

## ORIGINAL RESEARCH ARTICLE

## Parenting in a changing climate: The relationship between discussing climate change with children aged 5–11, family eco-behaviors, and climate change anxiety

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Climate change has a substantial impact on human health, and the rising levels of climate change anxiety have led to a global call for action. However, data exploring the relationship between climate change, mental health, and individuals with parental responsibility is limited. This study examined the association between parental climate anxiety and their discussions with their children about climate change, eco-behaviors, and demographic factors. This cross-sectional study employed an anonymous online questionnaire comprised of the 22-item climate change anxiety and eco-behaviors validated scale, disseminated using a snowball sampling technique. Participants were eligible if they (i) were guardians with parental responsibilities of at least one primary school-age child (5 – 11 years old) and (ii) lived in the United Kingdom (UK). A total of 153 participants were included in the analysis. The findings revealed that parents who reported discussing climate change with their children, engaging in eco-friendly and pro-environmental actions, and noticing that their child/children were worried about climate change experienced higher levels of climate change anxiety. This study offers valuable insights into the nuanced engagements around climate change and mental health among those with parental responsibility in the UK. The implications of these findings extend to informing policies, interventions, and educational strategies aimed at supporting parents and guardians to mitigate the adverse effects of climate change on mental health.

**Keywords:** Climate change; Parenting; Mental health; Eco-behavior; Climate change anxiety

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**1. Introduction**

Climate change, reported as “the defining crisis of our time” (United Nations, 2020), has a significant impact on human health. However, there is a paucity of data regarding the

relationship between climate change and mental health, and as such, there is a necessity for evidence on measures to mitigate the impact (Wu *et al.*, 2020). Climate change anxiety is a prominent term associated with the effect of the climate crisis on mental health and mental distress. It is considered a heightened emotional or mental distress in response to the extreme changes in the climate (Alliance, 2020). However, worrying about the climate crisis is a rational reaction to the potential threat to life and a fear for the future (Wray, 2023), with parenthood found to cause an increase in climate change worries when compared to individuals without parental responsibilities (Ekholm, 2020).

Parental climate anxiety has also been reported by Gaziulusoy (2020), who reported that parents not only expressed their worries, sadness, and hopelessness for their children but also their perceived inadequacy to sufficiently prepare them for the future. This presents a significant challenge for parents, particularly as Corner *et al.* (2015) identify them as among the trusted messengers of climate change, highlighting their potential to positively influence the actions and outlook of their children. This role is concurred by Madden *et al.* (2023), while Léger-Goodes *et al.* (2023) argue that parents can also influence the extent to which their children experience climate change anxiety. That said, it has also been found that parents may not be aware of their children's worries about climate change. Indeed, during interviews with parent-child dyads, Léger-Goodes *et al.* (2023) found that while some parents reported their children were unconcerned about climate change, the children themselves divulged their worry. This indicates that parents may not only need to manage their own anxieties toward climate change but also navigate preparing their child/children for an uncertain future while anticipating and indeed managing potential climate anxiety.

Growing symptoms related to climate change anxiety have led organizations worldwide to raise this psychological phenomenon as in need of action. Current evidence highlights that the issue of climate change exacerbates mental distress, particularly among young people, even for individuals who are not directly affected (Lawrance *et al.*, 2021). This phenomenon is recognized as a global mental health risk, with its incidence increasing (Swim *et al.*, 2022). Climate change anxiety has been operationalized as a multi-factor construct, measurable by self-report, and differentiated from general anxiety (Clayton & Karazsia, 2020). The emotional reaction to climate change in this formulation is seen to cluster around a factor termed cognitive-emotional impairment, which captures the self-perceived impact on affective and cognitive resources. Self-

perceived impact on fulfilling life roles, such as attending to work and family responsibilities, clusters around a separate factor termed functional impairment. Those scoring highly on validated scales report specific anxieties around climate change as causing a significant impact on mental health (Coffey *et al.*, 2021). Climate change anxiety is correlated with depression (Clayton & Karazsia, 2020; Larionow *et al.*, 2022) and generalized anxiety (Clayton & Karazsia, 2020), though further research is required to establish cause-effect relations (Heeren *et al.*, 2023) and cross-cultural validity (Larionow *et al.*, 2022).

Research indicates several variables associated with climate change anxiety, indicating that some people are more likely to be affected (Clayton, 2020; Hickman, 2020; Jackson *et al.*, 2023; Lee *et al.*, 2020; Ojala, 2012; van Nieuwenhuizen *et al.*, 2021; Vergunst & Berry, 2022; Wu *et al.*, 2023). An individual's personality, age, and where they live can influence the degree to which they experience climate change anxiety (Clayton, 2020). Young adults (Wu *et al.*, 2020), farming communities, and those living in areas directly impacted by climate change-induced weather events are particularly susceptible (Cunsolo *et al.*, 2020). Those with knowledge about climate change (Asgarizadeh *et al.*, 2023), engaging in eco-behaviors (Lukacs *et al.*, 2023), studying environmental topics (Daeninck *et al.*, 2023), and those who feel an affinity with nature (Coffey *et al.*, 2021) are also more likely to experience climate anxiety. Despite these associations, there is a limited understanding of how conversations between children and their parents about climate change relate to parental climate change anxiety. Therefore, this study aims to explore the relationship between United Kingdom (UK) parents'/carers' engagement with their children aged 5 – 11 years regarding climate change and (i) climate change anxiety, (ii) eco-behaviors, or (iii) parental demographics.

## 2. Methods

### 2.1. Study design

The study adopted a cross-sectional approach for data collection from parents with at least one child aged 5 – 11 years (UK primary school age) using an online questionnaire (Appendix A1). The anonymous questionnaire incorporated the Climate Change Anxiety Scale (Clayton & Karazsia, 2020) to explore differences in climate change anxiety and eco-behaviors across demographic characteristics. The Climate Change Anxiety Scale comprises 22 items. Items 1 – 13 evaluate climate change anxiety, consisting of cognitive-emotional impairment (Items 1 – 8, Cronbach's alpha = 0.79) and functional impairment (Items 9 – 13, Cronbach's alpha = 0.78). Items 14 – 16 evaluate eco-behavior,

consisting of experience of climate change (Items 14 – 16, Cronbach’s alpha = 0.82), and behavioral engagement (Items 17 – 22, Cronbach’s alpha = 0.81). The demographic variables were designed using recommendations from the Government Statistical Service (Civil Service, 2024). All variables are presented in Table 1.

**2.2. Data collection**

Snowballing techniques were adopted as a convenient, low-cost, and efficient way to access parents with at least one child aged 5 – 11 years on social media platforms (Leighton *et al.*, 2021). Informed consent was obtained before participants responded to the questionnaire. Ethical approval was obtained by the Institution’s College Ethics Committee for full consent and a questionnaire. There were 153 out of 196 participants who completed the full questionnaire and were included in the analysis.

**2.3. Analysis**

The data were analyzed using IBM Statistical Package for the Social Sciences 28 software to examine relationships across and within the pre-determined characteristics. We used null hypotheses to test for significant differences between variables. The normality test by Kolmogorov–Smirnov indicated the scale was not evenly distributed (0.080, *p* = 0.018). Therefore, non-parametric statistical tests were performed (Mann–Whitney U test for two-group comparisons or Kruskal–Wallis for more than two-group comparisons). Dependent variables (DVs) were climate change anxiety (cognitive-emotional impairment, functional impairment) and eco-behaviors (experience of climate change, behavioral engagement), and independent variables (IVs) were demographic variables. We analyzed

whether the DVs differed across each IV. We checked for reliability with the McDonald’s Coefficient Omega (0.852, mean [M] = 48.08, standard deviation = 9.632, coefficient of variation = 92.768). An effect size ( $r = z \div \sqrt{N}$ ) was calculated for the Mann–Whitney U tests, and  $eta^2(H) = (H - K + 1) / (n - k)$  for Kruskal–Wallis and determined as either small, medium, or large. The results are summarized in Table 2.

**3. Results**

**3.1. Demographic variables**

There was a significant difference in the category “cognitive and emotional impairment” across different participant ages ( $H[2] = 6.556; p = 0.038$ ) with a small effect size (0.03). Younger parents (<35 years) had a higher mean rank (MR) = 85.73 compared to their older counterparts, with those aged 36 – 45 years having an MR of 66.16 and those >45 years having an MR of 76.44. A significant difference was also found in “climate change anxiety” between participants with a qualification of “degree level or higher” (median [Md] = 2.21; *n* = 89) and those with other qualifications (Md = 2.07; *n* = 32). The Mann–Whitney U test results were  $U = 1054.5; z = -2.173; p = 0.03$ , with a small effect size (0.2). Similarly, there was a significant difference in the category “experience of climate change” based on educational qualifications. Participants with a “degree level of higher” had Md = 2; *n* = 88 compared to those with “other” qualifications (Md = 1.67; *n* = 32;  $U = 1022; z = -2.329; p = 0.02$ ), with a small effect size (0.21). There was a significant difference in the category “experience of climate change and geographical area,” based on geographical area ( $H[3] = 13.075; p = 0.0004$ ) with a small/moderate effect size (0.06). Participants living in an “inner-city” area ranked higher (MR = 98.18) than those in their more rural counterparts (MR: village = 82.51; suburbs = 78.32; town = 60.22).

**3.2. Child/children talks about climate change**

There was a significant difference in “climate change anxiety” between participants who reported “yes” that their child/children talks about climate change (Md = 2.3; *n* = 78) and those who reported “no” that their child/children does not (Md = 2.04; *n* = 75;  $U = 1870.5; z = -3.85; p < 0.001$ ), with a medium effect size (0.31). There was also a significant difference in “functional impairment” (Md: “yes” = 1.4; “no” = 1;  $U = 2172; z = -2.754; p = 0.006$ ) with a small effect size (0.23), “experience of climate change” (Md: “yes” = 2.33; “no” = 1.67;  $U = 2136.5; z = -2.812; p = 0.005$ ) with a small effect size (0.22), and “behavioral engagement” (Md: “yes” = 4.17; “no” = 3.83;  $U = 1920; z = -3.580; p < 0.001$ ) with a small effect size (0.29). This

**Table 1. Categories of key variables**

Categories	Variables	Instruments
Climate change anxiety	(i) Cognitive-emotional impairment	Items 1 – 13 in the Climate Change Anxiety Scale
	(ii) Functional impairment	
Eco-behavior	(i) Experience of climate change	Items 14 – 22 in the Climate Change Anxiety Scale
	(ii) Behavioral engagement	
Demographic variables	(i) Age	Questionnaire informed by the Government Statistical Service
	(ii) Relationship to child	
	(iii) No. of children	
	(iv) School type	
	(v) Ethnic group	
	(vi) Education	
	(vii) Employment status	
	(viii) Geographical location	
	(ix) Child’s climate change	
	(x) Education	

**Table 2. Summary of findings**

Characteristics				Climate change anxiety scale		Cognitive and emotional impairment		Functional impairment		Experience of climate change		Behavioral engagement	
	<i>n</i> (%)	<i>SD</i>	<i>M</i>	<i>H, U<sup>†</sup></i>	<i>p</i>	<i>H, U<sup>†</sup></i>	<i>p</i>	<i>H, U<sup>†</sup></i>	<i>p</i>	<i>H, U<sup>†</sup></i>	<i>p</i>	<i>H, U<sup>†</sup></i>	<i>p</i>
<b>Age</b>													
<36	59 (38.6)	0.709	0.767	1.181	0.477	6.556	0.038*	1.031	0.597	2.604	0.272	0.290	0.865
36 – 45	67 (43.8)												
>45	24 (15.7)												
<b>Relationship</b>													
Father	44 (29)	0.668	1.12	2.085	0.353	4.718	0.095	0.246	0.884	0.591	0.744	0.469	0.791
Mother	83 (54)												
Other	26 (17)												
<b>No. of children</b>													
1	69 (45.1)	0.499	0.549	2654.5 <sup>†</sup>	0.372	2638.5 <sup>†</sup>	0.335	2256.5 <sup>†</sup>	0.02*	2799.5 <sup>†</sup>	0.832	2437.5 <sup>†</sup>	0.119
>2	84 (54.2)												
<b>School type</b>													
Academy	19 (12.4)	0.766	2.7	0.437	0.933	1.411	0.703	3.295	0.348	0.214	0.975	2.387	0.496
Free school	16 (10.5)												
Local authority	106 (69.3)												
Other	9 (6)												
<b>Ethnic group</b>													
White	125 (81.7)	0.369	0.839	1288.0 <sup>†</sup>	0.273	1459.0 <sup>†</sup>	0.83	1164.5 <sup>†</sup>	0.131	1373.5 <sup>†</sup>	0.731	1079 <sup>†</sup>	0.057
Other	24 (15.8)												
<b>Education</b>													
Degree or above	89 (58.2)	0.443	0.736	1054.5 <sup>†</sup>	0.03*	1324 <sup>†</sup>	0.551	1331 <sup>†</sup>	0.633	1022 <sup>†</sup>	0.02*	1095.5 <sup>†</sup>	0.063
Other	64 (58)												
<b>Employment</b>													
Employed	133 (89)	0.318	0.887	876.0 <sup>†</sup>	0.131	967 <sup>†</sup>	0.326	984.5 <sup>†</sup>	0.391	1000.5 <sup>†</sup>	0.461	880 <sup>†</sup>	0.147
Other	17 (11)												
<b>Geographic area</b>													
Inner city	22 (14.4)	1.0	2.65	4.448	0.217	1.476	0.688	2.899	0.408	13.075	0.004**	3.867	0.276
Suburbs of a city	46 (30.1)												
Town	48 (30.4)												
Village	36 (23.5)												
<b>Child/children learns about climate change in school</b>													
No	23 (15)	0.738	2.41	2.026	0.363	0.504	0.777	2.104	0.349	1.197	0.55	3.464	0.177
Unsure	45 (29.4)												
Yes	85 (55.6)												
<b>Child/children talks about climate change</b>													
No	75 (49)	0.502	0.51	1870.5 <sup>†</sup>	<0.001***	2483.0 <sup>†</sup>	0.102	2172 <sup>†</sup>	0.006**	2136.5 <sup>†</sup>	0.005**	1920 <sup>†</sup>	<0.001***
Yes	78 (51)												

(Cont'd...)

Table 2. (Continued)

Characteristics	n (%)	SD	M	Climate change anxiety scale		Cognitive and emotional impairment		Functional impairment		Experience of climate change		Behavioral engagement	
				H, U <sup>†</sup>	p	H, U <sup>†</sup>	p	H, U <sup>†</sup>	p	H, U <sup>†</sup>	p	H, U <sup>†</sup>	p
Environmental or pro-environmental action													
No	10 (6.5)	0.426	1.05	17.307	<0.001***	7.122	0.028*	6.756	0.034*	10.296	0.006**	20.074	<0.001***
Unsure	18 (11.8)												
Yes	125 (81.7)												
Child/children worries about climate change													
No	74 (48.4)	0.448	0.27	28.171	<0.001***	10.662	0.005**	10.548	0.005*	9.985	0.007**	21.182	<0.001***
Unsure	51 (33.3)												
Yes	28 (18.3)												

Notes: \*indicates  $p < 0.05$ . \*\*indicates  $p < 0.01$ . \*\*\*indicates  $p < 0.001$ ; <sup>†</sup>U - This indicates a Mann Whitney U was performed; H indicates a Kruskal–Wallis test was performed.

Abbreviation: Standard deviation.

indicates that parents whose child/children talked to them about climate change are at higher risk of climate change anxiety.

### 3.3. Eco-friendly and pro-environmentally friendly behavior

There was a significant difference in “climate change anxiety” and participants who reported that they take “environmentally friendly or pro-environmental action” ( $H[2] = 17.307$ ;  $p < 0.001$ ) with a moderate effect size (0.09). Participants who reported “yes” ranked higher (MR = 82.53) than those who were “unsure” (MR = 68.42) or who reported “no” (MR = 23.32). There was also a significant difference in all four categories: “cognitive and emotional impairment” ( $H[2] = 7.122$ ;  $p = 0.028$ ) with a small effect size (0.02), “functional impairment” ( $H[2] = 6.756$ ,  $p = 0.034$ ) with a small effect size (0.04), “experience of climate change” ( $H[2] = 10.296$ ;  $p = 0.006$ ) with a small effect size (0.4), and “behavioral engagement” ( $H[2] = 21.182$ ;  $p < 0.001$ ) with a moderate effect size (0.11). This indicates that those who engage in eco-friendly and pro-environmentally friendly behavior are more likely to experience higher levels of climate change anxiety.

### 3.4. Child/children worries about climate change

There was a significant difference in “climate change anxiety” and participants who reported that their “child/children worries about climate change” ( $H[2] = 28.171$ ;  $p < 0.001$ ) with a moderate effect size (0.16). Participants who reported “yes” ranked higher (MR = 98.71) than those who were “unsure” (MR = 93.43) or who reported “no” (MR = 57.46). There was also a significant difference in all four categories: “cognitive and emotional impairment”

( $H[2] = 10.662$ ;  $p = 0.005$ ) with a small effect size (0.05), “functional impairment” ( $H[2] = 10.548$ ;  $p = 0.005$ ) with a small effect size (0.04), “experience of climate change” ( $H[2] = 9.985$ ;  $p = 0.007$ ) with a small effect size (0.4), and “behavioral engagement” ( $H[2] = 21.182$ ;  $p < 0.001$ ) with a moderate effect size (0.12). This indicates that parents who report that their child/children worry about climate are more likely to experience higher levels of climate change anxiety.

## 4. Discussion

These findings indicate that although there was no overall difference in climate change anxiety for parents of different ages, younger parents were more likely to rank higher in the category of “cognitive and emotional impairment.” This finding corroborates the original scale development study by Clayton & Karazsia (2020) and a study from Poland by Larionow *et al.* (2022). The greater impact on younger adults may be partly attributable to the increasing prevalence of climate change discussions during a critical period of their identity development (Swim *et al.*, 2022). Psychological practitioners and climate change activists have commented that climate change anxiety is not pathological but an understandable reaction to real existential threats (Wray, 2023). Weintrobe (2018) posits that confronting the painful realization of the impact of climate change on our species’ existence is a necessary first step to taking action to address the threat. Therefore, acute cognitive and emotional disturbance in the younger generational cohorts may signal a turning point toward a more responsible approach to sustainable living. However, further research is required to understand the specific impact on mental health for different age groups.

These findings indicate that parents who had studied to a “degree level or above” ranked higher in “climate change anxiety” and the specific category “experiences of climate change.” This is supported by Niedzwiedz & Katikireddi (2023), who reported that those with higher tertiary education are more likely to experience concerns. However, this variable is largely absent from current publications; instead, the focus is specifically on the correlation between environmental education and the increase in climate change anxiety (Asgarizadeh *et al.*, 2023; Daeninck *et al.*, 2023). University graduates have been identified as a group more likely to engage in learning (Hall *et al.*, 2023). Therefore, it could be that they are more aware of global issues impacted by climate change and, thus, more susceptible to climate change anxiety. However, the original scale development and validation (Clayton & Karazsia, 2020; Wullenkord *et al.*, 2021) found no significant differences associated with education, which, combined with the apparent paucity of data on this variable, presents an interesting finding that warrants further investigation.

An individual’s personality, age, and where they live can influence the degree to which they experience climate change anxiety (Clayton, 2020). Young adults (Wu *et al.*, 2020), farming communities, and those living in areas directly impacted by climate change-induced weather events are particularly susceptible (Cunsolo *et al.*, 2020). Those with knowledge about climate change (Asgarizadeh *et al.*, 2023), engaging in eco-behaviors (Lukacs *et al.*, 2023), studying environmental topics (Daeninck *et al.*, 2023), and those who feel an affinity with nature (Coffey *et al.*, 2021) have also been found to be more likely to experience climate anxiety.

Although there was no overall difference in climate change anxiety for parents living in different areas, those who live in inner-city areas were found to report higher experiences of climate change. This aligns with the review by Cianconi *et al.* (2023), who state that communities are more vulnerable to the impacts of climate change in urban spaces, which in turn adversely affect mental health. Such vulnerability may be influenced by exposure to climate change-related civic schemes recently enacted in cities that are highly salient to urban residents’ experiences, such as flood defenses (Oubennaceur *et al.*, 2022), clean air zones (Sarmiento *et al.*, 2023), and rewilding of green spaces (Root-Bernstein, 2022). Since avoidance of such exposure is not feasible, recommendations for coping with the negative effects of climate change anxiety draw on recent empirical findings that indicate collective climate activism reduces anxiety and depression (Schwartz *et al.*, 2023). Joining collective climate efforts fosters meaning-focused coping, which is shown to protect against the

adverse psychological effects of climate change anxiety (Ojala & Bengtsson, 2019). Non-hierarchical organization of collective climate action has shown promising findings in building intergenerational agency and efficacy while addressing climate change (Gallay *et al.*, 2022). Such action should be facilitated at all levels of urban governance in a manner that does not introduce or exacerbate systemic disadvantage to any population (Cianconi *et al.*, 2023).

Arguably, the most important finding highlighted in this study is that parents ranked significantly higher in climate change anxiety and scale categories, whether they report their child/children talking about climate change, engage in eco-friendly and pro-environmentally friendly behavior or worry about climate change. In reverse, this also indicates that families who are less concerned with climate change are less likely to engage in eco-behaviors. While this approach will lower their susceptibility to climate change anxiety, it will, in turn, restrict their potential to reduce household environmental impacts as well as their influence on the actions and outlook of their children, a role Corner *et al.* (2015) identified for parents. Cordero *et al.* (2020) highlight that receiving appropriate climate change education facilitates pro-environmental behaviors. Therefore, developing climate literacy by educating parents could encourage them to make pro-environmental decisions and have long-term benefits for their children as well as local communities and society. However, the findings highlight that UK families who are currently experiencing the impact of climate change and are engaging in eco-behaviors require psychological support. Understanding climate change and its impact can be a challenge, even for those comfortable with their knowledge. However, for parents or guardians, there is an additional responsibility to alleviate the significant impact of climate change on future generations.

The findings here also link with wider literature suggesting that those who know about climate change are more likely to be impacted by it (Jackson *et al.*, 2023), highlighting the importance of parents seeking help for their mental health and climate change education. A World Health Organization-UNICEF-Lancet Commission recommended coalitions across sectors to overcome commercial and environmental pressures on children (Clark *et al.*, 2020). Earlier education, not only about mental health and the environment but also about housing, energy, agriculture, and transport, was particularly helpful in protecting their mental health. In these education opportunities, it is advisable that parents clarify what children can do about climate change (Murthy, 2022), identify positive climate change actions that can improve children’s mental health (Trott, 2022), and

cultivate empowerment (Trott, 2020). Moreover, parental education can be done collectively in a community, which is often more conducive to children's mental health as it can address a sense of loneliness (Trott, 2019). A sense of loneliness is a risk factor for children's mental health, particularly those in minority groups (Murthy, 2022). Learning that other children share similar concerns, leading to common humanity, can reduce distress (Kotera *et al.*, 2024a). Methods for climate change education can be diversified. For example, climate change education can be offered digitally, supported by parents, so that children can see images or videos to understand climate change (Trott, 2020). Parents can also embed a conversation about climate change in their daily routine with children (Trott, 2022). Long-term and informal engagement by both children and parents about climate change can enable children's perspectives to shift, which can prevent children from feeling overwhelmed by the magnitude of climate change. Families must be provided with age-appropriate interventions and education to support their understanding while simultaneously safeguarding and developing their emotional resilience.

While our study offers helpful insights into climate change anxiety and family communication, several limitations should be noted. First, our sample size did not reach the number estimated in our power calculation, and participants were recruited using a non-probabilistic sampling technique. Second, the use of self-report measures introduces potential response biases (Kotera *et al.*, 2022). Third, as a cross-sectional study, it cannot determine the causal direction of the observed effects – whether high anxiety leads to more conversations about climate change or vice versa. Relatedly, climate change anxiety is a newly defined construct, and its long-term impact remains unknown (e.g., longitudinal studies of COVID-19 report changes in mental health) (Kotera *et al.*, 2024b). Future research should employ larger data sets (e.g., national level) and conduct longitudinal evaluations to address these gaps.

## 5. Conclusion

The study contributes valuable insights into the nuanced relationship between climate change anxiety and mental health among parents in the UK. It reveals that families with younger parents tend to be more concerned regarding the impact of climate change. Parents who were particularly vulnerable to climate change anxiety were those living in inner-city communities. However, parents who feel they are directly experiencing the impact of climate change are more likely to engage in environmentally friendly or pro-environmental behaviors and have discussions with their families about their concerns. The study, therefore,

highlights the importance of providing sufficient support, education, and opportunities for action to parents, helping them manage climate anxiety for both themselves and their children. These implications are crucial for shaping policies, interventions, and educational strategies aimed at mitigating the adverse effects of climate change on mental well-being, particularly among the younger generation. Therefore, further empirical and pragmatic studies are needed to ascertain the impact of parental education on children.

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## Conflict of interest

The authors declare that they have no competing interests.

## Author contributions

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## Ethics approval and consent to participate

This study received ethical approval from the College of Health, Psychology, and Social Care, University of Derby (ethics reference number: ETH2223-2559). Online consent was obtained from all participants before completing the questionnaire.

## Consent for publication

This online questionnaire was anonymous, and all participants took part with the understanding that the results would be published.

## Availability of data

The data are available from the authors on reasonable request.

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## Appendix

### New Page – Online Questionnaire

#### 1. Do you live in the UK? Yes / No

No = statement: Thank you for your interest in the study. Unfortunately, because we are wanting to ask UK parents for this study, you are not able to take part.

Yes = Which country in UK do you live in? Choose: [England] [Scotland] [Wales] [Northern Ireland]

#### 2. Do you have at least one child who is aged between 5 and 11 years old?

No= Thank you for your interest in the study. Unfortunately, because you do not have a child within this age group you are not able to take part. This is because we are looking at how parents communicate about climate change with this age group.

Yes= How many children do you have?

If click A, B, C or D the number of boxes will appear asking for age of child.

- A. 1 [age]
- B. 2 [age 1st] [age 2nd]
- C. 3 [age 1st] [age 2nd] [age 3rd]
- D. More than 4 [age 1st] [age 2nd] [age 3rd] [age 4th] [age other]
- E. Prefer not to say

#### 3. What is your relationship to the child or children?

- A. Mother
- B. Father
- C. Non-binary parent
- D. Guardian
- E. Grandparent
- F. Carer

#### 4. What is your age?

- A. 18-25
- B. 26-35
- C. 36-45
- D. 46-55
- E. 55 and above
- F. Prefer not to answer

#### 5. What is your ethnic group?

Sensitivity: Internal

Appendix A1. Online questionnaire

These are the recommended ethnic group question for use in England (both paper and electronic) from the Government Statistical Service (2019)

Choose one option that best describes your ethnic group or background

**White**

1. English / Welsh / Scottish / Northern Irish / British
2. Irish
3. Gypsy or Irish Traveller
4. Any other White background, please describe

**Mixed / Multiple ethnic groups**

5. White and Black Caribbean
6. White and Black African
7. White and Asian
8. Any other Mixed / Multiple ethnic background, please describe

**Asian / Asian British**

9. Indian
10. Pakistani
11. Bangladeshi
12. Chinese
13. Any other Asian background, please describe

**Black / African / Caribbean / Black British**

14. African
15. Caribbean
16. Any other Black / African / Caribbean background, please describe

**Other ethnic group**

17. Arab
18. Any other ethnic group, please describe

**6. Do you have any educational qualifications for which you received a certificate?**

- A. Yes
- B. No
- C. Prefer not to say

If Question 6=No

**7. Do you have any professional, vocational, or other work-related qualifications for which you received a certificate?**

- A. Yes
- B. No
- C. Prefer not to say

Sensitivity: Internal

Appendix A1. Online questionnaire

If Question 6=Yes OR Question 7=Yes

**8. Was your highest qualification?**

- A. at degree level or above
- B. or another kind of qualification
- C. Prefer not to say

**9. What is your employment status**

- A. Full time employment
- B. Part time employment
- C. Unemployed
- D. Other (please state)
- E. Prefer not to say

**10. What area do you live in?**

- A. Inner city
- B. Suburbs of a city
- C. Town
- D. Village
- E. Other, please describe
- F. Prefer not to say

**11. Please choose which applies to your child's (or children's) primary school:**

- A. Local authority school
- B. Academy
- C. Free school (Funded by the government but not run by the local authority)
- D. Faith school
- E. Private school
- F. Prefer not to say
- G. Home School

**12. Please rate your level of awareness regarding climate change**

0 = unaware of climate change	1 = very low level of awareness	2 = low level of awareness	3 = moderate level of awareness	4 = high level of awareness	5 = Very high level of awareness
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**13. Has your child (or children) learned about climate change at primary school?**

\_\_\_\_\_ yes \_\_\_\_\_ no \_\_\_\_\_ unsure

Sensitivity: Internal

Appendix A1. Online questionnaire

If yes, please provide further details on what they have learned and how old they were

14. Do you think your child/ren should be learning about climate change at primary school?

\_\_\_\_\_ yes \_\_\_\_\_ no \_\_\_\_\_ unsure

Please provide further details on your opinion

15. Does your child (or children) talk about climate change with you?

\_\_\_\_\_ yes \_\_\_\_\_ no

Yes = how often do you talk about climate change with your child or children?

A. Somewhat (e.g., you remember you talked about it with them, but not regularly)

B. Often (e.g., you talk about it once-a-week basis)

C. Very often (e.g., more frequent than once a week)

16. Have you learned anything new about climate change because of talking to your child (or children)?

\_\_\_\_\_ yes \_\_\_\_\_ no

If yes, please add some detail on what you have learned

17. Do you/would you feel comfortable to discuss climate change with your child (or children)?

\_\_\_\_\_ yes \_\_\_\_\_ no \_\_\_\_\_ unsure

Yes = why do you/would feel comfortable? No = why do you/would you not feel comfortable?

18. Would any of the following options help to increase your confidence talking about climate change and other global environmental conditions with your child (or children)? Please select all that apply

- A. Meetings with your child's primary school to discuss the content taught
- B. Workshops on climate change and other global conditions to help increase your own understanding

Sensitivity: Internal

Appendix A1. Online questionnaire

- C. Leaflets and online materials on climate change and other global conditions that you could read at home
- D. Books you could read to your child to help you discuss on climate change and other global conditions
- E. Other, please state
- F. None of the above

19. Do you and/or your household do anything you would consider an environmentally friendly or pro environmental action?

\_\_\_\_\_ yes \_\_\_\_\_ no \_\_\_\_\_ unsure

If yes, please provide further details on what you and/or your household do

20. Do you feel your child or children are worried about climate change?

\_\_\_\_\_ yes \_\_\_\_\_ no \_\_\_\_\_ unsure

If yes, please provide further details on why you think they may be worried

**The Climate Change Anxiety Scale (Clayton and Karazsia, 2020)**

Please rate how often the following statements are true of you.

1	2	3	4	5
Never	Rarely	Sometimes	Often	Almost always

1	Thinking about climate change makes it difficult for me to concentrate.	
2	Thinking about climate change makes it difficult for me to sleep.	
3	I have nightmares about climate change	
4	I find myself crying because of climate change	
5	I think, "why can't I handle climate change better?"	
6	I go away by myself and think about why I feel this way about climate change	
7	I write down my thoughts about climate change and analyse them	
8	I think, "why do I react to climate change this way?"	
9	My concerns about climate change make it hard for me to have fun with my family or friends.	
10	I have problems balancing my concerns about sustainability with the needs of my family.	
11	My concerns about climate change interfere with my ability to get work or school assignments done.	
12	My concerns about climate change undermine my ability to work to my potential.	
13	My friends say I think about climate change too much	
14	I have been directly affected by climate change	

Sensitivity: Internal

Appendix A1. Online questionnaire

15	I know someone who has been directly affected by climate change	
16	I have noticed a change in a place that is important to me due to climate change	
17	I wish I behaved more sustainably	
18	I recycle	
19	I turn off lights	
20	I try to reduce my behaviours that contribute to climate change	
21	I feel guilty if I waste energy	
22	I believe I can do something to help address the problem of climate change	

Please Click Submit your responses and consent to data being used for the purpose of this study.

Online Questionnaire Show Debrief

Sensitivity: Internal

Appendix A1. Online questionnaire