



Perspective

From the suites to the streets: Examining the range of behaviors and attitudes of international climate activists

Jean Léon Boucher^{a,*}, Garfield T. Kwan^b, Gina R. Ottoboni^c, Mark S. McCaffrey^{d,*}

^a School for the Future of Innovation in Society, Arizona State University, Tempe, AZ 85287, USA

^b Marine Biology Research Division, Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA 92093, USA

^c Social Sciences Division, Community College of Vermont, Montpelier, VT 05601, USA

^d ECOS, UN Climate Change Community for Education, Communication and Outreach Stakeholders, Kiskágyon 3046, Hungary



ARTICLE INFO

Keywords:

Activism
Climate activism
Social movements
Climate change
Protest
Youth

ABSTRACT

Inspired by previous protest movements, climate activists began taking to the streets in the fall of 2018, revitalizing and reshaping the three-decade-old climate activist movement. This metamorphosis in climate activism, which has led millions around the world to participate in climate strikes and protests, is reflected in the composition of the activists themselves, who the media frequently portray as primarily young and female. In order to better understand this new and evolving landscape, we surveyed self-identifying climate activists, obtaining results from 367 individuals across 66 countries. Our survey, augmented by seven individual interviews, provides an overview of current climate activists, their attitudes, priorities, and actions. Here we map our findings, delineating differences based on gender, age, and geography. Our results indicate that the media's focus on young female activists is warranted—at least in Europe and North America. We find that while activists share a commitment toward rapid and substantial reduction of greenhouse gases, their attitudes and actions taken to address climate change can significantly differ by demographic group. Despite its limitations, this study provides a glimpse into the demographics, behaviors, and attitudes of climate activists across the globe.

1. Introduction

Who are today's climate activists? What motivates them and what are their priorities? Do they consider themselves well informed? What sources of information do they rely upon? How does climate change shape their lives and their outlook on the future? In mid-September of 2019, just as Climate Week was kicking off across the globe, we set out to answer these and related questions.

For over three decades, beginning in the late 1980s, global climate activists sought to raise awareness, reduce environmental risk, decrease dependency on fossil fuels and increase renewable energy and sustainable practices [1,2]. These early climate activists were disproportionately older white males [4] and, at least in the United States, they were from higher rather than lower socioeconomic classes [5–7], politically left-leaning [8–11] and driven by strong beliefs [12–15]. Moreover, these activists usually belonged to networked communities of like-minded individuals that provided social support for their activism and civic engagement [16]. Research also shows that these activists may have been inclined toward frugal or minimalist tendencies [17]. In the

face of political polarization and manufactured doubt [18], however, they struggled to make an impact, both in the United States [19] and across the globe [20]. Of note, though, some scholars argue that there have been some emissions-reduction successes attributable to these instances of civic protest [3].

In August 2018, however, Greta Thunberg [21], then fifteen years old, began her school-strike protest outside the Swedish Rikstag, and in so doing, started changing the face of climate activism. In the months that followed, the movement took on new energy and was reshaped. This metamorphosis in climate activism is reflected in both the composition of activists themselves and in the form of that activism. The older, policy-focused climate movement has been infused with youthful energy, capturing media attention, and influencing political and corporate leaders [22].

It seems apparent, then, that the profile of the climate activist has changed as the present movement incorporates the energy, concerns, and tactics of a younger generation. The new champions of climate action are often depicted as young women [23,24] and this depiction provided a starting point for our research and prompted us to ask who

* Corresponding authors.

E-mail addresses: JLB964@gmail.com (J.L. Boucher), markscaffrey@gmail.com (M.S. McCaffrey).

are today's climate activists. Martiskainen et al. [25] recently asked similar questions in their study of 64 climate activists in six cities in the UK, Canada, the US, and Norway. Their findings of broad variances in activist's motivations—inclusive of climate knowledge, affective and behavioral investments—led to the development of a typology that characterizes protesters and ranges from those who are more issue-committed to those less engaged and more interested in striking as a social activity [25].

Here, we also develop a profile of climate activists based on the results of a short (ten questions; Supplemental Material 1), English-only online questionnaire. Mindful that we could not reach all those who had taken some sort of climate action, we focused our research on self-identified climate activists, distributing our survey through climate discussion lists and targeted social media. Using a snowball method, we invited climate activists to complete the survey and share it with their peers, ultimately gathering a convenience sample of 367 respondents from 66 nations. The questionnaire was available online from 19 September 2019 to 12 October 2019 and was supplemented by qualitative interviews with seven respondents from across the globe, allowing us to begin to construct an emerging picture of self-identified climate activists.

2. Insights into the present-day climate activist

Our respondents were relatively gender balanced, with 49.3% identifying as women, 46.9% as men, 1.3% as gender non-binary. 2.5% preferred not to answer (Fig. 1). However, we found a significant difference between men and women as age increased: younger respondents were more likely to be women whereas older respondents were more likely to be men ($F_{1,8} = 18.34; p = 0.0027$). While this gender difference was more salient for our North American, European, and Oceanic respondents (Fig. 2), it was not observed among our African and Asian respondents who were mostly men regardless of age.

When it came to relative youth, 43% of our respondents were under 34 years old; 25% were between 25 and 34 years old; and 18% were under 24 (Fig. 1). Our respondents spanned six continents, inclusive of 66 countries, though the overwhelming majority of them were from North America (Fig. 2; Supplemental Material 2). This may be a reflection of both the English-only nature of the survey and the networks through which it was distributed as a number of them are affiliated with US institutions. Alternatively, it may also indicate a resurgence of alarm and concern about climate change in the US—a concern that has fluctuated over the past decade [26]. Some of our respondents have been involved with activism for years, even decades, while others, inspired by young climate activists like Greta Thunberg and recent scientific and media reports, are new to the movement.

Overall, nearly half our respondents indicated that they are involved

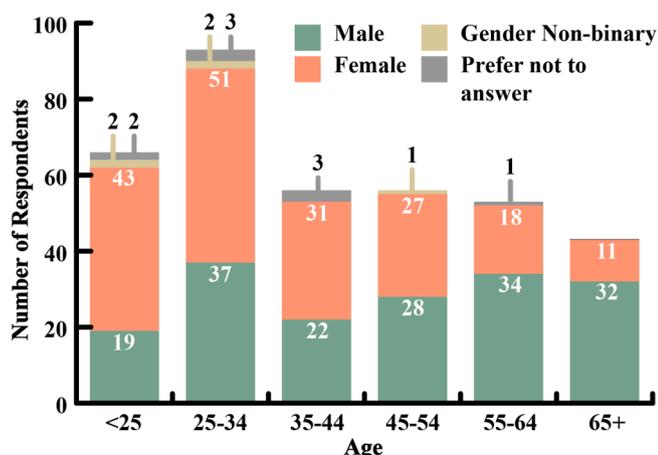


Fig. 1. Age and gender demographics of respondents (n = 367).

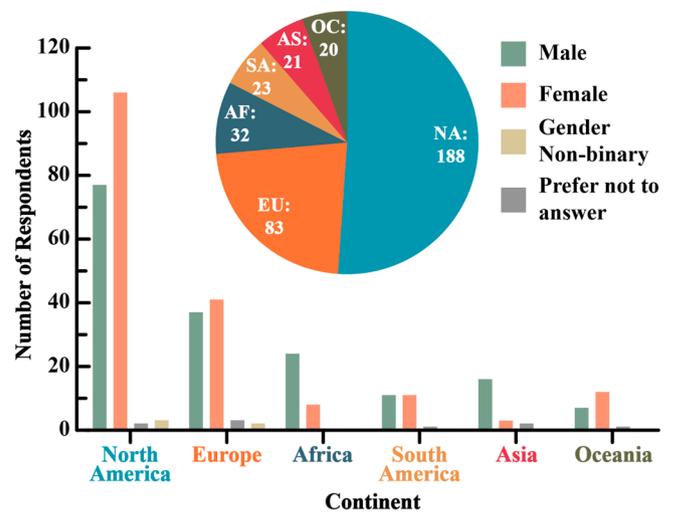


Fig. 2. Gender and geographic demographics of respondents (n = 367).

in some way with education, either as students (23%) or educators (22%). Over a third described themselves as climate professionals or climate scientists. 14% work in the business sector, 9% work in government and 6% in agriculture. Not surprisingly, when it comes to understanding climate change, almost all considered themselves to have above average knowledge (55% far above average and 40% above average) compared to that of the general public. They also generally considered themselves knowledgeable and able to communicate effectively about climate science and related policy issues. 92% indicated that they are confident (very or well informed) that they understand the practical steps necessary to reduce climate impacts and 84% indicated that they were confident (a great deal or a lot) in their ability to share this knowledge with others.

2.1. Gender differences

In contrast to male activists, female activists made careful purchasing choices based on climate and environmental considerations ($p = 0.0022$), choosing more sustainable brands ($p = 0.0268$), purchasing and recycling used materials such as clothing ($p < 0.0001$). They were also more likely to be vegetarian ($p = 0.0199$; Fig. 3). Significantly, and in accord with earlier studies that found that women generally interpret risk more strongly than men [27], women were more pessimistic about our ability to respond to climate change and also more likely to be

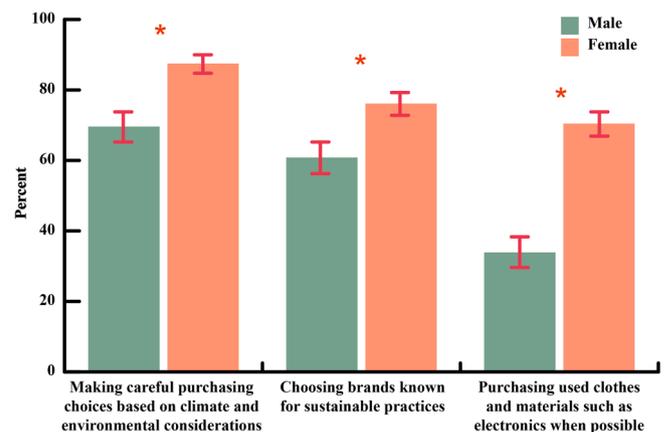


Fig. 3. Comparison of purchasing decisions by gender and analyzed with Wilcoxon rank sum test ($\alpha = 0.05$) with p-values adjusted using the Benjamini-Hochberg method. *denotes significance. Error bars represent standard error of the mean.

concerned with the impact of climate change on poor and vulnerable populations ($p = 0.0124$). This calls to mind an environmental care ethic that is often gendered [28].

2.2. Age differences

When it comes to where activists have gained their understanding of climate issues, learning in schools ranked consistently and significantly as the least important source across all age groups (Fig. 4). Respondents instead indicated that they learn more from their own study, from scientists, and from their peers (Fig. 4). School as the source of climate-issue knowledge also significantly decreases with age ($p = 0.0172$). Even so, activists aged 25–34 ($p = 0.0440$) and 35–44 ($p = 0.0320$) utilized schools as a resource more so than those in the 65+ age group. This tendency also seems to differ across different geographical regions: North American activists found schools to be significantly more influential than for European activists ($p < 0.0001$).

Age was also a factor in both actions and attitudes. Activists under 24 were significantly more likely to be vegetarian ($p = 0.0041$) or vegan ($p = 0.0383$). Both those under 24, as well as those between 25 and 34, were significantly more likely to indicate that they were ‘not confident’ that we would be able to ‘prevent the worst impacts’ of climate change and that ‘serious effects will occur that mainly impact poor and vulnerable populations’ ($p = 0.0002$). Although climate activists of all ages responded that they participate in public marches, survey results indicated that those under 25 were significantly more likely to participate in school strikes ($p < 0.0001$) and were more involved in climate-related school and/or community activities ($p = 0.0270$).

2.3. Geographical differences

Our results indicate that geography and context matter for personal actions and priorities. Regional and cultural contexts appear to be an important factor in climate activism. For example, European activists were significantly more likely than those in other parts of the world to indicate that they do not fly at all ($p < 0.0001$). This may reflect the availability of alternate modes of transportation in Europe (such as the robust network of trains and buses), which makes flying a less necessary option and/or this finding may relate to the emerging phenomenon of flight shaming or ‘flygskam’ [29]. In contrast, activists in Oceania have fewer viable choices other than flying. Overall, 41% of respondents indicated they were flying less, 8% were not flying at all, and 6% would

fly only for climate-related events.

Oceanic activists led in all categories regarding thoughtful purchasing power, including ‘making careful purchasing choices based on climate and environmental considerations’ ($p = 0.0005$), ‘choosing brands known for sustainable practices’ ($p = 0.0007$), and ‘purchasing used clothes and materials such as electronics when possible’ ($p = 0.0002$).

Those in Africa and Asia were the least likely to indicate that they had changed their purchasing habits in response to climate change. They were also significantly more likely to agree with the statement, ‘humans will appropriately respond and be able to minimize most negative impacts’ ($p < 0.0001$). Respondents from Africa were also more inclined to think that ‘catastrophic changes will lead to continued mass extinctions including of humanity’ than their North American ($p = 0.0086$), European ($p = 0.0059$), South American ($p = 0.0069$), and Oceanic ($p = 0.0094$) counterparts.

3. Shared goals, differing attitudes and actions

Overall, survey responses and interviews suggest that climate activists share many goals and consider themselves well informed and articulate about the causes, effects, risks, and possible responses to climate challenges. In contrast, when it comes to lifestyle choices, and effective strategies to mitigate climate change and its outcomes, responses differed widely, although some strategies were characteristic of the group generally.

3.1. Personal actions

Across all our respondents, most (90%) reported that they have communicated with others about climate change, limited waste, including food waste (87%), conserved energy (83%), and made careful purchases (78%). Roughly a third (32%) indicated they had divested their own finances from institutions and funds tied to fossil fuels. A majority indicated they had reduced meat and dairy (52%), while about a third had become vegetarian (22%) or vegan (10%). One respondent, however, commented that eating regeneratively produced meat is one of the best ways to sequester carbon and is ‘far better than being vegetarian.’ Yet another commented that ‘[d]rastically reducing or eliminating animal agriculture’ was a priority. For some, low-impact lifestyles were nothing new. One commented, ‘I became a vegetarian, stopped owning a car and ceased flying a long time before global warming became a political issue.’

When it came to climate action, one activist commented that they tried to ‘[l]ead by example rather than being obnoxious’; others were proud of being jailed, ‘accelerating the class war’ and ‘organizing against capitalism.’ A strong majority (70%) had participated in public protests and in climate strikes (43%). Nearly a quarter had participated in ‘civil disobedience’ (23%), and a small minority (4%) indicated they had been involved with ‘uncivil disobedience’, both of which were undefined.

3.2. Public strategies

In aggregate, activists generally agreed that ‘increasing the political will for action’ was the best means to address current environmental and climate challenges. As with other responses, this phrase is open to interpretation since ‘political will’ is a nebulous term. ‘Developing the right policy solutions’ also ranked highly as a priority, followed by a cluster of other strategies, including holding politicians and corporations responsible for their actions, engaging the public, building community capacity, divesting from fossil fuels, changing people’s mindsets, and ensuring a just transition to address social inequalities. Somewhat surprisingly, the tactics of ‘enforcing a price on carbon’ and ‘developing the right technological solutions’ were considered less critical as top priorities overall.

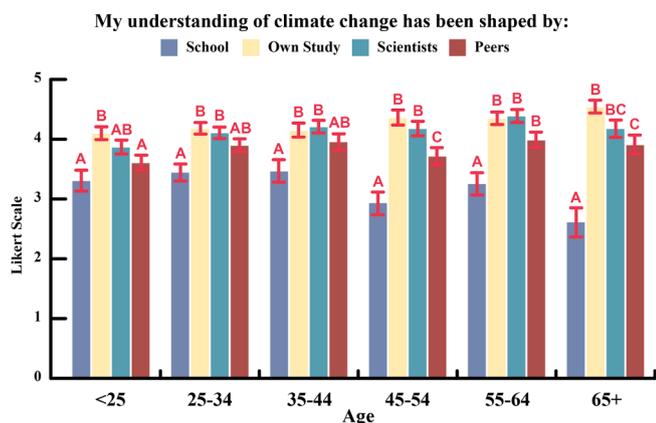


Fig. 4. Comparison of the influences of climate change understanding across age and analyzed with Wilcoxon rank sum test ($\alpha = 0.05$) with p-values adjusted using the Benjamini-Hochberg method. Error bars represent standard error of the mean. Different alphabetical letters denote significance, e.g., A is statistically different from B; neither A nor B is statistically different from AB; and A, B, and AB are statistically different from C. Significance is measured within age group and not across age groups.

3.3. Outlook

When asked what they believe the likely outcomes of current environmental and climate challenges would be in the next century, two thirds of respondents (66%) anticipated serious effects from climate impacts, with more than one in four (27%) indicating that they felt catastrophic changes would lead to continued mass extinctions, including the end of humanity. Fewer than one in five (18%) were confident that ‘humans will appropriately respond and be able to minimize most negative impacts.’ Nearly half (49%) indicated that, although they were not confident that humanity will turn the corner and prevent the worst impacts, they felt there was still a chance that it might. As mentioned, there were notable differences in these views by gender and geography.

4. Additional insights from in-depth interviews

Because the survey itself was deliberately streamlined to encourage completion, deeper qualitative interviews were conducted with seven individuals: four males, three females, four from North America, one each from Europe, Africa, and Asia. Several had been involved in climate-related issues for years, including one young student activist who had been engaged in climate activism for a decade. One, a young researcher, came to the decision to identify as an activist only recently, while another younger student had been active, organizing through his school and church for over a decade.

Because the interviewees were self-selected, they cannot be considered representative of climate activists worldwide, although, as with the survey overall, they provide a glimpse into commonalities and diverse views of activists. Significantly, all interviewees were involved with, or inspired by, multiple climate organizations, including local NGOs, Fridays for Future, the Climate Reality Project, Citizens Climate Lobby, Sunrise Movement, 350.org, and Extinction Rebellion. Similarly, all were inspired by Greta Thunberg, though several considered her a polarizing figure. Four interviewees (from North America and Europe) expressed concern over the flaws of corporate capitalism and corporate ‘greenwashing’ and another four, all male, mentioned the importance of religious faith or background as a contributing factor in their climate activism.

All interviewees agreed that being active—as challenging as it was, was empowering. One expressed the view that rather than worry about climate catastrophe, it was in a sense liberating to do the next right thing, whatever it might be. ‘I know what needs to be done,’ said one. Another indicated, ‘It’s too late for some things, but it’s not too late for others.’

5. Discussion

Despite the diversity of our respondents across gender, age, and geography, our survey results show that activists share a common concern: Politicians and corporations are not taking climate change seriously enough, and urgent action is needed to address the climate challenge.

Our results also suggest, in accord with media reports [23], that climate activism—at least in North America—has undergone a demographic shift: younger activists are more likely to be women than men. We also note that the high level of responses from women in North America and Europe aligns with recent research on climate protests and other ‘resistance’ [30,31]. Interestingly, though our respondents were highly educated—half were either students or educators who considered themselves well informed and generally able to convey the complexity of the climate challenge—formal education seems secondary to their learned understanding of climate issues. In other words, they reported that self-study and the direct input of scientists were more significant in shaping their knowledge of climate and climate change than what they learned in school.

Developing and distributing an international survey within a short time frame poses some challenges. Despite our best efforts, our dataset lacks homogenous representation across the countries of the world. We speculate that our survey responses may have been affected by the nature of our English-only survey. Likewise, response rates may have been lower in countries in which the free expression of ideas and opinions is limited and/or subject to punitive measures. In contrast, the higher response rate from some regions may reflect either accessibility to climate change protest activity and/or the presence of a robust social media network. Importantly, a higher survey response does not necessarily equate with a higher level of action in mitigating climate change: Despite having an overwhelmingly high response rate, the United States has the lowest performance on climate change according to the Countries by Climate Change Performance Index [32]. One final factor that may have influenced our results: We sought the responses or those who embraced the terminology of ‘climate activist’ and utilized climate activist networks to disseminate our survey via snowball method.

One of the interviewees, a mother of two who has been active in climate negotiations and outreach for more than a decade, expressed some ambivalence about labeling herself as an activist, but in the end decided that ‘since I do what an activist does,’ she was willing to complete the survey and be interviewed. Others who are also active in promoting climate policies and action may similarly have chosen not to self-identify as activists as the term has political and cultural connotations, and may therefore have chosen not to complete the survey. As such, the dataset should be interpreted with these limitations and caveats in mind. Even so, we believe our study provides a helpful glimpse to the demographics, behaviors, and attitudes of climate activists across the global community.

Despite varied personal choices and behaviors, our respondents recognized that deep systemic change—more than personal change—is required to address the global climate challenge. It remains to be seen whether climate activism will be able to contribute to a social tipping point [33] capable of mobilizing society, rapidly reducing greenhouse gas emissions, preparing communities, and minimizing planetary risks. What is clear is that without greater social awareness and action, reaching that tipping point seems unlikely. Will what appears to be a re-energized and expanded climate movement be able to move the needle? And finally, can an admittedly limited profile of climate activists help identify pressure points?

6. Method

The survey instrument (included in [Supplemental Material 1](#)) was developed in September 2019 with input from several self-identified climate activists. A snowball methodology was used for deploying the invitation to the questionnaire, which was released via email and select social media sites. Email was the primary form of outreach, including specific requests to organizations like 350.org, Fridays for Future, and Extinction Rebellion. Only 350.org replied that they would share our request; we are not sure if the others did or did not. The survey was shared by some on Twitter and Facebook, and the invitation did encourage people to forward it to others. While respondents were from nearly a third of the nations that signed the United Nations Framework Convention on Climate Change (UNFCCC), it is worth noting that we had no responses from China, both Koreas, Japan, and Russia. We attribute this to the following factors: The survey was only available in English and some countries lacked access to the survey altogether.

While we received responses from activists in many parts of the world, as those responses were generated through email lists and social media, both of which reach particular demographic audiences, we acknowledge uncertainties regarding the distribution of responses with respect to gender, age, and geography. In addition, because the survey was deployed opportunistically and was developed quickly to take advantage of Climate Week, some of the questions were arguably not well designed, using vague terms such as ‘political will’.

Demographic data (e.g., gender \times age) was analyzed using linear regression. The survey's Likert scale responses were converted to ordinal data and the survey's binary responses were converted to binomial data. All survey responses were analyzed with non-parametric statistical tests, namely the Kruskal-Wallis rank sum test for 2-factor analysis, and the Wilcoxon rank sum test with continuity correction for 3+ factors. Both of these tests ($\alpha = 0.05$) were followed by Kruskal-Wallis multiple comparison with p-values adjusted using the Benjamini-Hochberg method (1995). All statistical analysis was performed using R.

7. Data Access

The data for this study can be found in a Mendeley data repository at doi: <https://doi.org/10.17632/jkcjdyv5p7.1> (<https://doi.org/10.17632/jkcjdyv5p7.1>)

Credit authorship contribution statement

Jean Léon Boucher: Conceptualization, Resources, Facilitation, Writing, Editing. **Garfield Kwan:** Methodology, Software, Formal analysis, Data curation, Writing, Editing. **Gina R. Ottoni:** Conceptualization, Writing, Editing. **Mark S. McCaffrey:** Conceptualization, Methodology, Investigation, Writing, Editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.erss.2020.101866>.

References

- [1] S. Agrawala, Context and early origins of the intergovernmental panel on climate change, *Clim Change* 39 (4) (Aug. 1998) 605–620, <https://doi.org/10.1023/A:1005315532386>.
- [2] S. Andresen, S. Agrawala, Leaders, pushers and laggards in the making of the climate regime, *Global Environ. Change* 12 (1) (2002) 41–51, [https://doi.org/10.1016/S0959-3780\(01\)00023-1](https://doi.org/10.1016/S0959-3780(01)00023-1).
- [3] F. Adedoyin, I. Ozturk, I. Abubakar, T. Kumeka, O. Polarin, F.V. Bekun, Structural breaks in CO2 emissions: are they caused by climate change protests or other factors? *J. Environ. Manage.* 266 (2020) 110628, <https://doi.org/10.1016/j.jenvman.2020.110628>.
- [4] B.W. Redekop, M. Thomas, Climate change leadership: from tragic to comic discourse, in: B.W. Redekop, D.R. Gallagher, R. Satterwhite (Eds.), *Innovation in Environmental Leadership: Critical Perspectives*, Routledge, New York, 2018, pp. 145–166.
- [5] T. Dietz, A. Dan, R. Shwom, Support for climate change policy: social psychological and social structural influences, *Rural Sociol.* 72 (2) (Jun. 2007) 185–214.
- [6] A. Leiserowitz, E. Maibach, C. Roser-Renouf, and J. D. Hmielowski, *Global Warming's Six Americas*, March 2012 & Nov. 2011, Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication, 2012.
- [7] A.M. McCright, The social bases of climate change knowledge, concern, and policy support in the U.S. *General Public*, *Hofstra Law Rev.* 37 (4/7) (2009) 1017–1047.
- [8] R.E. Dunlap, A.M. McCright, A widening gap: republican and democratic views on climate change, *Environ.: Sci. Policy Sustainable Dev.* 50 (5) (2008) 26–35, <https://doi.org/10.3200/ENVT.50.5.26-35>.
- [9] D.L. Guber, A cooling climate for change? Party Polarization And The Politics Of Global Warming, *Am. Behav. Sci.* 57 (1) (2013) 93–115, <https://doi.org/10.1177/0002764212463361>.
- [10] A. Leiserowitz, E. Maibach, C. Roser-Renouf, J. D. Hmielowski, *Politics & Global Warming: Democrats, Republicans, Independents, and the Tea Party*, Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change Communication, 2011.
- [11] R. Perkowitz, M. Speiser, G. Harp, C. Hodge, K. Krygsman, *American Climate Values 2014: Psychographic and Demographic Insights*, Strategic Business Insights and ecoAmerica, Washington, DC, 2014.
- [12] M. Dresner, C. Handelman, S. Braun, G. Rollwagen-Bollens, Environmental identity, pro-environmental behaviors, and civic engagement of volunteer stewards in portland area parks, *Environ. Educ. Res.* 21 (7) (Oct. 2015) 991–1010, <https://doi.org/10.1080/13504622.2014.964188>.
- [13] M. Finger, From knowledge to action? Exploring the relationships between environmental experiences, learning, and behavior, *J. Soc. Issues* 50 (3) (1994) 141–160.
- [14] A. L. Owen and J. Videras, "Civic Cooperation, Pro-Environment Attitudes, and Individual Behavior," *Social Science Research Network*, Rochester, NY, SSRN Scholarly Paper ID 650283. Available: <<http://papers.ssrn.com/abstract=650283>>, Dec. 2004 (Accessed: Oct. 05, 2015. [Online]).
- [15] L. Whitmarsh, G. Seyfang, S. O'Neill, Public engagement with carbon and climate change: to what extent is the public 'carbon capable'? *Global Environ. Change* 21 (1) (Feb. 2011) 56–65.
- [16] J. Anderson, Elusive Escapes? Everyday Life and Ecotopia, in: *Utopias, Ecotopias and Green Communities: Exploring the Activism, Settlements and Living Patterns of Green Idealists*, vol. 1, L. Leonard, Ed. Bingley, UK: Emerald, 2007.
- [17] J.L. Boucher, The logics of frugality: reproducing tastes of necessity among affluent climate change activists, *Energy Res Soc. Sci.* 31 (Sep. 2017) 223–232, <https://doi.org/10.1016/j.erss.2017.06.001>.
- [18] R.E. Dunlap, A.M. McCright, Challenging climate change: the denial countermovement, in: R.E. Dunlap, R.J. Brulle (Eds.), *Climate Change and Society: Sociological Perspectives*, University Press, Oxford, 2015, pp. 300–332.
- [19] C. Roser-Renouf, E.W. Maibach, A. Leiserowitz, X. Zhao, The genesis of climate change activism: from key beliefs to political action, *Clim. Change* 125 (2) (2014) 163–178.
- [20] J. Hadden, Explaining variation in transnational climate change activism: the role of inter-movement spillover, *Global Environ. Politics* 14 (2) (May 2014) 7–25.
- [21] G. Thunberg, *No One Is Too Small to Make a Difference*, Penguin Books, UK, 2019.
- [22] C.J. Gardner, M.J. Struebig, Z.G. Davies, Conservation must capitalise on climate's moment, *Nat. Commun.* 11 (1) (2020) 1–2, <https://doi.org/10.1038/s41467-019-13964-y>.
- [23] S. Kaplan, Teen girls are leading the climate strikes and helping change the face of environmentalism, *Washington Post*, 2019. <<https://www.washingtonpost.com/science/2019/09/24/teen-girls-are-leading-climate-strikes-helping-change-face-of-environmentalism/>> (accessed Dec. 04, 2019).
- [24] A. Bell, Climate strikes grow up, *New Sci.* 243 (3248) (2019) 21, [https://doi.org/10.1016/S0262-4079\(19\)31766-X](https://doi.org/10.1016/S0262-4079(19)31766-X).
- [25] M. Martiskainen, S. Axon, B.K. Sovacool, S. Sareen, D. Furszyfer Del Rio, K. Axon, Contextualizing climate justice activism: Knowledge, emotions, motivations, and actions among climate strikers in six cities, *Global Environ. Change* 65 (Nov. 2020), 102180, <https://doi.org/10.1016/j.gloenvcha.2020.102180>.
- [26] M.T. Ballew, et al., Climate Change in the American Mind: Data, Tools, and Trends, *Environ.: Sci. Policy Sustainable Dev.* 61 (3) (2019) 4–18, <https://doi.org/10.1080/00139157.2019.1589300>.
- [27] D.J. Davidson, W.R. Freudenburg, Gender and environmental risk concerns: a review and analysis of available research, *Environ. Behav.* 28 (3) (1996) 302–339, <https://doi.org/10.1177/0013916596283003>.
- [28] K.P. Whyte, C.J. Cuomo, Ethics of caring in environmental ethics, in: S. M. Gardiner, A. Thompson (Eds.), *The Oxford Handbook of Environmental Ethics*, Oxford University Press, Oxford, 2017, pp. 234–247.
- [29] (British Broadcasting Corporation) BBC, "What is flygskam? Greta speaks up about 'flight-shaming' - CBBC Newsround," Jul. 19, 2019.
- [30] D.R. Fisher, *American Resistance: From the Women's March to the Blue Wave*, Columbia University Press, New York, 2019.
- [31] D.R. Fisher, et al., The science of contemporary street protest: New efforts in the United States, *Sci. Adv.* 5 (10) (2019), <https://doi.org/10.1126/sciadv.aaw5461>.
- [32] (Climate Change Performance Index) CCPI, "Overall Results," *Climate Change Performance Index | German Watch*, <<https://www.climate-change-performance-index.org/>>, 2020 (accessed Sep. 06, 2020).
- [33] I.M. Otto, et al., Social tipping dynamics for stabilizing Earth's climate by 2050, *PNAS* 117 (5) (Feb. 2020) 2354–2365, <https://doi.org/10.1073/pnas.1900577117>.