Eco-anxiety and the influence of climate change on future planning is greater for young US residents with direct exposure to climate impacts

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Abstract

Awareness of the threats of climate change is engendering distress in increasingly documented ways, with young people particularly affected. Experiences such as climate distress and eco-anxiety have implications for the health and wellbeing of societies, economies, and for climate action, including mental health, agency to address the crisis, and future planning. While multi-country studies suggest that eco-anxiety and related experiences of distress may vary with context, the hypothesis that exposure to climate-related impacts increases eco-anxiety and associated psychological impacts is underexplored in youth at the individual level. Here we show that in a large sample of US youth (aged 16–24, n = 2834), self-reported direct experience of climate-related events significantly increased eco-anxiety, climate distress and the impact of climate change on future planning, but also psychological adaptation, meaning-focused coping and climate agency. As the climate crisis accelerates and exposure to climate-related hazards increases, these findings have important implications for the mental health of populations, life choices that have socioeconomic impact, and climate behaviours of the growing group of young people experiencing these threats.

INTRODUCTION

The psychological dimensions of the climate crisis, including experiences termed eco-anxiety and climate distress, have become increasingly researched for how they influence both mental health and society's response to the crisis\(^1\). How people are thinking and feeling about climate change, and how those psychological responses impact individual and collective actions, have enormous consequences for shaping economies and the ability to meet climate targets\(^2,3\). Despite the rapid increase in data on the psychological and mental health implications of the climate crisis over the last few years (particularly for the critical developmental window of adolescence and emerging adulthood), there is a lack of studies of sufficient size to gain a comprehensive understanding of the implications on mental health, future planning and climate action for different subgroups, including those with direct experience of climate impacts. As the largest and most comprehensive study of US youth to date, we outline the widespread implications of climate awareness on the psychology, mental health, future planning and behavioural choices of the generation inheriting the crisis, and how the growing frequency of direct climate experiences turbocharges such effects.

Eco-anxiety, or the “chronic fear of environmental doom”\(^4\) is a normal response to the existential threat posed by climate change that can act as a stressor to precipitate or exacerbate symptoms of mental ill-health and impair daily functioning, which is particularly prevalent in young people\(^5,6,7\). Strong emotional responses and distress in the face of climate change can also spur action and can thereby be part of a healthy and adaptive response to current realities, supporting community resilience\(^8,9,10,11,12,13\). Evidence shows climate awareness and distress can also impact future planning, such as whether to have children\(^6,14,15\). The question of how these developments are affecting youth is receiving increasing attention and has raised concern among child health professionals\(^5,16,17,18\).
Young people already face an escalating mental health crisis in the United States. The US Surgeon General reports that this is influenced by multiple factors in addition to climate change, including social media, gun violence, racism and the COVID-19 pandemic\textsuperscript{19}. While such threats to youth wellbeing can conceivably be addressed by policy change, today's young people must contend with a changing climate over their entire lives, even if progressive climate policies are consistently enacted from this point forward\textsuperscript{20}. Previous research shows there may be potential beneficial feedback loops to unlock, whereby taking climate action can have a protective effect on wellbeing and promote resilience, pointing out co-benefits for people and planet\textsuperscript{21}. As the number of people with direct climate experiences grows, both in the US and globally, it is critical to understand the implications for the breadth and severity of young people's psychological responses to climate change. Protecting and promoting mental health and accelerating appropriate pro-environmental behaviours and climate action, is key to enabling the best possible climate for future generations.

In this study, our objectives were to (1) examine how young people in the US are psychologically impacted by climate change, and (2) how self-reported direct experience of climate impacts affects these psychological responses and behavioural intentions. We conducted an online survey, composed of both existing psychometric scales and novel questions, to assess young people's concern and anxiety about climate change, positive and negative emotional associations of climate change, the extent to which thoughts and feelings about climate change interfere with "normal" functioning, how they are coping with and adapting to new climate realities, their sense of agency to act on climate change, and the impact of climate awareness on future planning. We then examined whether these psychological responses vary depending on self-reported direct experiences of climate events, and how general mental health factors into this, to identify specific vulnerabilities for increased climate-associated psychological distress. For that reason, we oversampled areas with elevated exposure to adverse weather events and air pollution.

**METHODS**

**1.1. Survey**

We conducted a cross-sectional online survey of US youth. The questionnaire was based on the Changing Worlds survey conducted in the UK\textsuperscript{8} and feedback from our Young Person's Advisory Group, which consisted of 9 US residents aged 16 to 24 years from across the country. The survey was designed to assess psychological distress, a broad spectrum of emotions, and respondents' sense of agency with respect to climate change, and the associations with mental health conditions. In the current study, we added several scales and questions covering direct experiences with climate change, psychological adaptation, coping, and future planning. Direct experiences with climate change were self-assessed, i.e., we asked respondents whether they had personally experienced climate change impacts, first in general (i.e., yes or no) and later with a multiple-choice list of climate events (e.g. floods, wildfires, extreme temperatures). The first question is intentionally subjective as climate impacts are diverse and subject to individual interpretation. Because our focus is on the psychological responses to climate change, we
classified respondents as directly impacted or not based on their own assessment. For the second question about specific impacts, respondents could have theoretically experienced an adverse weather event and not have attributed it to climate change. Whether people attribute an event to climate change may be influenced by various factors, including political affiliation\textsuperscript{,22} but this was not measured.

The Hogg Eco-anxiety Scale was included as a measure of how the respondents’ worry about the environment is impacting their emotions, cognitions, behaviour and functioning. We approached the concept of psychological adaptation in the manner described by Reser et al.,\textsuperscript{13} i.e., as individual adjustments in risk perception, threat appraisal, and associated emotional, cognitive, and motivational responses to climate change. The concept also includes changes in behaviour that are associated with these affective and cognitive processes. We also included new questions on meaning-focused coping, adapted from a psychological adaptation scale developed for patients with chronic illness in a healthcare setting\textsuperscript{23}. In particular, these questions asked how processing thoughts and feelings about climate change may increase an ability to live in alignment with deeper values, beliefs, or a sense of purpose, which can motivate and sustain wellbeing in difficult times, and thereby constitute a form of meaning-focused coping.\textsuperscript{24} Finally, we asked whether respondents’ awareness of climate change made them want to educate themselves to prepare for a climate-affected future, whether that awareness affected family planning, educational, financial, and lifestyle decisions, and whether they felt pressure to experience certain places before they change.

The questionnaire was divided into 4 sections: (1) health and wellbeing, including questions on generalised anxiety, previous or current mental health conditions, and life satisfaction; (2) COVID-19 pandemic experiences and responses, included for context, but not reported here; (3) climate change experiences and responses, including direct climate impacts, and psychological responses as measured with the Hogg eco-anxiety scale\textsuperscript{25}, Reser et al.’s\textsuperscript{13} climate distress scale, ratings of 21 climate emotions that were chosen based on feedback from this study’s Young People’s Advisory Group, a climate agency scale (also based on Reser et al. 2012\textsuperscript{13}, and previously used in Lawrance et al. 2022\textsuperscript{8}, a psychological adaptation scale (based on Reser et al. 2012\textsuperscript{13}), a set of questions targeting meaning-focused coping, and five questions relating to their future planning; (4) demographic questions, including age, gender identity, education, family affluence, ethnicity/cultural background. Respondents’ ZIP codes were classified according to rural-urban commuting area (RUCA) codes, which describe U.S. census tracts using measures of population density, urbanisation, and daily commuting. See Appendix A for further details on the survey design and scales included. The questionnaire is available at https://osf.io/vr9xy.

The questionnaire was implemented on Qualtrics survey software and distributed to a Qualtrics research panel between November 2021 and January 2022. The inclusion criteria were age (16–24 years), literacy in English and US residency. Sampling was first conducted to mirror ethnicity, gender, and regional population distributions according to the US census, and additional participants were then recruited from areas that have been identified as particularly vulnerable to high impact climate events. We identified such regions at the county level as reported in the FEMA National Risk Index for Natural Hazards,
National Lung Association State of the Air Report, and CDC/ATSDR Social Vulnerability Index (for details, see Appendix A). While we made every effort to sample a representative cross-section of the US population, some influence of self-selection bias cannot be excluded. The cross-sectional survey taken during the COVID-19 pandemic provides only a snapshot at a time when respondents may have been experiencing a wide range of stressors. This may impact how they think and feel about climate change\textsuperscript{26}, however other research suggests that the pandemic and climate change concerns do\textit{ not} draw from the same finite pool of worries\textsuperscript{8}. All respondents provided informed (digital) written consent.

1.2. Analyses

We registered our data analysis plan (https://osf.io/zm7rt) prior to examining the data, and provide an updated plan which outlines any deviations (https://osf.io/tq324). The analyses were exploratory, focused on identifying patterns in the data, rather than on testing specific hypotheses. We present descriptive statistics on the outcome variables (mental health and wellbeing, eco-anxiety, climate distress, climate emotions, agency, psychological adaptation, meaning-focused coping, future planning) and examine how direct experiences with climate impacts might affect these outcomes and their interactions. To evaluate the association between continuous outcome variables (scale scores) and direct experiences of climate change, we used linear regression with robust standard errors to account for unequal variance and adjusted for the following prespecified demographic covariates: age, sex, education, family affluence score (based on the Family Affluence Scale-III), rural vs urban, and ethnicity.

RESULTS

2.1. Sample description

The responses were collected by Qualtrics, resulting in 2883 valid responses, after excluding respondents who did not meet the inclusion criteria, failed Qualtrics’ internal quality check, or did not finish the survey. We implemented additional quality control tests to identify potential poor quality or dishonest responses. For further details, see Appendix A. This resulted in a further $n = 49$ respondents being excluded (1.7% of the original sample), leaving $N = 2834$ as our final sample. For the calculation of scale scores, we imputed missing item scores using mean substitution only if less than half of the scale items were missing. If more data points were missing, the scale score was not calculated and treated as missing data. We employed pairwise deletion (available-case analysis) for all statistical analyses. All variables included in the analyses had less than 5% missing data.

2.2. Demographics

Respondents were aged 16–24 years (mean = 20.4, SD = 2.5). Half of the sample (49.8%) identified as female, 43.8% identified as male, and 4.5% identified as gender non-conforming. A further 0.8% preferred to self-define, while 1.2% preferred not to disclose their gender. A relatively large proportion of the sample identified as LGBTQI+ (26.8%), although this is in line with a recent poll in the Gen Z population\textsuperscript{27}. White (non-Hispanic) respondents made up almost half of the sample (48.5%), followed by Hispanic/Latinx
respondents (20.9%), Black/African-American (14.2%), mixed-race/multiple ethnicities (7.0%), Asian (6.6%), Indigenous (1.8%), while 1.1% preferred to self-specify. Most were studying at least part-time (32.3% students and 28.0% combining study with work), 26.4% were working, and 13.3% were neither in work nor in school. Most had finished high school (80.1%), and 16.2% had completed at least a Bachelor’s degree. With regard to socio-economic status, the median score on the Family Affluence Scale was 7 (IQR = 5–9; scale range: 0–13). The vast majority were resident in a metropolitan area (88.3%), while 6.8% resided in a micropolitan area, and 4.9% in a rural area, based on the RUCA classification of their reported ZIP code. For further details, see Appendix B.

Most of the sample had experienced at least some anxiety in the preceding two weeks. GAD-7 scores indicated that 21.4% of the sample was not or minimally anxious, 28.2% had mild anxiety, 29.9% had moderate to severe anxiety and 20.5% could be classified as having severe anxiety (GAD-7 mean = 9.6, SD = 5.7; scale range: 0–21). Of those who answered the question about their personal mental health history, 33.5% reported having a current diagnosis or receiving treatment for a mental health condition (184 respondents explicitly declined to answer and 4 left this question blank).

Outcome descriptive data

We characterised the sample on a wide range of psychological responses to climate change. For details about the internal consistency and item descriptives, refer to Appendix C.

2.2.1. Climate-related distress and functional interference

Climate distress (possible score range: 8–40) was moderate in this sample (mean = 21.6, SD = 7.6). Using equivalent cut-off scores to Reser et al. (2012)\textsuperscript{13}, in our sample 30.7% could be classified as experiencing low levels of climate distress (score: 8–18), while the majority (56.5%) was moderately distressed (19–29), and a minority (12.9%) was highly distressed (score: 30–40). On average, respondents in this sample scored relatively low on the Hogg Eco-anxiety Scale\textsuperscript{25} (possible score range: 0–39), although there was high variation in the scores (mean = 13.1, SD = 10.1). When directly asked to rate how climate thoughts and feelings interfered with daily functioning (e.g. sleeping, focusing): 0 (“not at all”) − 5 (“extremely”) respondents typically indicated experiencing “some” interference (median = 3, IQR = 1–3).

2.2.2. Climate emotions

Of the 21 emotions probed in relation to climate change, the most highly endorsed were concern, interest, disappointment, frustration, sadness, anxiousness and anger. Emotions that were rated relatively low included both positive (e.g. courageous) and negative (e.g. cynical) emotions (Fig. 1).

2.2.3. Climate agency

In terms of agency\textsuperscript{8}, the total score indicated an on average neutral to slightly positive sense of agency within this sample (mean = 2.8, SD = 5.1), but responses covered the full range of the 10-item scale, from −20 indicating no agency at all to 20 indicating a very well-formed sense of agency. Among the
individual scale items (possible score range −2 to 2), the greatest reported sense of agency were in the domains of awareness (mean = 0.6) and capability (mean = 0.5) (knowing which actions to adopt and believing in their ability to execute them) as well as in the power of actions to change thoughts and feelings for the better (mean = 0.5). The median item scores were 0 (neutral) for all domains except awareness (median = 1) and capability (median = 1), indicating that the sample held an ambiguous sense of agency on dimensions such as efficacy, (lack) of control, negative effect of their behaviour on their own feelings and cognitions (causing burnout or fatigue), their ability to influence others, their sense of urgency, and feelings of personal responsibility (Fig. 2 - Panel A).

2.2.4. Psychological adaptation

The mean overall psychological adaptation score (possible score range: 9–54) reflected the fact that, on average, respondents did not express strong feelings in either direction (mean = 32.6, SD = 8.7). Just a quarter to a third of respondents endorsed or strongly endorsed the various dimensions of psychological adaptation (Fig. 2 - Panel B). Among the least endorsed adaptation actions was relocating in response to climate change.

2.2.5. Meaning-focused coping

10.8% of the respondents indicated that they had not at all learned to process their thoughts and feelings about climate change. For the remaining respondents, the mean overall score for meaning-focused coping was 11.86 (SD = 3.62) out of a possible range of 4–20. This reflects the fact that most respondents indicated the items applied to them “somewhat” (Fig. 2 - Panel C). A pro-social response to the threat of climate change was the most commonly endorsed, with 40% of respondents indicating that processing their thoughts and feelings around climate change made them at least “quite a bit” more willing to help others, while 90% said they were at least “a little bit” more willing to help others.

2.2.6. Planning for the future

The questions on future planning revealed that a relatively common result of respondents’ awareness of climate change was a self-expressed need to educate themselves on climate change in a way that school has not, in order to prepare themselves for a climate changed future (38.7% responded “Yes”, 40.0% responded “Maybe”). A third (32.7%) of respondents strongly felt a desire to see certain places before they change or disappear as a result of climate change, and 37.5% saying “maybe”, indicating a relatively common fear of missing out, or a sense of impending loss of opportunity. A quarter (25.2%) agreed that climate change makes them question whether they will have children, with an additional 32.2% saying “maybe” (Fig. 2 - Panel D).

2.3. Direct exposure to climate impacts

2.3.1. Descriptive data
Slightly less than half (42.9%) of respondents indicated that they had been directly affected by climate change. Among this subset of respondents, the most commonly reported specific impacts were extreme temperatures (47.4%) and air pollution (42.4%). This was followed by floods (31.1%), prolonged exposure to smoke from wildfires (30.1%), superstorms or hurricanes (26.1%), drought (24.8%), significant local environmental change (23.5%), and wildfires (18.2%).

### 2.3.2. Comparison of directly affected vs non-affected individuals on key outcomes

The perception of being directly impacted by climate change was positively associated with the number of specific events the individual reported as having experienced (e.g. floods, droughts, wildfires). Having experienced any one of the events was significantly associated with increased likelihood of the subjective perception that one was directly affected by climate change (see Appendix D for details). Crucially, the perception of being directly impacted by climate change was significantly associated with higher scores on all the key outcome scales (Table 1).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Not directly impacted</th>
<th>Directly impacted</th>
<th>Adjusted Mean Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eco-anxiety</td>
<td>1,590 10.1 (9.7)</td>
<td>1,198 17.0 (9.3)</td>
<td>6.9 (6.2–7.6)***</td>
</tr>
<tr>
<td>Functional Interference</td>
<td>1,576 2.2 (1.4)</td>
<td>1,193 3.0 (1.3)</td>
<td>0.9 (0.7-1.0)***</td>
</tr>
<tr>
<td>Climate Distress</td>
<td>1,584 19.4 (7.4)</td>
<td>1,195 24.6 (6.8)</td>
<td>5.2 (4.6–5.7)***</td>
</tr>
<tr>
<td>Climate Agency</td>
<td>1,581 2.2 (5.0)</td>
<td>1,193 3.7 (5.2)</td>
<td>1.4 (1.0-1.8)***</td>
</tr>
<tr>
<td>Psychological Adaptation</td>
<td>1,569 31.0 (8.6)</td>
<td>1,188 34.9 (8.4)</td>
<td>3.9 (3.2–4.5)***</td>
</tr>
<tr>
<td>Meaning-Focused Coping</td>
<td>1,405 11.1 (3.7)</td>
<td>1,052 12.8 (3.3)</td>
<td>1.7 (1.4-2.0)***</td>
</tr>
</tbody>
</table>

*Linear regression model is adjusted for age, sex, education, family affluence score (FAS), rural vs urban, and ethnicity. *** p < 0.001

Those who reported being directly impacted by climate change also reported stronger emotional associations with climate change, across the full spectrum of feelings we assessed, using the same type of linear model employed above, adjusted for the same demographic variables (Fig. 3). All the adjusted mean differences were statistically significant at p < .001. For the full table, see Appendix D.
Those who reported direct climate impacts were more likely to respond “Yes” when asked: whether their awareness of climate change made them want to educate themselves in ways that school currently does not, in order to be more prepared for a climate changed future (adjusted PR = 1.45, 1.32–1.60); more likely to think saving money for the future is pointless (aPR = 1.42, 1.18–1.72); more likely to want to visit places in the world that might change from climate impacts (aPR = 1.40, 1.25–1.56), more likely to question having children (aPR = 1.66, 1.45–1.91) and more willing to make big lifestyle changes (aPR = 1.60, 1.36–1.88).

2.3.3. Interaction between exposure to climate impacts and mental health/wellbeing

Respondents who reported being diagnosed or receiving treatment for a mental health condition experienced greater interference of climate thoughts and feelings on normal day-to-day functioning, and this trend was stronger among individuals that reported direct experiences with climate change versus those that had not reported direct experiences.

Table 2
Mean scores for functional interference of climate-related thoughts and feelings as a function of direct experience with climate change impacts and self-reported mental health status.

<table>
<thead>
<tr>
<th>Treatment or diagnosis of mental health condition (self-reported)</th>
<th>N</th>
<th>Mean interference score (range: 1–5), mean (SD)</th>
<th>Adjusted Mean Difference⁹</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No direct climate change impacts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None reported (reference)</td>
<td>912</td>
<td>2.09 (1.45)</td>
<td>-</td>
</tr>
<tr>
<td>Not current</td>
<td>142</td>
<td>2.15 (1.43)</td>
<td>0 (-0.24, 0.23)</td>
</tr>
<tr>
<td>Current</td>
<td>397</td>
<td>2.27 (1.40)</td>
<td>0.21 (0.04, 0.37) *</td>
</tr>
<tr>
<td><strong>Direct climate change impacts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None reported (reference)</td>
<td>548</td>
<td>2.80 (1.26)</td>
<td>-</td>
</tr>
<tr>
<td>Not current</td>
<td>110</td>
<td>2.94 (1.37)</td>
<td>-0.11 (-0.39, 0.17)</td>
</tr>
<tr>
<td>Current</td>
<td>482</td>
<td>3.28 (1.24)</td>
<td>0.47 (0.31, 0.62) ***</td>
</tr>
</tbody>
</table>

⁹Linear regression model is adjusted for age, sex, education, family affluence score (FAS), rural vs urban, and ethnicity. *p < 0.05, ***p < 0.001

DISCUSSION

This study examines wide-ranging psychological responses that 16–24 year olds in the United States report experiencing in connection with climate change. Our findings underscore that self-reported direct experience of climate-related events is a significant indicator of how young people are thinking and
feeling about climate change, as well as how this interacts with their mental health and behavioural intentions. Notably, respondents with self-reported direct exposure to climate impacts were more distressed and experienced more functional interference due to their thoughts and feelings about climate change. They also showed stronger emotional reactions to climate change. Nevertheless, our respondents with self-reported direct exposure were more likely to find meaning in processing their thoughts and feelings around climate change, and were adjusting psychologically to climate change realities, including through making future plans based on their climate awareness, and had a more positive sense of agency to address the crisis. These findings align with others’ observations that “climate distress” is a multi-faceted and layered emotional experience.28

Personal experience with direct impacts of climate change has been previously associated (in small scale studies) with greater environmental worry and climate anxiety9,29,30,31, and predicted higher risk perception, which then correlates with support for climate policies22. Two such studies found that people who experience extreme weather events, for example flooding, can become more worried about climate change overall as it becomes a more salient threat, based on a stressful experience and negative emotions perceived to be caused by climate change32,33. This seems to be most true for people who have the least capacity to cope (i.e. maintain wellbeing in the face of climate threats and experiences), a concerning finding from a mental health and climate justice perspective34. These people also importantly have stronger intentions for personal actions to mitigate climate change and show stronger support for progressive climate policies. Confirming this, researchers found that symptoms of climate anxiety mediated a positive influence of direct experience of climate impacts on engagement with climate mitigation in Filipino adolescents35. Evidence also suggests that higher psychological adaptation to climate change is associated with experience of direct climate impacts, implying that various elements of coping may in some cases be catalysed by such experiences13. This growing body of research supports our findings that show that constructive ways of dealing with the problem can co-occur with feelings of distress and concern, including agency, psychological adaptation, and engagement with the crisis through behavior change and future planning. Further research is needed to understand how this relationship can be optimised for protective feedback effects that co-benefit human and planetary health.

It remains unclear whether the observed adaptive reactions can be maintained longer-term, especially in the context of insufficient broader government and societal commitments to climate mitigation and adaptation. It is conceivable that there is a limit to psychological adaptation, and that distress and concern may start to take a toll on overall wellbeing, which reduces people’s capacity to take climate action. More research is needed to understand the enabling conditions (beyond curbing greenhouse gas emissions) for protective factors that may buffer against poor wellbeing outcomes, including longitudinal studies and in-depth qualitative investigations22. Furthermore, because we oversampled from regions recently affected by climate change impacts, our combined data does not provide an accurate reflection of climate distress prevalence among US youth. There is still a need for representative and longitudinal surveys to monitor changing patterns in the psychology of climate change among this demographic, and particularly any interactions with other mental health factors and intersecting vulnerabilities. Substantive
and sustained investment is required to develop evidence-based interventions and support programs that are age-appropriate and targeted.

Our findings indicate that the extent to which young people in the US today have grappled with the idea of climate change as an overarching threat is likely highly differentiated. Targeted resources that match individual psychological needs may be required to help young people make sense of the impacts of climate change on their own lives, the lives of others, find effective coping strategies, and take action. This will also require training of mental health professionals to be ‘climate-aware’, as they will play a key role in highlighting, evaluating, scaling and increasing the accessibility of both new and pre-existing clinical and non-clinical interventions that may protect and promote mental health and wellbeing in the climate crisis\(^\text{36}\). Mental health practitioners are increasingly encountering climate change-related concerns in help-seeking clients, yet most feel unprepared, or lack the resources to engage effectively with the issue, highlighting a clear need for interdisciplinary research and practice development\(^\text{37}\). Climate policy and action, particularly in heeding the IPCC report calls for participatory approaches of local communities, can benefit from an understanding of direct climate-related experiences in catalysing desire for community action opportunities\(^\text{38,39}\).

Given that children born today already face up to 7x the number of extreme weather events as their grandparents, and that these impacts are growing\(^\text{40}\), the positive relationships we found between perceived direct experience and eco-anxiety, climate distress, functional interference, and future planning have implications for the social and economic wellbeing of generations into the future. Furthermore, we found that respondents with a current mental health diagnosis experienced more functional interference from their climate thoughts and feelings, particularly when they perceive themselves to have experienced direct impacts. This highlights how those living with a mental health condition may be made increasingly vulnerable to poor health and wellbeing outcomes as climate impacts escalate. The exact nature of the relationship between mental health, wellbeing and climate impacts should be a priority for future research to determine if, or under what conditions, climate-related psychological reactions can become a short-term or long-term risk factor for mental disorders\(^\text{41}\).

The evidence shows that at least a quarter to a third of young people surveyed seem to be preparing themselves for climate impacts through education, family planning, and travel as a kind of “last chance” tourism. The prospect of making (other) significant life changes (e.g. making lifestyle concessions) was less popular, with 20% indicating a definitive willingness to alter their way of living in response to, or in preparation for the effects of climate change. The proportion of young people taking radically hopeless stances, such as believing that saving money for the future is pointless, was small. Notably, self-assessed exposure to direct climate impacts made future planning considerations more likely across all items, a finding indicative of a trend that has the potential to influence socioeconomic shifts. For instance, as the proportion of the population of child bearing age with direct experience of climate impacts grows, which under current climate projections remains very likely\(^\text{20}\), changing decision-making among young adults could have striking implications for birth-rates. Further research is needed to clarify...
the social and economic implications of young people's eco-anxiety and climate distress. Our findings nevertheless underscore that direct experience of impacts one understands to be exacerbated or caused by climate change may significantly shape personal life choices. Discerning how climate change is already influencing young people's big life decisions is key to envisioning and preparing for future challenges and opportunities in a rapidly warming world, and enabling both psychological and physical community adaptation.

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Figure 1

Mean emotion ratings (item score range: 0-3) for 21 emotions related to climate change. In orange are the emotions that were rated higher than the average across all emotions (thick black line), i.e. those most strongly endorsed in the sample. In blue are the emotions that were rated lower than average. Error bars represent 95% confidence Intervals.
Figure 2

The percentage of respondents in agreement with (A) the 10 items of the climate agency scale; (B) the 9 items in the Psychological Adaptation scale; (C) the 4 statements of the Meaning-Focused Coping Scale, excluding any respondents who indicated that they “had not at all learned to process their thoughts and feelings on climate change”; and (D) the 5 items assessing respondents’ considerations of climate change in specific decisions regarding future plans. Note: (*) indicates items that were reverse coded in calculating total scores.
Figure 3

Mean difference in emotion ratings between respondents who reported having experienced direct climate impacts vs those who did not report this. As shown, all differences were positive, indicating higher emotion ratings in the directly impacted group. The dotted lines are the lower and upper bounds of the 95% Confidence Intervals around the adjusted mean difference in the solid line.
**Figure 4**

The percentage of respondents in agreement with each of the 5 items assessing planning for the future, as a function of their direct experience with climate change impacts.

**Supplementary Files**

This is a list of supplementary files associated with this preprint. Click to download.

- AppendixFinal.docx