

Eco-reproductive Concerns in the Age of Climate Change

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Abstract: Media reports and public polls suggest that young people in many countries are increasingly factoring climate change into their reproductive choices, but empirical evidence about this phenomenon is lacking. This article reviews the scholarship on this subject and discusses the results of the first empirical study focused on it, a quantitative and qualitative survey of 607 US-Americans between the ages of 27 and 45 who were factoring climate change into their reproductive choices. While 59.8% of respondents reported being “very” or “extremely concerned” about the carbon footprint of procreation, 96.5% of respondents were “very” or “extremely concerned” about the well-being of their existing, expected, or hypothetical children in a climate-changed world. This was largely due to an overwhelmingly negative expectation of the future with climate change. Younger respondents were more concerned about the climate impacts their children would experience than older respondents, and there was no statistically significant difference between the eco-reproductive concerns of male and female respondents. These and other results are situated within scholarship about growing climate concern in the United States, the concept of the carbon footprint, the carbon footprint of procreation, individual actions in response to climate change, temporal perceptions of climate change, and expectations about the future in the United States. Potential implications for future research in environmental psychology, environmental sociology, the sociology of reproduction, demography, and climate mitigation are discussed.

Keywords: climate change, climate concern, carbon footprint, reproduction, fertility, mitigation

Introduction

In many countries, young people seem to be increasingly connecting climate change to their reproductive choices. This is suggested by the number of news and opinion articles covering this phenomenon (e.g. Bielski 2019; Irfan 2019; Snow 2019) as well as the number of activists, public thinkers, and celebrities that are publicly discussing what was previously a private question. As U.S. Representative Alexandria Ocasio-Cortez asked in March 2019, “Is it ok to still have children” in the age of climate change (“Ocasio-Cortez” 2019)? In response to this public questioning of reproductive intentions and practices in the context of climate change, the media and environmental organizations have conducted a handful of public polls (Miller 2018; Australian Conservation Foundation 2019; Morning Consult 2020), though they have often been interpreted and reported inaccurately.¹

Empirical data about this phenomenon is needed given its potential significance to the experiences of large numbers of young people today, as well as the potential implications for environmental psychology, the sociology of climate change, the sociology of reproduction, environmental ethics, demography, and climate mitigation. This article discusses the results of the first empirical research focused on young people that are factoring climate change into their reproductive choices. It offers insight into the concerns, considerations, and expectations that are influencing these reproductive plans and choices. It concludes by discussing some of the implications of this phenomenon and identifying questions for future research.

Background and Literature Review

How many people are factoring climate change into their reproductive choices? A public poll conducted in the United States in 2018 found that among 20 to 45 year olds who did not have children and either did not want them or were not sure, 11% cited “worried about climate change” as one of their concerns (Miller 2018). More recently, a 2020 poll found that among 18 to 44 year old Americans without children, 14.3% cited climate change as a “major reason” for not having children at the time of the poll, while 20.7% cited it as a “minor reason” (Morning Consult 2020). This suggests that approximately 12.5 million Americans of what is traditionally considered childbearing age were not having children at least

¹ For example, the article publicizing the results of a 2018 BusinessInsider poll (Relman and Hickey 2018) claimed that the poll provided information about the number of Americans who are factoring climate change into their reproductive choices. In reality, it suggested a modest generational shift in applied ethics on the subject.

partially because of their climate concerns.² This number does not include the millions of American parents that are having fewer children than they desired because of climate change—the 2018 poll also found that 33% of all respondents who “had or expected to have fewer children than they considered ideal” cited “worried about climate change” as one of the motivating factors (Miller 2018). A different 2018 poll found a similar level of concern among environmentally-engaged Australians (Australian Conservation Foundation 2019), suggesting that this eco-reproductive hesitation may be common in countries that are socio-economically and culturally similar to the United States, such as many OECD nations.

To date, most of the academic research on the subject of reproductive choices in the age of climate change has been in the field of applied ethics, such as Rieder’s *Toward a Small Family Ethic: How Overpopulation and Climate Change Are Affecting the Morality of Procreation* (2016) and Conly’s *One Child: Do We Have a Right to More?* (2016). Very little empirical scholarship has been published on the relationship between concerns about climate change and individual fertility intentions and choices. Within sociology, demography, and women’s and gender studies there is a robust literature on how individuals decide whether to have children (e.g. Morgan and King 2001; Carmichael and Whittaker 2007; Blackstone and Stewart 2012; Testa et al 2014), and on voluntary childlessness in the United States (e.g. Blackstone 2019) and elsewhere. At times, this literature touches on environmental issues. For example, within the literature on the decision not to parent, concerns about “population growth” were common in the 1970s and 1980s (Houseknecht 1987), and recent scholarship contains occasional references to concerns about “overpopulation” (e.g. Park 2005, 394–5; Langdridge et al 2007, 128), though these have not been the focus of sustained research or analysis. Additionally, there has been research on the relationship between general environmental concern and fertility intentions (Arnocky, Dupuis, and Stroink 2012), suggesting a positive relationship between environmental concern and anti-reproductive attitudes. However, an analysis of the 2011 Eurobarometer survey found a positive relationship between climate concern and the intended number of children (De Rose and Testa 2015). And some scholars have begun to speculate on the potential link between climate change and fertility in developing countries (e.g. Thiede 2019).

² Calculated using data from the US Census Bureau 2018, US Census Bureau 2019, Monte and Knopp 2019, and Morning Consult 2020. This calculation assumes that of the approximately 50 million Americans between the ages of 20 to 45 who did not have children in 2019, the Morning Consult 2020 figures about the percentage of Americans of childbearing age who did not have children at least partially because of climate change concerns were representative of the entire US population.

The connection between fertility and socio-ecological concerns is a sensitive topic with a controversial and sometimes violent history (e.g. Robertson 2012) that continues today (e.g. Darby 2019). In recent years there has been principled resistance, among both scholars (e.g. Murphy 2017) and public thinkers (e.g. Roberts 2017) to discussing the connection between fertility, population, and climate change, for a variety of reasons (Coole 2013). However, other scholars have highlighted the importance of acknowledging that population is an important factor in greenhouse gas emissions, and might therefore play a role in climate mitigation as well as adaptation (e.g. Haraway 2016; Bongaarts and O'Neill 2018). Historically, population and the production of greenhouse gases have been found to be nearly proportional (O'Neill et al 2012), and scholars have argued that three-fourths of the global increase in emissions between 1990 and 2017 can be attributed to population growth, with one-fourth due to an increase in emissions per capita (Gerlagh et al 2018). Some models predict that slower population growth would lead to a decrease in total emissions by 40% or more by the year 2100 (O'Neill et al 2012). While much of the research on the connection between fertility, population, and climate change has focused on policy implications, such as increasing access to family planning and education for girls (e.g. Hawken 2017), this study demonstrates that some environmentally concerned individuals are factoring this connection into their own reproductive plans and choices. Especially given the number of people that seem to be thinking about their reproductive choices in relation to climate change, scholars need to be able to discuss this subject without conflating individual choices with policies that would sanction coercion or violence.

Despite growing bodies of research in adjacent areas of study, there is an absence of scholarship on the relationship between climate change and individual reproductive intentions and practices. This article fills an important gap in the scholarship and lays the groundwork for further research.

Research Design and Methodology

The primary research questions that informed the research design were: How are young people who are factoring climate change into their reproductive choices making these decisions? Which factors are more important to them, and which are less important? How are they imagining a climate-changed future, and how are these expectations informing their reproductive choices?

Since there has been no empirical research published on the way that young climate-concerned people are thinking about their reproductive choices in relation to climate change, the research design was an exploratory survey. We expected that a detailed survey with

branching and open-ended questions would result in the kind of rich data that is available through in-person interviews, but might be less subject to social desirability bias when it comes to emotionally and politically sensitive subjects such as reproductive choices. The survey contained 16 open-ended questions and between 24 and 31 multiple-choice questions, depending on the responses. The open-ended questions focused on respondents' emotions in relation to climate change; their personal and political actions in response to climate change; their anxieties, fears, and hopes about having children in the age of climate change; the conversations they have with others about this subject; and their vision of and concerns about the future. The multiple-choice questions were standard demographic questions and questions about how respondents feel about climate change, which actions they prioritize, and which actions they take. The survey questions were designed in consultation with the organization *Conceivable Future*, which has been organizing dialogues with Americans who are concerned about their reproductive choices in relation to climate change for the last half-decade. The survey questions are available in the electronic supplemental material. This article is focused on the responses to questions about respondents' concerns about the carbon footprint of having children; their concerns about the well-being of their existing, expected, or hypothetical children in a climate-changed future; and their visions or expectations of a future with climate change.

Snowball sampling was used to locate and recruit subjects that were otherwise difficult to locate (Atkinson and Flint 2001). Ten well-known climate thinkers, activists, and organizations posted the link to the anonymous survey on public Facebook and Twitter pages, which ensured that the survey would be disseminated widely.³ The posting specified that respondents had to be 27 or older and had to be "connecting climate change to their reproductive choices." These inclusion criteria were included in the survey's screening questions, along with the Yale Program on Climate Change Communication's SASSY tool, which screened respondents for belonging in the "Alarmed" segment of Global Warming's Six Americas (Chryst et al 2018). In consultation with *Conceivable Future*, 27 was selected as the minimum age to ensure that participants were not just registering fleeting anxieties, on the assumption that many Americans today do not begin thinking concretely about having children until their middle or late-twenties. At the end of the survey, respondents were asked to share the survey link with anyone who might qualify. For each respondent

³ While digital surveys risk a bias towards those who have Internet access and, given this methodology, those who use social media, the youthfulness of the target population of this survey mitigates that risk. Approximately 98.5% of Americans between 18 and 49 have Internet access, and approximately 83% of those aged 18 to 49 use social media. See Smith and Anderson 2018; Anderson et al 2019.

who completed the survey, US\$20 was donated to one of ten environmental or reproductive justice organizations, from which the respondents were asked to choose at the survey's conclusion. We should expect that this altruistic compensation might lead to self-selection for altruistic individuals, and individuals who are concerned about climate change or reproductive justice.

Because of the significant media attention within the United States on Americans that are factoring climate change into their reproductive plans and choices, we focused our attention on US-Americans. 1,159 respondents passed the pre-screen, including 845 Americans. 656 of these Americans fell within the age range of 27-45. The upper limit of 45 was selected because it has conventionally been understood as the end of "childbearing age" in the US, and because responses by participants in their fifties and sixties often demonstrated that they were retroactively "connecting" climate change to their past reproductive choices, but had not factored climate change into those choices at the time they were made. Data cleaning involved the removal of 30 responses that were retroactively connecting climate change to previous reproductive choices and 19 that had a completion rate below 90%. Given the dearth of scholarship on this subject, this research was built on a grounded theory approach to inductively generate conceptual frameworks and hypotheses (Glaser and Strauss 2017). The open-ended questions in the survey were not informed by existing conceptual frameworks and theories and therefore designed to be exploratory. For the qualitative survey responses discussed in this article, the researchers developed categories and subcategories based on thematic analysis, and independently coded the responses (Charmaz 2006). Representative examples have been selected to illustrate common themes.

There are benefits and limitations to this methodology. Virtual sampling and online surveys can be useful in accessing 'hard to reach' populations; allow respondents to answer at a convenient time; can expand the size, scope, and geographical distribution of a sample; and can facilitate timely data analysis (Evans and Mathur 2005; Baltar and Brunet 2012). The primary limitation of this methodology is that the sample is not randomly selected, and that snowball sampling and recruitment through social media can lead to a homogenous sample. Indeed, the sample is relatively homogenous in terms of race and ethnicity, political identification, and educational attainment. The 607 respondents in this sample were predominantly white (88% white; 6% Asian; 3% Latinx; 2% Native American; <1% Black; <1% Middle Eastern), liberal (70% very liberal; 21% liberal; 4% moderate; <1% conservative; 5% no opinion), and female (73% female; 22% male; 5% non-binary). The majority (52%) had a graduate or professional degree, with another 41% having a Bachelor's

degree; 1% had an Associate's degree; 4% had some college credit; 1% had a high school diploma or GED; and <1% had received education up until 9th grade. 27% of respondents were located in the Northeast; 18% in the Midwest; 12% in the South; 41% in the West; and 2% were US citizens living abroad. 66% of respondents identified as heterosexual; 17% as bisexual; 4% as homosexual; 9% as "other"; and 3% preferred not to say. 24% of respondents were parents; 12% were nonparents who were planning to have children in the future; 29% were nonparents who were undecided on whether they would have children in the future; and 35% were nonparents who were committed to not having children.

Due to the sampling methodology and the sample's homogeneity in terms of race and ethnicity and educational attainment, the results obtained might not be representative of all Americans who are factoring climate change into their reproductive choices, or of people outside of the United States. However, the focus on a group of predominantly white Americans makes this research particularly relevant to the study of climate mitigation, since we should expect the reproductive choices of this population to have a greater impact on climate mitigation than other groups. This is due to the consistently high per capita greenhouse gas emissions in North America (e.g. Piketty and Chancel 2015) as well as the persistent racial wealth gap in the United States (e.g. Sullivan et al 2015), which, combined with the concentration of greenhouse gas emissions among the wealthy (e.g. Gore 2015), makes the reproductive choices of white Americans likely to have a significant impact on future climate change.

Results

Concerns about the Carbon Footprint of Procreation

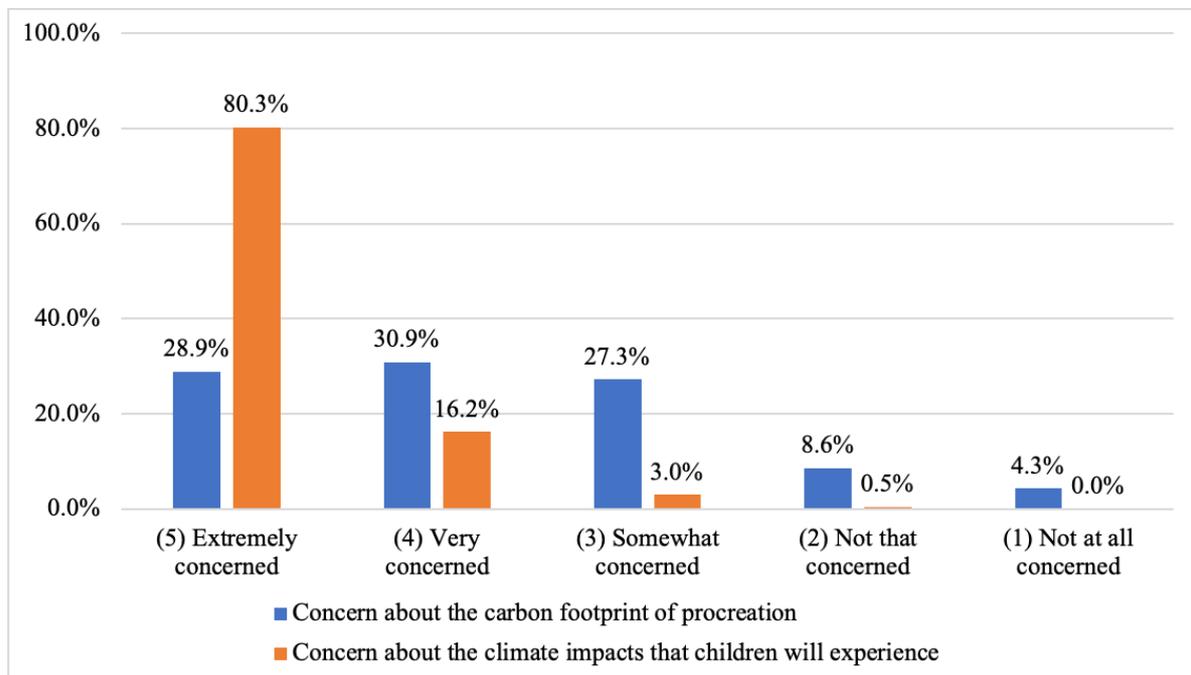
Almost all survey respondents were concerned about the carbon footprint of procreation. Respondents were asked, "How concerned were/are you about your (potential) child's lifetime carbon footprint?"⁴ with a rating scale that ran from 1, "Not at all concerned," to 5, "Extremely concerned." The mean was 3.71 out of 5 (Table 1), with 59.8% of respondents reporting being "very" or "extremely concerned" about the carbon footprint of procreation (Figure 1).

⁴ The survey utilized branching to present appropriately-worded questions to each respondent, but they are condensed here to apply to respondents in the categories parents, planning, and undecided. Respondents committed to being childfree were not presented with these quantitative questions. This was because their responses to this question would have been less reliable, since most of them had made the decision not to have children at some point in the past. As a result, they would either be reporting on something that had happened in the past, instead of describing their level of concern at the time of the survey, or reporting on a hypothetical concern in the present (how concerned they would be about their children's futures if they had children).

Table 1. Average concern about the carbon footprint of procreation and the climate impacts that children will experience for all responses, parents, planning, and undecided, female, and male. Standard deviation reported in parentheses.

	All responses (N = 395)	Parents (N = 144)	Planning (N = 73)	Undecided (N = 178)	Female (N = 305)	Male (N = 80)
Concern about the carbon footprint of procreation	3.71 (1.10)	3.55 (1.12)	3.70 (1.04)	3.85 (1.10)	3.80 (1.01)	3.49 (1.29)
Concern about the climate impacts that children will experience	4.76 (0.52)	4.65 (0.58)	4.79 (0.44)	4.84 (0.49)	4.77 (0.51)	4.76 (0.53)

Figure 1. Percentage breakdown of respondents' answers to "How concerned were/are you about your (potential) child's lifetime carbon footprint?" and "How concerned were/are you about the climate impacts your (potential) child would/will witness or experience?"



Undecided respondents were more concerned about the carbon footprint of procreation than those who were planning to have children, who were more concerned than parents. Four tests were conducted to determine if the level of concern about the carbon footprint of procreation was statistically different between parents (n = 144), planning (n =

73), and undecided ($n = 178$) respondents. Statistical significance ($\alpha = 0.05$) was found via a Kruskal-Wallis equality-of-populations rank test ($\chi^2(2) = 6.247, p = 0.044$); but not found via a one-way ANOVA ($F(2, 395) = 2.84, p = 0.060$); Levene test ($F(2, 395) = 0.369, p = 0.691$); and Brown-Forsythe test ($F(2, 395) = 0.353, p = 0.703$). Following the Kruskal-Wallis test, pairwise comparisons from a post hoc Dunn test specified that between the three groups, significant differences were found between those undecided about having children and parents ($p = 0.007$) only, demonstrating that undecided respondents were significantly more concerned about the carbon footprint of procreation than parents.

An ordered logistic regression found no statistically significant association between age and an individual's odds of being concerned about the carbon footprint of procreation (odds ratio of -0.027 (95% CI, -0.065 to 0.012), $z = -1.31, p = 0.190$). Additionally, no statistical significance was found in concern between males and females at the 5% level ($\alpha = 0.05$) via a Mann-Whitney U test (z -statistic = $1.701, p = 0.089$). A Kruskal-Wallis found no significant difference in how respondents with at least a bachelor's degree answered the question, compared to those without ($\chi^2(2) = 0.087, p = 0.768$). Similarly, no significant difference was found in how respondents with a doctorate degree answered the question, compared to those without ($\chi^2(2) = 0.003, p = 0.957$).

In their responses to an open-ended follow-up question, many respondents described being conflicted in their concern about the carbon footprint of procreation. On one hand, most reported hearing about or reading summaries of academic papers about the carbon footprint of procreation and found this information compelling enough to factor it into what many people consider to be their most consequential life decision. As a childfree 32-year old consultant in Ohio wrote, "I cannot produce another person that will continue to destroy the planet, as they will inherit my first world lifestyle. I also cannot live with the feeling of responsibility that I made a decision to have a child for my own pleasure while destroying exactly what I'm fighting to save."⁵ Many parents and respondents who were planning to have children noted that their concerns about the carbon footprint of procreation had led them to have, or plan to have, a smaller family. For example, a 38-year old teacher and mother in Minnesota said, "I really didn't think a lot about the carbon footprint of having another child, until I read something saying that the best thing you can do to reduce your

⁵ Childfree, white, female, 42, abroad (Lebanon). All quotations are typical examples of the positions expressed by a number of survey respondents.

carbon footprint is not reproduce. Thinking about that has influenced my decision not to have a third child.”⁶

On the other hand, many respondents argued that viewing climate change through the lens of individual choice was a problematic, “neoliberal,” and ineffective framing of a collective problem.⁷ As a pregnant 36-year old doctoral candidate in New York put it, “I feel frustrated with the idea that I should not have children because of their lifetime carbon footprint. That puts an emphasis on individual sacrifice and responsibility that is not reflective of the actual causes (and possible solutions) for the problems we face with the climate—these are large-scale, systemic problems.”⁸ Similarly, a 37-year old civil engineer and father in Massachusetts wrote, “I’m not going to not have a family because economic and political leaders have fucked this up for everyone. That’s not on me as an individual and it makes me mad that under our neoliberal/individualistic framing it’s my responsibility to deny my spouse and myself that right. No, fuck that.”⁹

Many respondents voiced both perspectives, and described struggling as they decided which one to prioritize. Many also went out of their way to clarify that while they were concerned about the carbon footprint of reproduction, they did not believe that “overpopulation” was a problem, and were not supporters of any kind of population control. For example, an undecided 28-year old policy expert in Massachusetts wrote, “It’s sort of a faux pas in the climate movement right now to talk about overpopulation because ‘overpopulation’ has frequently been used in the past to shame incredibly poor countries about their birth rates, and efforts at population control often have genocidal undertones (or just tones). The real problem is overconsumption.” But, he continued, “Of course total consumption is closely tied to population.” He reported being “extremely concerned” about the carbon footprint of procreation, commenting that for him, “adding another American to the mix is not a morally neutral act.”¹⁰

Concerns about the Climate Impacts that Children will Experience

Concern about the carbon footprint of procreation was dwarfed by respondents’ concern for the well-being of their existing, expected, or hypothetical children in a climate-changed future. Respondents were asked, “How concerned were/are you about the climate impacts

⁶ Parent, white, female, 38, Minnesota.

⁷ Undecided, Asian-American, female, 36, Illinois.

⁸ Parent, white, female, 36, New York.

⁹ Parent, white, male, 37, Massachusetts.

¹⁰ Undecided, white, male, 28, Massachusetts.

your (potential) child would/will witness or experience?” with the same rating scale, from 1, “Not at all concerned,” to 5, “Extremely concerned.” The mean was 4.76 out of 5, with 96.5% of respondents reporting being “extremely concerned” or “very concerned” with the climate impacts that their existing, expected, or hypothetical children will or would experience (Figure 1).

Undecided respondents were more concerned about the climate impacts their children would experience than those who were planning to have children, who were more concerned than parents. Four tests were conducted to determine if the level of concern about the impacts their children would experience was different between parents ($n = 144$), planning ($n = 73$), and undecided ($n = 178$) respondents. Statistical significance ($\alpha = 0.05$) was found via a one-way ANOVA ($F(2, 395) = 5.230, p = 0.001$); Kruskal-Wallis equality-of-populations rank test ($\chi^2(2) = 15.242, p = 0.001$); Levene test ($F(2, 395) = 13.466, p = 0.000$); and Brown-Forsythe test ($F(2, 395) = 5.232, p = 0.006$). Following the Kruskal-Wallis test, pairwise comparisons from a post hoc Dunn test specified that between the three groups, significant differences were found between parents and those planning to have children ($p = 0.029$), and between those undecided about having children and parents ($p = 0.000$). As such, it can be concluded that parents were significantly less concerned about the climate impacts their children will experience compared to respondents who were undecided and planning to have children.

Younger respondents were more concerned about the climate impacts their children would experience than older respondents. An ordered logistic regression found that an increase in age was significantly negatively associated at the 5% level ($\alpha = 0.05$) with an increase in the odds of being concerned about (potential) impacts, with an odds ratio of -0.076 ($z = -2.84$ (95% CI, -0.128 to -0.023), $p = 0.005$). The difference between the responses of male and female respondents was not significant—no statistical significance was found at the 5% level ($\alpha = 0.05$) via a Mann-Whitney U test (z -statistic = -0.105, $p = 0.916$). A Kruskal-Wallis found no significant difference in how respondents with at least a bachelor’s degree answered the question, compared to those without ($\chi^2(2) = 0.015, p = 0.902$). Similarly, no significant difference was found in how respondents with a doctorate degree answered the question, compared to those without ($\chi^2(2) = 0.025, p = 0.875$).

Whereas the qualitative comments about the carbon footprint of procreation tended to be abstract, the qualitative comments on this subject demonstrated a deep concern, anxiety, and even anguish about the climate impacts that participants expected their existing, expected, or hypothetical children to experience in the course of their lifetimes. A

childfree 31-year old writer in Washington wrote that “climate change is the sole factor for me in deciding not to have biological children. I don’t want to birth children into a dying world. I dearly want to be a mother, but climate change is accelerating so quickly, and creating such horror already, that bringing a child into this mess is something I can’t do.”¹¹ An undecided 27-year old project manager in Michigan voiced a similar ethical concern, writing, “I feel like I can’t in good conscience bring a child into this world and force them to try and survive what may be apocalyptic conditions.”¹² And a 38-year old editor and mother in Florida described a common story: “I was first committed not to bring any children into this doomed world, but then I met my husband and fell in love and I wanted them. They have brought me so much joy, but I feel so guilty about it. I don’t want them to have to suffer through the future humans have created for them. I worry about them being caught up in natural disasters (we live in Florida, so hurricanes have been a concern). I worry about them dealing with the massive unrest that will result from loss of natural resources and climate migration.”¹³

Parental anxiety about how their children will fare in a climate-changed future was so strong that 6.3% of parents confessed to feeling some regret about having children due a sense of hopelessness and despair about climate change.¹⁴ For example, a 40-year old teacher and mother in Minnesota wrote, “I regret having my kids because I am terrified that they will be facing the end of the world due to climate change.”¹⁵

Relationship Between Both Concerns

According to their responses to these quantitative questions, 61.5% of respondents were more concerned about climate impacts their existing, expected, or hypothetical children will or would experience than the carbon footprint of procreation; 37.7% of respondents were equally concerned; and only 0.8% were more concerned about the carbon footprint of procreation. A Spearman’s Rank test yielded a significant positive association (test statistic: $r_s = 0.25$, $p = 0.000$). Similarly, a bivariate regression yielded a significant positive relationship with a slope of 0.50 (regression coefficient: $\beta = 0.503$, t -statistic = 4.87, $p = 0.000$). Both tests show that respondents were significantly more concerned about the climate impacts their children would experience than the carbon footprint of procreation.

¹¹ Childfree, white, female, 31, Washington.

¹² Undecided, white, female, 27, Michigan.

¹³ Parent, white, female, 38, Florida.

¹⁴ These regrets were expressed across a range of responses to open-ended questions in the survey. The inter-coder rating for regret was high ($\alpha = 1.0$)

¹⁵ Parent, white, female, 40, Minnesota.

Visions of the Future

As the qualitative responses demonstrate, respondents' concerns about the climate impacts their existing, expected, or hypothetical children will or would experience in the future depended upon their visions of and expectations about the future. To investigate how young US-Americans who are factoring climate change into their reproductive choices are thinking about the future, the survey contained an open-ended question about the future, "What do you think the world will be like in 2050?" 2050 was selected as a midpoint between the near future and the distant future, and because it is frequently used as a reference point in projections of climate impacts. 98 respondents did not answer this question, or wrote some version of "I'm not sure or maybe I don't want to think about it," and 11 responses were uncategorizable.¹⁶ The remaining 498 responses were independently coded by two researchers into five emergent categories—Positive, Mixed/Neutral, Negative, Conditional, and Hopeful—with a high inter-coder reliability rating ($\alpha = 0.97$).

Of the 400 responses that offered a likely vision of the future (either Positive, Mixed/Neutral, or Negative), 92.3% were Negative, 7.0% were Mixed/Neutral, and 0.6% were Positive. The Negative category contained negative descriptions of the future with no positive aspects. For example, a childfree 42-year old researcher in Vermont wrote that the world in 2050 will be "a hot house hell, with wars over limited resources, collapsing civilization, failing agriculture, rising seas, melting glaciers, starvation, droughts, floods, mudslides, and widespread devastation."¹⁷ Similarly, an undecided 27-year old model in Pennsylvania wrote, "Unrecognizable. Extreme weather. Food shortages. Political and economic dissolution. Large scale conflicts. Migration. Drought."¹⁸ Responses in the Mixed / Neutral category contained a description of the future containing both positive and negative elements, or a neutral description of the future. For example, an undecided 31-year old campaigner in California wrote, "Higher sea levels, high frequency of climate-related extreme weather events, Pacific Island nations underwater, lots of climate refugees, possible collapse of global capitalism (or on its way to collapse), more authoritarian regimes. But also a resistance that is community-based, caring for one another, and we have finally stopped using fossil fuels and instead rely on renewable energy."¹⁹ Responses in the Positive category contained more positive than negative aspects. For example, a 42-year old nurse

¹⁶ Childfree, Asian-American, female, 43, California.

¹⁷ Parent, white, male, 42, Vermont.

¹⁸ Undecided, white, genderfluid, 27, Pennsylvania.

¹⁹ Undecided, white, female, 31, California.

in Washington, wrote, “I’m cautiously optimistic that the millennials who get on my nerves often will indeed become awesome leaders in time, and so too the generations after them.”²⁰

Of the 498 total responses, 9.8% of responses were in the Hopeful category, and 9.8% were in the Conditional category. Hopeful responses contained a description of what respondents hoped to see in the future, as opposed to what they think is likely. For example, a childfree 29-year old energy consultant in California wrote, “Hopefully more equitable than it is now, but I think natural disasters will become even more common and climate change will make things crazier. I think the world will be more divided along certain lines politically but I hope we are able to reach resolution on some ongoing conflicts of the 20th century and early 21st.”²¹ Responses in the Conditional category described different possible futures, dependent on the actions taken in the present and near future. For example, a 44-year old conservation worker and mother in California wrote, “If we don’t adequately address climate change: Less predictable, more civil unrest, wars over finite resources, water for example, more refugees, pain, crime suffering, disease, famine, inequality. More frequent natural disasters, displaced populations, fully abandon [*sic*] cities, endangered/extinct wildlife. If we do address it appropriately the most progressive society we have seen. A bright future full of potential and promise.”²² For more examples from each category, see the electronic supplemental material.

As these examples suggest, the Negative visions of the future tended to be intensely negative. A composite narrative (Willis 2018) of common aspects of responses in the Negative category, included in the electronic supplemental material, describes a future of overlapping and reinforcing climatic, ecological, epidemiological, social, economic, political, geopolitical, and migration crises. Respondents expected the psychological toll of these developments to be significant, and this seemed to constitute a central element of respondents’ concerns about having children in the context of climate change. As a 30-year old software engineer in California wrote, “I strongly believe that children alive today are going to live through a long period of trauma, violence and devastation on a global scale that will rival World War I in its sheer terror unleashed on an unprepared population.” In this context he, along with many other respondents, was “uncomfortable bringing children into the world given the circumstances.”²³

²⁰ Childfree, white, female, 42, Washington.

²¹ Childfree, white, female, 29, California.

²² Parent, white, female, 44, California.

²³ Undecided, white, male, 30, California.

Reproductive Considerations Beyond Climate Change

While all the respondents in this sample reported factoring climate change into their reproductive plans and choices, it is worth noting that climate change was rarely discussed as the only consideration. In response to an open-ended question posed to childfree respondents—“What factors were involved in your decision not to have biological children?”—respondents also referenced more traditional factors, such as problems finding a suitable partner; their partner’s preferences; financial concerns; reproductive capabilities; physical and mental health; the lack of a strong desire to have children; as well as troubling global issues beyond anthropogenic climate change (such as the perception of growing inequality and injustice and the perception of rising fascism in the US and around the world). When the qualitative responses by parents, planning, and undecided respondents (to various open-ended survey questions) touched on reproductive considerations beyond climate change, these factors were also present.

Additionally, the extent to which climate change was described as being factored into respondents’ reproductive plans and choices varied widely. Some respondents stated unambiguously that climate change was the sole reason for choosing not to have children, like the 32-year old investor in Oregon who wrote, “I want a family. I want biological children. But I won’t have them” because of the “devastating effects of climate change.”²⁴ For others, climate change was the primary but not the sole reason for choosing not to have children or to have fewer children than they desired, such as the tech worker in Minnesota who reported that “climate change is the #1 with a bullet reason I’m not having kids.”²⁵ For others, such as a 36-year old self-employed woman in Northern California, “many, many factors have gone into this decision,” one of which was climate change.²⁶

Discussion

This research confirms that some climate-concerned young people are now factoring climate change into what many people consider to be the most intimate and consequential decision an adult makes in their life course—the decision about whether to conceive and raise children, and how many.²⁷ In this sample, concerns about the climate impacts that children

²⁴ Childfree, white, female, 32, Oregon.

²⁵ Childfree, white, female, 30, Minnesota. “With a bullet” is a colloquial expression meaning that something is quickly rising to the top.

²⁶ Childfree, white, female, 36, California.

²⁷ This article is concerned with reproductive choices in the age of climate change, but not all people have the freedom or ability to choose whether to have children, or how many. That denial is an incredibly important topic, but it is not the focus of this article. Additionally, this article is focused on the question of biological reproduction, but one alternative to conceiving biological children, frequently cited by respondents, is

will experience were stronger and more affectively charged than concerns about the carbon footprint of procreation.

Although respondents' concerns about the carbon footprint of reproduction were less intense and emotional than their concerns about the climate impacts their children will or would experience, it is striking that 87.1% of respondents who were parents, planning, or undecided were "extremely," "very," or "somewhat" concerned about the carbon footprint of reproduction. While the assertion of an individualized "carbon footprint" and its application to reproductive choices is in some ways a new form of a decades-old Malthusian concern about 'overpopulation' in environmental discourse (e.g. Robertson 2012), it is, in other ways, a new concept. As a metaphor and accounting metric, the carbon footprint was popularized between 2007 and 2011 (Turner 2014, 59-60; Girvan 2017, 32-36), and it carries some complicated ethical and political implications that ought to be closely examined given its sudden centrality to environmental discourse and ethics.²⁸ The concept of a "carbon legacy" of reproduction was developed in a journal article published in 2009 (Murtaugh and Schlax 2009), using data from 2005. Until recently it was the only published study that calculated the carbon footprint of conceiving biological children. Its results have been accepted and presented, often in somewhat reductive ways, by scholars (e.g. Wynes and Nicholas 2017) as well as a large number of journalists, and these web articles have been shared widely. For example, a 2017 article in the British newspaper *The Guardian*, titled "Want to fight climate change? Have fewer children" (Carrington 2017), has been shared over 11,000 times, with evocative graphics optimized for social media.²⁹ A single study, now over a decade old, seems to have had a remarkable influence on the way that the respondents in this sample thought about their reproductive intentions and practices—and, most likely, millions of Americans along with them. While it is beyond the scope of this article to explore in detail the reductive and potentially misleading ways that Murtaugh and Schlax's careful study has been interpreted and presented by journalists and others, it is worth noting that a recent (non-peer reviewed) study, examining the same question, came to a very different conclusion (Halstead and Ackva 2020). While there have been a number of single-exposure experiments on the influence of footprint information on behavioral intentions (e.g. Brook 2011; Toner et al 2014), there has been little social scientific research on what happens when this novel

adoption. This space does not permit an appropriately detailed discussion of how adoption fits into these considerations, though it is worth noting that adoption in the United States is often a difficult, lengthy, and often expensive process, and therefore was carried out less frequently than it was praised by survey respondents.

²⁸ See, for example, Paterson and Stripple 2010; Turner 2014; Girvan 2017.

²⁹ Though this article reported on the results of the study by Wynes and Nicholas 2017, Wynes and Nicholas utilized data from Murtaugh and Schlax 2009.

concept becomes deeply embedded, over a period of years or even decades, in the normative ethical considerations of climate-alarmed people, who constitute a growing subset of the population (Goldberg et al 2020). Given the dearth of research on the carbon footprint of reproduction and its apparent influence on the way that some climate-concerned people are thinking about their most intimate life choices, further research is needed.

This application of the normative ethics of the carbon footprint to individual reproductive intentions and choices occurs within the context of a vigorous and sometimes polarizing debate, among both scholars and environmentalists, about the value of emphasizing individual actions in response to climate change. Supporters of encouraging high-impact individual actions—which frequently include eating a plant-based diet, purchasing renewable energy, flying less, living car-free, and having a smaller family—argue that while individuals making ethical choices might have a small direct effect on overall greenhouse gas emissions, these choices have positive and potentially nonlinear spillover effects (e.g. Truelove et al 2014). Others contend that individual ethical choices can lead to moral licensing, in which adoption of one moral behavior results in a decreased likelihood of the adoption of another (e.g. Tiefenbeck et al 2013), which would be especially problematic if individual ethical choices lead to a decreased desire and willingness to engage politically (e.g. Mann and Brockopp 2019). The empirical evidence to date has been mixed (Maki et al 2019). This research demonstrates that some young people are struggling with this question in their most significant life choices.

Unlike carbon footprint concerns, concerns about the climate impacts that children will or would experience were based on expectations, hopes, and fears about the future. Of course, climate change is both a present and a future concern; climate change is already happening, but climate concerns, fears, and anxieties are future-oriented, given the lag between greenhouse gas emissions and climatic change (e.g. Ricke and Caldeira 2014), along with the expected ecological, epidemiological, social, economic, and political consequences. Given that Americans are increasingly connecting extreme weather to climate change (Deeg et al 2019), and that there is growing alarm about climate change (Goldberg et al 2020), it is not surprising that some Americans (and people all around the world) who understand the lag between emissions and consequences are combining extrapolations from current and recent events with reports about negative projections to develop intensely negative visions and expectations of the future. This psychological effect of climate change—an anticipatory anxiety, or “pre-traumatic stress disorder” (Davenport 2017)—is only beginning to be widely acknowledged and studied (Gifford and Gifford 2016), and deserves more attention

given the number of Americans that are now “alarmed” about climate change (Goldberg et al 2020).

Social scientists have frequently seen the tendency to imagine climate change in the future as a problem to be overcome, with scholarship in environmental communication focused on the ways in which climate change might be made more psychologically proximate. While perceptions of climate futures tend to have less impact on actions in the present (e.g. Spence and Pidgeon 2010), reproductive choices and plans might constitute an exception to this general rule. This is because reproduction is inherently tied to futurity; prospective parents who are attempting to predict what the lives of their children might be like as adults are, by necessity, imagining the future. If perspectives on the future change over time, it would seem likely to have some effect (of indeterminate size) on reproductive intentions and choices. Indeed, it has been observed historically that when expectations about the future have become less positive, such as in Russia after the fall of the Soviet Union, fertility has seen a decline (Brainerd 2007).

How widely shared is the intensely negative and declensionist vision of the future expressed by the majority of participants in this sample? It is possible that these respondents had an exceptionally negative perception of the future, since the sampling methodology might lead to self-selection for this very attribute. However, the fact that this particular sample had a negative perception of a climate-changed future is in line with what we might expect from a recent public poll on expectations of the future, which found that Americans expect the average standard of living to be worse in 2050 than it is today; and that Democrats are more likely than Republicans to expect the environment to become worse off in the future (Pew Research Center 2019). While it is beyond the scope of this article to evaluate which aspects of this sample’s composite vision of the world in 2050 (presented in the electronic supplemental material) are more or less probabilistically likely, or to discuss how respondents might have come to view the future in this way, it is notable that this composite vision bears striking similarities to recent popular American nonfiction books and articles that attempt to describe a climate-changed future, such as David Wallace-Wells’ bestseller, *The Uninhabitable Earth* (Wallace-Wells). It also bears similarities to widely-read American novels of climate fiction, which are frequently set in apocalyptic climate futures (Schneider-Mayerson 2017). Further research might determine how widespread this expectation of an intensely negative future is in the United States (and elsewhere), whether it is concentrated among specific groups, and whether there is a reliable correlation between negative expectations about the future and reproductive plans and choices.

While all participants in this sample reported factoring climate change into their reproductive plans or choices, it was rarely described as the sole consideration. In this sample, as for most people of child-bearing age, decisions about reproduction were the product of a multitude of factors, including cultural and familial attitudes about the ideal family size; national and state laws and policies; employment opportunities; financial considerations; the desires of one's partner; and reproductive capabilities (e.g. Parker and Alexander 2004). Future research might attempt to determine which of these factors are most salient for different groups of people that are factoring climate change into their reproductive choices.

Given the sampling methodology utilized for this study, these results are not considered generalizable. In particular, this sample was composed predominantly of white Americans, which did not allow us to compare the concerns of different racial and ethnic groups. Further research might determine whether different racial and ethnic groups are more or less concerned about the carbon footprint of procreation and the climate impacts their children might experience.

Additionally, this study is limited by its reliance on self-reporting. While there is no way around this limitation when it comes to investigating the reasons why individuals make reproductive choices at the micro level, it means that there is some level of uncertainty with the results. It is possible, for example, that some respondents made individual reproductive choices for unrelated, "nonrational" (Overall 2012, 205), or unconscious reasons, and then explained those decisions post facto with reference to their climate concerns. Indeed, some survey respondents acknowledged this possibility in their responses. At the very least, we might consider these concerns to be part of an eco-reproductive vocabulary of motives (Mills 1940), by which individuals make sense of and explain their reproductive choices to themselves and to others by drawing on what they imagine to be socially and culturally acceptable explanations.

Conclusion

While widespread eco-reproductive concerns in relation to climate change seem to constitute a relatively recent phenomenon, these concerns seem unlikely to disappear. Besides the expected longevity of climate change itself, we are in a period of growing climate concern (Goldberg et al 2020), including more widespread concern among younger generations (Ballew, Marlon et al 2019), in which the effects of climate change are becoming more obvious and Americans are increasingly connecting extreme weather to climate change (Deeg et al 2019). As such, it would not be surprising if the percentage of young

people who are factoring climate change into their reproductive plans and choices grows over time.

This research has implications for multiple areas of study, including environmental ethics, environmental sociology, the sociology of reproduction, and demography. The fertility rate in the United States has been declining over the last decade, from 2.12 births per woman in 2007 to 1.73 in 2018, as it has in a number of other industrialized countries. This has contributed to alarming headlines about “the end of babies” (Sussman 2019). It is possible that growing climate concerns account for some percentage of the most recent decline in fertility, though further research is needed to understand whether this is the case. Further research is also needed to ascertain to what extent these eco-reproductive concerns are shared around the world.

Finally, this research may have implications for climate modellers. The phenomenon of climate concern contributing to a reluctance to have children raises the possibility that so many young people in wealthy, high-emissions nations will choose to have smaller families or forego procreation entirely that they may succeed in one of their goals: influencing the overall fertility rate, population, and production of greenhouse gases, and thus contributing, to some extent, to climate mitigation.

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ELECTRONIC SUPPLEMENTAL MATERIAL
Eco-Reproductive Concerns in the Age of Climate Change

I. Visions of the World in 2050

Table 1. Categories, definitions, examples, and distribution of responses to the open-ended question, “What do you think the world will be like in 2050?”

Response category	Operational definition	Examples of verbatim open-ended responses	Category as a percentage of substantive responses (N = 498)	Category as a percentage of Positive, Mixed/ Neutral, or Negative responses (N = 400)
Negative	Negative description of the future (no positive aspects)	<p>“Unprecedented refugee crises with growing hostility towards the refugees, who likely come from marginalized populations. The rich will have tried to build enclaves for themselves, and it is likely unemployment will be high as the economy is severely damaged by climate disasters. My city of Chicago will be safe from wildfires and hurricanes, but will have almost as many 100 degree days as Phoenix does now, sending energy costs soaring and making it unsafe to be outside on certain days.”³⁰</p> <p>“Rough. Highly catastrophic weather, divisive politics, temperamental financial markets, hostile industries, dwindling biodiversity, continually rising sea levels, exponentially increasing pollution, completely ignorant/ambivalent populace.”³¹</p> <p>“Probably bearable for the rich and incredibly shitty for everyone else. The nexus of bad stuff around 2050 seems to be pretty fucking awful. How much of the coast is going to be uninhabitable? How depleted are oceanic fish stocks going to be? How bad is antibiotic resistance going to be? How’s our current flirtation with authoritarianism going to work out? Probably pretty fucking badly.”³²</p>	74.1% (369)	92.3% (369)

³⁰ Undecided, white, female, 31, Illinois.

³¹ Planning, white, female, 27, Pennsylvania.

³² Childfree, Asian-American, male, 31, New Mexico.

Mixed / Neutral	A description of the future containing both positive and negative elements; or a neutral description of the future	<p>“In some ways very similar to how it looks now. Because of the ‘threat’ narrative around climate change, I think there will be an increase in the military state and top-down control, closing of borders, and a lot of nationalism. But I also think community bonding, organizing, general bottom-up approaches will get stronger as people band together. There will be significant climate impacts in 2050 (sea level rise, heat waves, fires, disappearing water bodies, etc.) which won’t completely change the landscape of the world but displace and hurt enough people to shake up our society. But I think those two forces—people’s creativity and passion creating strong communities and helping each other, and the top-down control—will co-occur.”³³</p> <p>“We’ll be living in a much more environmentally friendly way but also suffering the consequences of climate change with much more heat and unpredictable weather, conflict due to lack of water and food in some regions and racism due to an influx of climate refugees.”³⁴</p> <p>“Hotter, wilder, more explosive, more dynamic, lots of migrations, people on the move to find a better life, new ecologies, and hopefully new ways of being that involve more than just innovative green technology—actual societal evolution born out of a realization that we are all connected.”³⁵</p>	5.6% (28)	7% (28)
Positive	Positive description of the future (more positive than negative aspects)	<p>“We will be spending a lot more time taking care of each others [<i>sic</i>]. Fossil fuels will be a thing of the past. We will laugh about the old days of oppression.”³⁶</p> <p>“I’m cautiously optimistic that the millennials who get on my nerves often will indeed become awesome leaders in time, and so too the generations after</p>	0.6% (3)	0.8% (3)

³³ Planning, white, female, 27, California.

³⁴ Undecided, white, female, 31, California.

³⁵ Undecided, white, female, 32, California.

³⁶ Parent, Asian-American, female, 41, Washington, D.C.

		<p>them. If nothing else they are relatively more awake to the crisis than my generation and those before me. I think behaviors will change somewhat. I think technologies will help. And hopefully there will be enough strength to overpower corporate interests in favor of human rights.</p> <p>I think the weather will be worse, but hopefully we will be course correcting.”³⁷</p> <p>“I believe that the youth are more informed. I believe that there will be less usage of fossil fuels.”³⁸</p>		
Conditional	Different possible future dependent on the actions taken in the present and near future	<p>“It depends on what we do today. If we continue in [the] current economic/political paradigm, we will be in a freefall of global ecological collapse—causing starvation, mass migration, war, chaos, suffering.”³⁹</p> <p>“It depends on what we do now. One possibility is that we have a managed retreat from the coasts, and a global endeavor to resettle refugees and finish shifting our economy into a sustainable one, with degrowth at the center. Another possibility is that we have a mass die-off of humans, with millions and millions of people left to drown or die from disease or famine, and the Global North sitting comfortably behind walls of iron and concrete with snipers perched atop them.”⁴⁰</p> <p>“It depends on the actions we take now and if we take them at emergency speed. If we do nothing, millions will have died and billions will have been drive [sic] from their homes in mass climate migration. Society may have collapsed. No one knows...”⁴¹</p>	9.8% (49)	-
Hopeful	A description of what they	“I can only hope that many, many, many, many more people—both powerful	9.8% (49)	-

³⁷ Childfree, white, female, 42, Washington.

³⁸ Parent, white, female, 39, Michigan.

³⁹ Undecided, white, female, 28, Texas.

⁴⁰ Planning, white, male, 29, New York.

⁴¹ Parent, white, female, 35, Washington.

	hope to see in the future	<p>individuals and the grassroots, average Joe population—will have embraced climate change both as an international crisis and an incredible opportunity to empower and develop their countries, communities, and themselves. Whether this shift in mindset will come about via ‘just enough’ catastrophe to open peoples’ eyes, or because there has been such devastation that the issue absolutely cannot be ignored, I can’t say.”⁴²</p> <p>“I can hope we will have found affordable alternatives to our fossil fuel dependence. I hope to see a drastic reduction in the use of plastics and toxic chemicals, increased access to safe drinking water and clean air for all; removal of garbage from our oceans. I do have hope for positive change.”⁴³</p> <p>“Hopefully greener, hopefully less-wired, hopefully less-industrialized in the current form. There are so many natural and biological solutions for life’s problems, especially organic farming and mycoremediation (allowing fungus to purify the planet). I hope in the future all humans figure out this truth.”⁴⁴</p>		
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II. Composite Narrative of the World in 2050

Among the respondents that presented a Negative vision of the future, there was a general consensus on what 2050 is likely to hold. To illustrate the qualitative responses to the survey question on how respondents imagine the year 2050, a composite narrative (Willis 2018) of common aspects of the open-ended responses Negative responses to this question has been assembled. This presents a qualitative window into respondents’ concerns about the climate impacts their children will experience in the future. Adapting the methodology of Rebecca Willis (Willis 2017), each aspect of this composite narrative was mentioned by at least 20 respondents; does not conflict with other aspects of the composite narrative; and is composed of direct quotations.

⁴² Childfree, white, female, 28, Pennsylvania.

⁴³ Parent, white, female, 37, Illinois.

⁴⁴ Parent, white, female, 40, New Jersey.

In this future, sea-level rise, floods, drought, wildfires, hurricanes, and increasingly extreme temperatures will be common. “Many island nations will have shrunk or disappeared” and “some low-lying parts of coastal cities will be officially abandoned.”⁴⁵ “Some of our beloved animals may have gone extinct,” and “ecosystems all over the world will be destroyed and thinned out due to too much rapid change.”⁴⁶ “Food stocks will likely move indoors under controlled environments destroying many cultural traditions,” and there will be “food shortages as crops, especially commodity crops, will suffer, causing spikes in prices and starvation in many parts of the world.”⁴⁷ “Free flowing running water will be scarce” and “air quality will be generally lower.”⁴⁸ “Large swaths of the coasts will be uninhabitable, and inland cities and states will be overwhelmed by migration” from the coasts.⁴⁹ As a result, “cities and suburbs will be denser.”⁵⁰ In this context, “new diseases” will become more common.⁵¹

In response to climate change, “many wealthy countries will have eliminated oil/ coal as a power source—electricity will be renewables and cars will be battery charged.” However, this energy transition will occur “a little too late.”⁵² Humanity will turn to “climate interventions” such as “mass geoengineering.”⁵³ The combination of climatic, demographic, social, and epidemiological events alongside anxiety and fear will lead to “increased xenophobia and regressive politics/policies.”⁵⁴ “Migrants fleeing to the Global North” will be “met with fortified borders and [an] increasingly militarized response.”⁵⁵ There will be “more authoritarian regimes.”⁵⁶ Inequality will grow, and the wealthy, living in “gated communities” protected by “private security, private power generators and private firefighters,” will be insulated from some of these events.⁵⁷

⁴⁵ Undecided, white, female, 28, Pennsylvania.

⁴⁶ Planning, white, female, 33, Connecticut; childfree, white, female, 30, Pennsylvania.

⁴⁷ Undecided, Asian-American, male, 33, California; childfree, white, female, 33, Maine.

⁴⁸ Undecided, Asian-American, female, 34, California; childfree, white, male, 27, Minnesota.

⁴⁹ Undecided, white, female, 31, California.

⁵⁰ Undecided, Asian-American, female, 28, Washington.

⁵¹ Undecided, white, male, 28, Rhode Island.

⁵² Parent, white, female, 38, Oregon; undecided, white, female, 30, Colorado.

⁵³ Childfree, white, female, 33, Maine; undecided, Asian-American, male, 28, California.

⁵⁴ Undecided, white, female, 33, California.

⁵⁵ Parent, white, male, 37, Massachusetts.

⁵⁶ Undecided, white, female, 31, California.

⁵⁷ Undecided, Asian-American, female, 27, Illinois; childfree, white, female, 33, California.

Overall, “climate catastrophes [*sic*] like hurricanes and wildfires will be happening at the turn of every corner and we will live in a permanent state of war or something like a militarized state.”⁵⁸

III. Survey Questions for US Respondents

1. Please tell your story of becoming aware of the gravity of climate change. When did you first become concerned? What events were important as time went on?
2. Which of the following emotions have you felt in response to your awareness of climate change?
Options (able to select multiple): Afraid, Scared, Frightened, Nervous, Angry, Hostile, Irritable, Scornful, Disgusted, Loathing, Guilty, Ashamed, Angry at Self, Dissatisfied, Dissatisfied with Self, Sad, Downhearted, Alone, Lonely, Happy, Joyful, Delighted, Cheerful, Excited, Enthusiastic, Lively, Energetic, Proud, Strong, Confident, Bold, Daring, Fearless, Alert, Attentive, Concentrating, Determined, Shy, Bashful, Sheepish, Timid, Sleepy, Tired, Sluggish, Calm, Relaxed, At Ease, Amazed, Surprised, Astonished.
3. Please tell us a bit more about your emotional responses. Why do you think you felt or feel this way? Have your emotions in response to climate change shifted over time? Which ones have been particularly intense?
4. How many biological children do you have? (If you or your partner is currently pregnant, please count expected children.)
5. Do you plan to have biological children?
Options: Yes, Maybe, No.
6. Have you adopted or fostered any children?
 - a. Did you foster children, adopt, or both?
 - b. How many children have you fostered?
 - c. Over what span of time (in years) did you foster these children?
 - d. How many children have you adopted?
7. In which year(s) was (were) your child(ren) born?
8. Please describe the role that climate change considerations played in becoming a parent. Describe your process of coming to this decision (if it was a decision) in as much detail as you are comfortable with.
9. How concerned were/are you about your (potential) child’s lifetime carbon footprint?
Options: Likert scale of 1 – 5.
10. How concerned were/are you about the climate impacts your (potential) child will witness or experience?
Options: Likert scale of 1 – 5.

⁵⁸ Undecided, Latinx, female, 28, Pennsylvania.

11. Please explain your thoughts and feelings about the previous two questions. If there were other climate change-related concerns that informed your reproductive decisions, please describe them here.
12. Are you raising /planning to raise your (potential) child(ren) any differently than you would if climate change was not occurring? If so, how?
13. Do you think of your parenting as a contribution to creating a better world?
Options: Yes, No.
14. How do you think your parenting contributes to creating a better world?
15. If climate change were not occurring, do you think you would have biological children today/more biological children than you have now, or are planning to have?
Options: Yes, Maybe, No.
16. Do you tell friends, family, or anyone else about your concerns about having more biological children than you're currently planning/ why you have chosen not to have biological children? If not, why not? If so, how do those conversations go?
17. Was there a point in the past when you had been leaning towards not having children (partially as a result of climate change)? If so, can you describe the process of changing your mind?
18. What factors were involved in your decision not to have biological children? Please describe the decision-making process in as much detail as you are comfortable with.
19. Has climate change altered the way you think about the future, and your actions in the present? If so, how?
20. What culture or cultures do you consider yourself a part of? What perspectives on reproduction do you think you've received from it/them?
21. How do you define who is part of your family?
22. Which of the following actions have you taken in response to your awareness of global climate change?
Options (able to select multiple): Eating differently, Recycling, Sharing information about climate change on social media, Purchasing products that have a smaller carbon footprint, Participating in activist or protest movements around climate change, Flying less, Investing in a socially responsible way, Having a smaller family, Driving less, Voting based on a candidate's stance on this issue, Talking to others about climate change, None of the above.
23. Do you presently participate in any political activities? If yes, what activities, and how often? What role do you play?
24. What is your occupation?
25. What is your age?

26. What is your gender?
Options: Female, Male, Other (please specify).
27. Do you consider yourself to be...
Options: Heterosexual, Homosexual, Bisexual, Other (please specify), Prefer not to say.
28. Which country are you from?
29. Which state do you live in?
30. What city or town do you live in?
31. What do you think the world will be like in 2050?
32. Picture the people most affected by climate change. What do they look like?
33. Can you name three things that have influenced your vision of what a future with climate change will be like? For example, you could list specific personal experiences; specific conversations you've had with friends; scientific reports, newspaper articles, nonfiction books or novels you've read; or documentaries or films you've seen. (If you can't remember the titles of things you've read or seen, please give a very brief description.)
34. Which of the following actions do you think is most effective in response to climate change? Please drag the options to rank them according to their impact, 1 = MOST impactful, 11 = LEAST impactful. (They are currently ordered randomly.)
Options: Eating differently, Recycling, Sharing information about climate change on social media, Purchasing products that have a smaller carbon footprint, Participating in activist or protest movements around climate change, Flying less, Investing in a socially responsible way, Having a smaller family, Driving less, Voting based on a candidate's stance on this issue, Talking to others about climate change, None of the above.
35. What is your race?
Options (able to select multiple): White, Black or African American, American Indian or Alaska Native, Asian (Asian Indian, Japanese, Chinese, Korean, Guamanian or Chamorro, Filipino, Vietnamese, Samoan, or Other Asian), Native Hawaiian or Pacific Islander, Some other race (please specify).
36. Are you of Hispanic, Latino, or Spanish origin?
Options: "No, not of Hispanic, Latino, or Spanish Origin," "Yes, another Hispanic, Latino, Please type origin (for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on)," "Yes, Cuban," "Yes, Mexican, Mexican American, Chicano," "Yes, Puerto Rican."
37. What was your income last year (in US dollars)?
Options: Less than \$10,000, \$10,000 - \$19,999, \$20,000 - \$29,999, \$30,000 - \$39,999, \$40,000 - \$49,999, \$50,000 - \$59,999, \$60,000 - \$69,999, \$70,000 - \$79,999, \$80,000 - \$89,999, \$90,000 - \$99,999, \$100,000 - \$149,999, More than \$150,000.
38. What is the highest degree or level of school you have completed?
Options: Nursery school, Grade 1 through 11 (please specify grade), 12th Grade – No

diploma, Regular high school diploma, GED or alternative credential, Some college credit but less than 1 year of college credit, 1 or more years of college credit but no degree, Associate's degree, Bachelor's degree, Master's degree, Professional degree beyond a bachelor's degree, Doctorate degree.

39. What is your present religion, if any?

Options: Protestant, Roman Catholic, Orthodox (such as Greek or Russian Orthodox), Mormon, Jewish, Muslim, Hindu, Buddhist, Agnostic, Atheist, Nothing in particular, Other (please enter).

40. How would you describe your political views?

Options: Very conservative, Conservative, Moderate, Liberal, Very liberal, No opinion.

41. Do you define your politics differently from the traditional categories listed above? If so, how would you describe yourself?

42. In politics, as of today, do you consider yourself a Republican, a Democrat or an independent?

Options: Republican, Democrat, Independent, None of the above.