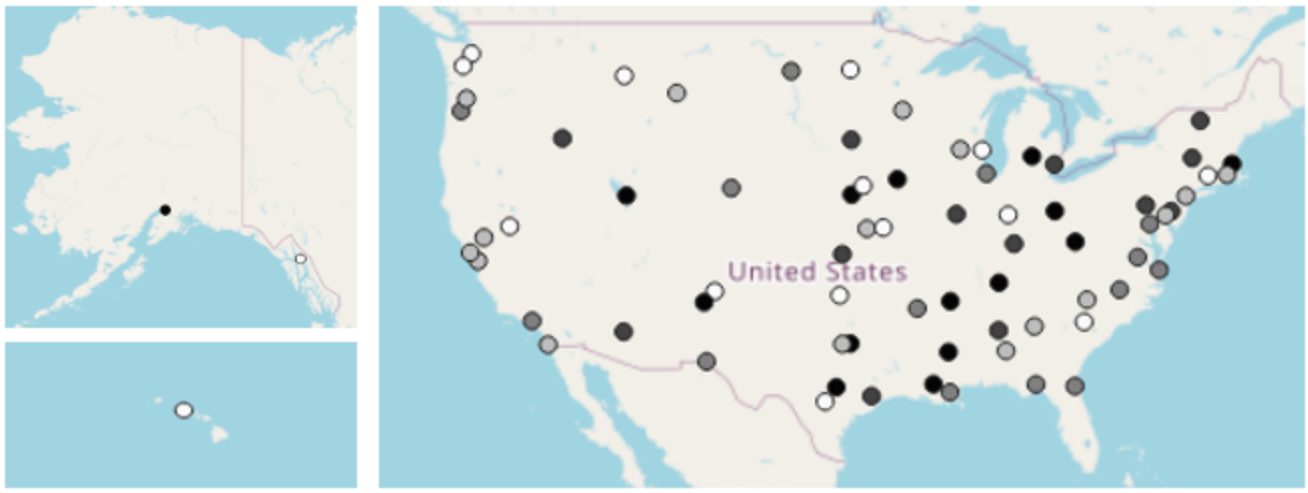


Figure 4

Percentage Negative Tone Words (Alaska, Hawai'i, Continental USA)

Caption:

Map of each city's negative tone score.

The dots are shaded by quintile. White dots represent the lowest quintile of negative tone score; black dots represent the highest quintile for negative tone.



Figure 5

Percentage Negative Emotion Words (Alaska, Hawai'i, Continental USA)

Caption:

Map of each city's negative emotion score

The dots are shaded by quintile. White dots represent the lowest quintile of negative emotion score; black dots represent the highest quintile for negative tone.