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# Disaggregating a climate generation: gender, agency and climate education among school students in England

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## ABSTRACT

Youth are often portrayed as a unified 'climate generation', yet this hypothesis risks obscuring crucial differences in how young people understand and engage with climate change. Drawing on a large-scale survey of secondary school students (11–14 years) in England, this paper examines how gender, including gender-diverse identities, and age correlate with climate-related emotions, attitudes, and perceived agency. Our findings show that girls report higher climate anxiety and sense of responsibility, but also greater helplessness, while boys express lower concern and greater optimism; gender-diverse students experience the most intense emotions overall. Older students are more likely to link climate action to systemic change than younger peers, who focus on individual behaviours. These disparities are not rooted in differences in knowledge but in emotional and agency constraints, revealing how structural and cultural conditions shape who is able to achieve agency. We argue that equitable climate change education requires attention to emotional labour, social identities, and the ecological conditions through which agency is achieved. By disaggregating the 'climate generation', this study reframes youth climate engagement as differentiated and relational, advancing debates on gender, justice, and agency in climate change education.

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youth climate engagement; gender differences; ecological agency; climate emotions; climate change education; secondary schooling in England

## 1. Introduction

Youth are frequently represented as a homogenous force for climate action—morally engaged, politically mobilised, and inherently empathetic towards 'green' issues. This 'climate generation' frame is prominent across media, activism, and policy discourse, where young people are celebrated for leading the charge on climate justice, often in contrast to perceived adult complacency (Department for Education (DfE) 2022;

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Han and Ahn 2020). From global school strikes to youth campaign activism, these depictions certainly bring youth voices to the forefront. In the process, however, they risk sliding into caricature, with little room to acknowledge the diverse realities of young people's lived experiences and potential for climate action. Scholars increasingly identify that casting youth as a singular, climate-conscious body risks effacing significant gender, class, race, and political distinctions (Corner et al. 2015; Stevenson, Peterson, and Bondell 2019; Hickman et al. 2021).

Robustly established gendered patterns illustrate the nuance: girls and young women consistently report more personal concern, responsibility, and pro-environmental orientation than boys and young men (Corner et al. 2015; Stevenson, Peterson, and Bondell 2019). However, they also have higher levels of climate-related anxiety and lower political agency (Ojala 2012; Hickman et al. 2021). What these findings suggest is that climate emotional labour is unequally distributed but not often acknowledged in education practice or policy. These patterns are not unique to England but have been observed cross-nationally, though how gender operates varies by level of development, urbanisation, and cultural context (Hunter, Hatch, and Johnson 2004; Echavarren 2023). Recent evidence suggests that gender gaps in environmental concern and pro-environmental behaviour persist across European settings (Zinober 2026), and that the relationship between climate anxiety and action itself gendered in ways that differ across contexts (Pinho 2025; Orkut and Perrin 2026). Ecofeminist scholarship offers one explanatory framework, linking women's heightened environmental concern to broader patterns of gendered care, vulnerability, and moral responsibility (Echavarren 2023). Within climate change education specifically, a growing body of scholarship calls for approaches attentive to gender, social justice, and the political dimensions of environmental engagement (Stapleton 2019; Trott et al. 2023). This study responds to those calls by examining how gendered patterns manifest in the everyday school experiences of young people in England—including those with gender-diverse identities, whose omission from existing research perpetuates the very homogenisation that the 'climate generation' framing has been critiqued for. Emerging work in queer ecology offers a relevant lens here, suggesting that gender-diverse individuals may experience environmental issues through a heightened attunement to precarity, interconnection, and justice (Russell 2013; Bazzul and Santavicca 2017). This framing may help contextualise the distinctive emotional intensity we observe among gender-diverse participants in our data.

Age differences add another dimension to youth climate participation variation. Early adolescents (ages 11–14 years) tend to be worried but short of socio-political solutions' comprehension and limited opportunities for civic engagement (Corner et al. 2015). In mid-adolescence (ages 15–18 years), students are more likely to articulate climate change as a systemic issue requiring collective, political intervention (Stevenson, Peterson, and Bondell 2019; Han and Ahn 2020). These developmental changes imply that students require progressive, age-appropriate learning opportunities that enable agency to be achieved through adolescence.

Despite growing international attention to these disparities, gaps remain in understanding how they unfold in everyday school contexts. Many studies focus on youth activism or out-of-school experiences, meaning the ordinary school settings where most young people encounter climate change education remain under-examined.

Furthermore, research almost exclusively compares ‘boys’ and ‘girls’, overlooking those with gender-diverse identities, who may experience environmental precarity and eco-emotional intensity in distinct ways (Garvey et al. 2019). Their omission continues the very homogenisation that the ‘climate generation’ narrative has been critiqued for.

These knowledge gaps are particularly salient in England. Secondary school climate change education is primarily embedded within science and geography curricula, where the emphasis is largely on scientific and conceptual learning (Dawson et al. 2022; Department for Education (DfE) 2013). Broader social, political, and justice-related dimensions are rarely addressed (Howard-Jones et al. 2021; Rushton, Walshe, and Johnston 2026). Following a period of limited policy attention, the Department for Education’s non-statutory Sustainability and Climate Change Strategy, launched in 2022, (Department for Education (DfE) 2022) signalled renewed ambition. However, the current implementation framework for the strategy—which focuses on extracurricular initiatives such as the National Education Nature Park and school-level support for sustainability changes through Climate Action Plans and the Climate Ambassadors Scheme (Department for Education (DfE) 2025d)—does not reliably shift daily curriculum or pedagogy (Rushton, Dunlop, and Atkinson 2025). There is also only limited funding for education settings to implement these programmes (Walshe and Rushton 2026); although many schools and other education settings have been able to access grant funding for extracurricular nature-based learning through the National Education Nature Park (2025), funding is open only to a relatively small number of eligible settings based on both a lack of access to nature and deprivation indicators (Department for Education (DfE) 2025c).

The recent Curriculum and Assessment Review (2025), commissioned by the Labour Government in 2024, has recommended further strengthening the place of climate change and sustainability education in some subjects (science, geography and design and technology), as well as the importance of pedagogy in ‘applying an engaging climate lens to existing curriculum content’ (Department for Education (DfE) 2025a, p.41). The review did not, however, make broader recommendations about widening the subjects in which themes of climate change and sustainability are taught (Ibid.). The Department for Education state that a new curriculum, responding to the recommendations of the Review, will be developed over the coming year and published in Spring 2027 for first teaching in 2028 (Department for Education (DfE) 2025b).

Meanwhile, young people in the UK continue to report feeling underprepared for climate-altered futures and insufficiently supported to find meaningful action pathways (Dunlop and Rushton 2022; Teach the Future n.d.). Educational scholars warn that positioning young people as de facto climate advocates without balanced structural accountability upholds unjust neoliberal expectations of youth responsibility (Dunlop and Rushton 2024). The pursuit of an equitable climate change education must, therefore, reflect real-life variations in emotional weighting and agency, using these disparities to underpin both the distribution of climate knowledge and support for climate action.

To address these concerns, we adopt an ecological understanding of agency (Biesta and Tedder 2007), which highlights how young people’s capacity to act is shaped by social relationships, environmental context, and available resources. Agency is thus viewed not as a fixed individual attribute, but as something achieved according to particular contexts—such as when schools enable students to explore various forms

of action and envisioning the future. While this approach to agency has been used to understand teachers' practice within climate change and sustainability education in England (Rushton, Dunlop, and Atkinson 2025; Walshe and Rushton 2026), its value in relation to students' diverse experiences remains less understood.

Guided by an interest in differentiated climate learning experiences, we explore three research questions:

1. How do levels of climate concern, emotional responses, and sense of agency differ by gender and age among secondary students in England?
2. How do gender and age shape students' understandings of climate action and their perceived opportunities for individual and systemic engagement?
3. How do students' reported school-based learning experiences differ by gender and age, and how are these linked to their climate attitudes and competencies?

By disaggregating the 'climate generation', this paper offers new empirical evidence of the differentiated emotional and participatory dimensions of youth climate engagement in a national school system. In doing so, we argue that equitable climate change education requires differentiated support across adolescence, such that evolving identities and forms of agency are recognised and brought into meaning for all young people.

### ***1.1. Agency as a conceptual framework***

Agency has become a prominent focus in educational policy and practice in England, particularly in relation to what children and young people should be able to do and become (e.g. Eteläpelto et al. 2013; OECD 2019). Yet, the meaning of the term is contested. By psychological accounts, agency appears as an individual capacity or trait that can be measured, developed, or 'activated' (e.g. Bandura 1986), while sociological perspectives shift attention to the social structures within which action becomes possible (e.g. Giddens 1984). Neither lens alone captures the complexities that arise when young people's aspirations meet institutional constraints nor locates responsibility justly between individuals and the structures that exist—an outcome which, as mentioned previously, can inadvertently conflate with neoliberal educational philosophy. By contrast, emergent approaches emphasise that agency is achieved in relation to context. Biesta and Tedder (2007) ecological model describes agency emerging from relationships between individuals and their environments: it is not merely what people bring with them, but what becomes possible with others and in particular moments. Emirbayer and Mische (1998) further describe agency as comprising three interrelated dimensions: iterational (shaped by past experience), projective (oriented to the future), and practical-evaluative (grounded in the present). The interplay of these dimensions helps explain why agency is not fixed, but a dynamic attribute determining what people believe they can do, with whom, and under what conditions.

This ecological approach is particularly important in climate change education. Much school-based provision continues to emphasise knowledge and personal responsibility over collective action and systemic change (Howard-Jones et al. 2021). Students may be told they are responsible for protecting the planet (e.g. through recycling and reducing waste) yet only rarely offered opportunities to think critically about

political systems or engage in decision-making. When young people are expected to solve climate problems without corresponding access to power or support, the outcome can feel punitive rather than empowering (Dunlop and Rushton 2024), translating to unjust pedagogy and perpetuating the ‘responsibilisation of young people’ (Irmeli Mustalahti et al. 2023). The tension between individual and systemic understandings of climate action is therefore not merely pedagogical but also political. Scholars of environmental and climate change education have argued that curricula emphasising personal behaviour change over collective or political action reflect and reproduce neoliberal assumptions about where responsibility for environmental problems resides (McKenzie 2012; Hursh, Henderson, and Greenwood 2015). This political dimension informs the second research question of this study.

Work examining teachers’ experiences of climate change and sustainability education in England has already shown how agency depends on school leadership, resources, and professional community (Rushton, Dunlop, and Atkinson 2025; Walshe and Rushton 2026). Yet we know far less about how students encounter these same enabling or constraining forces. A school may support teacher-led sustainability initiatives, while students remain largely peripheral or invited into action only as helpers rather than partners. Understanding agency ecologically helps us move beyond asking whether students care about climate change (most do) to asking whether they are supported to turn that concern into meaningful action. This perspective prompts us to situate agency within the broader network of relationships that make up a school—including curriculum, teachers, peers, leadership priorities, and the degree to which diverse voices and emotions are respected.

In this study, agency is therefore both an analytical lens and a matter of educational justice. We use it to interpret differentiated emotional, cognitive, and participatory experiences of climate change among secondary school students. It foregrounds the importance of both social identities (e.g. gender and age) and context (e.g. school organisation and curricular emphasis) for shaping possibilities to exercise agency. Accordingly, our analysis considers not only whether differences exist in students’ climate attitudes or emotions, but how school-based learning opportunities can either extend or curtail young people’s perception of what is possible in addressing the climate crisis.

## ***1.2. Climate change education in secondary schools in England***

At the present time, and ahead of the implementation of recent recommendations from the Curriculum and Assessment Review (Department for Education (DfE) 2025a), climate change education in England exists within a highly structured and assessment-driven curriculum. In secondary schools (ages 11–18 years), climate change-related content appears mainly in science (compulsory until age 16) and geography (compulsory until age 14) (Dawson et al. 2022; Department for Education (DfE) 2013). These subjects emphasise the scientific basis of climate change—such as greenhouse gas processes, environmental change, and human impacts—but rarely reference practical and political dimensions of climate action (Howard-Jones et al. 2021). As such, many students learn about climate change as a knowledge domain, but are ill-equipped to apply critical engagement, imagination, and collective action towards the topic. Recent critiques suggest this approach contributes to an

individualised conception of responsibility, where pro-environmental behaviours are perceived as personal lifestyle choices rather than shaped by wider social systems (Dunlop and Rushton 2022). While knowledge is essential, current climate change education may be failing to support students' understanding of climate justice, decision-making capabilities, or sustained hope in climate-altered futures.

The Department for Education's non-statutory Sustainability and Climate Change Strategy (Department for Education (DfE) 2022) has raised the profile for improving climate change and sustainability education in schools. Since its announcement, the Strategy has highlighted three initiatives: the National Education Nature Park to enhance access to nature-based learning; an extra-curricular Climate Leaders Award (formerly referred to as the Climate Action Award) to recognise students' engagement in sustainability; and Sustainability Leadership roles to encourage schools to appoint a Sustainability Lead and coordinate sustainability activity *via* a Climate Action Plan (Department for Education (DfE) 2022; Rushton, Dunlop, and Atkinson 2025). While the Nature Park is now operational, the Sustainability Leadership guidance remains voluntary: schools are encouraged, but not required, to appoint a Sustainability Lead or develop a Climate Action Plan, and no statutory framework underpins either initiative (Department for Education (DfE) 2025d; Rushton, Dunlop, and Atkinson 2025). The Climate Leaders Award, meanwhile, remains in development and, at the time of writing, has not been implemented. This uneven progress reflects a broader pattern in climate education policy, whereby school leadership is positioned as a key mechanism for embedding sustainability, but implementation depends largely on local capacity and commitment rather than statutory expectation.

These initiatives nonetheless represent an important symbolic recognition of climate change within national education policy, providing opportunities for some students to get outdoors, learn from real-world projects, and feel part of wider action. However, a strategy alone does not establish statutory curriculum or pedagogical requirements. Without guaranteed time, training, or funding, participation depends heavily on local priorities and limited volunteers (Rushton, Dunlop, and Atkinson 2025). Young people themselves report that climate change education still feels insufficient—especially when it comes to understanding political responsibilities or imagining how society could change (Walshe et al. 2024; Teach the Future n.d.). Many experience a gap between what they learn in school and the futures they expect to live through (Dunlop and Rushton 2022).

The emotional landscape of climate change education also remains largely undressed. Commonly reported feelings such as anxiety, anger, and despair can undermine students' engagement if left unsupported (Hickman et al. 2021). Yet schools do not routinely create space to address these emotions or recognise them as meaningful; emotional intensity is often regarded as a distraction rather than harnessed for action (Ojala 2012; Pihkala 2020). This absence matters for equity, as research shows climate emotions are not evenly distributed among young people. Critically, the point at which students become more aware of injustice and more curious about power structures is precisely the time many lose curricular contact with climate change; geography, for example, is often not studied beyond the age of 14 years. Whilst science remains compulsory until 16 years, what students learn about climate change may not be connected to their shifting identities or social concerns. Our study's

findings reflect this imbalance between what young people feel responsible for and what they feel empowered to change, as well as the ways in which education can reinforce this gap.

Together, these conditions mean that climate change education—and opportunities to achieve agency—are unevenly distributed. Some students find ways to engage deeply and feel part of collective solutions; others feel left to carry their concern alone. These differences are not random but adhere to patterns of gender and age that are already evident in wider research, and which this paper examines within the English school system. Whilst the DfE's Strategy (Department for Education (DfE) 2022) and the then-ongoing National Curriculum review (2024) are welcome indicators of progress, they arguably do not yet adequately reflect what is required during a formative educational period for young people. Our study responds to this need by looking at differentiated school-based experiences of students aged 11–14 years, when identities are solidifying, emotions are heightened, and they are beginning to question how society works. Understanding the conditions in which agency is enabled or constrained at this stage is crucial for building equitable and credible climate education—education that prepares all students to navigate, shape, and survive climate-altered futures.

## 2. Materials and methods

Within this section, we outline the data collection methods, participant profiles, ethical considerations, and study limitations, before providing a summary of the processes of data analysis.

### 2.1. Design and instrument development

Data were gathered from students in Years 7 to 9 (ages 11–14 years) between March and May 2024 using an online questionnaire hosted on Qualtrics. The survey was designed to be completed within approximately 30–40 min using a range of digital devices. Most students completed the questionnaire on personal laptops, tablets, or phones, either during the scheduled school session or independently at home. The questionnaire comprised 27 items organised into seven thematic sections: (1) all about you; (2) what do you think about climate change and sustainability?; (3) what do you do about climate change and sustainability in school?; (4) what do you think about climate change and sustainability in school?; (5) what would you like to learn about in relation to climate change and sustainability in school in the future?; (6) how do you feel about nature?; and (7) all about your life. Questions spanned multiple formats, including multiple-choice questions, Likert-type scales to gauge agreement or disagreement, frequency scales for specific activities, and open-ended text fields that allowed participants to share views, experiences, and definitions in their own words. The questionnaire's design, structure, and piloting process are described in detail elsewhere (Walshe et al. 2024).

This study draws specifically on responses to items related to students' attitudes and behaviours concerning climate change and climate change and sustainability education (CCSE) (see [Supplementary Material 1](#)). In addition, we draw on demographic

data, specifically gender (male, female, gender diverse [non-binary, prefer not to say, other and self-described]) and school year (7, 8 or 9).

Each research question aligns with specific survey items designed to capture the emotional, cognitive, and behavioural dimensions of students' climate responses. While the detailed statistical alignment is presented in [Table 1](#) (see Results), the methodological pairing is summarised here for clarity:

•RQ1 (Concern, emotions, agency): Q8 (climate beliefs); Q12 (emotional responses); Q13 (personal concern, sense of responsibility and empowerment)

•RQ2 (Understandings of climate action and opportunities): Q16 (opportunities for action in and beyond school); Q20 (learning interests)

•RQ3 (School-based learning experiences): Q18 (teacher influence and climate education experience)

This alignment guided subsequent statistical analyses and interpretation.

## 2.2. Participants and recruitment

A total of 2,429 student responses were submitted from schools across England (Walshe et al. 2024). Among those who provided demographic information (which

**Table 1.** Summary of t-test findings by research question.

| Research question                                       | Key gender findings                                                                                                                                                                                         | Key age findings                                                                                                                                                                                              | Implication                                                                                                                                                            |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RQ1: Concern, emotions, agency                          | Girls more often feel fear, anxiety, guilt, sadness, and helplessness (all $p < 0.001$ ). Boys more often feel 'brave' or 'happy'. Girls express greater responsibility, but no difference for empowerment. | Year 9 students report more despair and helplessness; Year 9 boys significantly more likely to report bravery. Responsibility rises with age, but empowerment does not.                                       | Gender is a stronger differentiator than age. Responsibility sans empowerment adds burden for girls; age amplifies this gap in Year 9.                                 |
| RQ2: Understandings of climate action and opportunities | Girls more engaged in family, whole-school projects, arts, fairness, wellbeing (many $p < 0.01$ ). Stronger interest in justice/systemic topics.                                                            | Year 9 students more interested in systemic issues (e.g. media critique and financial systems). Gender gaps widen with age, especially in fairness, wellbeing, arts, and intergenerational concerns.          | Gender differences consistent; age plays secondary role but amplifies disparities in older cohorts. Highlights need for nuanced approaches to engagement.              |
| RQ3: School-based learning experiences                  | Girls more likely to enjoy climate learning, want more, see it as personally important (all $p < 0.001$ ). Boys more likely to feel teacher and school support.                                             | Age effects weaker overall but more visible in Year 9, where gender gaps widen in positive school experiences and perceived influence. Some older students show greater cynicism alongside systemic interest. | Schools reproduce gender divides in climate learning and perceived agency; by Year 9 these divides are sharper, underscoring the need for equitable climate education. |

**Notes:** Only statistically significant results ( $p < 0.05$ ) are shown here. Year groups refer to Key Stage 3 secondary schooling in England (ages 11–14): Year 7 is the youngest cohort and Year 9 the oldest included in this study; where age trends are described, these run from Year 7 to Year 9.

was not compulsory), the age distribution was relatively balanced: 40% were in Year 7, 34% in Year 8, and 25% in Year 9. Gender representation included 56% identifying as girls, 43% as boys, and 1% as non-binary or gender diverse. In terms of ethnic background, 56% of participants identified as White, 25% as Asian or Asian British, 7% as Mixed, 5% as Black or Black British, and 4% as Arab. Regarding parental education, 64% of respondents indicated that at least one parent or carer had attended university.

All questions in the survey were voluntary, and therefore response rates varied. For questions relating to engagement with sustainability opportunities (Figure 5/ Question 16), we analyse only the responses of those who perceived themselves as having had access to an opportunity—consequently, these have a lower sample size of between 568 and 1219. For all other questions, our sample size ranged from 1657 to 1992. 92.4% of respondents stated a gender that was either Male or Female, and 99.5% provided their year group.

Recruitment was facilitated through teachers who volunteered their schools to participate. Surveys were distributed *via* class sessions as homework tasks, with no individual incentives offered other than the optional entry into a small prize draw.

### **2.3. Procedures and ethics**

Ethical approval for the study was granted by an Institutional Ethics Committee prior to the start of data collection. Written, informed consent was obtained from all participants at the outset of the survey.

Data handling adhered to the UK General Data Protection Regulation (GDPR) and the Data Protection Act (DPA) 2018, with all participant information anonymised prior to analysis. The purpose of the study and the voluntary nature of participation were explained clearly to all participants and teachers. Students were advised that choosing not to participate would have no effect on their school performance. Teachers were encouraged to debrief students after completion, given that some items touched on climate-related emotions and wellbeing.

### **2.4. Limitations of the study**

The data reflect the perspectives of students who chose to participate and should not be interpreted as representative of all secondary-aged students in England. Efforts were made to include schools with differing experiences of climate change and sustainability education and to engage full classes or year groups to capture a broad range of experiences. However, it is possible that teachers with a pre-existing interest in CCSE were more likely to administer the survey.

Although the optional prize-draw incentive aimed to encourage completion, students already interested in environmental issues may have been more inclined to take part. Because the online questionnaire was completed on personal devices and could be undertaken either during class or at home, the response environment likely varied across participants; differences in supervision, time, or peer influence may have affected engagement and response length. In addition, the self-report format and the online administration environment may have influenced response patterns.

Future iterations could standardise administration conditions or triangulate survey data with classroom observations to clarify how learning context shapes responses, while also extending sampling to younger and older cohorts or employing mixed-methods designs to explore the contextual and emotional dimensions of agency in climate education more deeply. Although we collected data on students' race and socioeconomic status, this paper does not consider intersectional analyses between these characteristics and gender; further research exploring these intersectionalities might provide a more nuanced understanding of the impact of social identities on student agency. Related research by members of the present team has separately examined socioeconomic variation in young people's climate attitudes in detail (Edwards, Perry, and Walshe 2025).

## **2.5. Data analysis**

Although participants could select from multiple gender options (male, female, non-binary, 'prefer not to say', 'other', and self-described), our main analysis focuses on male and female responses due to sample-size considerations. Within our analysis, we recognise gender not as a fixed demographic attribute, but a socially constructed and relational process shaped by social norms, expectations, and institutional contexts (Renold et al. 2017; Bragg et al. 2020). We acknowledge, therefore, that the fixed categories presented within our survey may not capture the fluidity or complexity of young people's lived experiences. We also recognise that using fixed survey categories, including binary labels, can unintentionally reinforce gender distinctions (Renold et al. 2017), so we interpret these findings as reported identity positions rather than complete descriptions of gender. Lastly, we acknowledge that 'prefer not to say' may encompass a heterogeneous group of respondents, including those who value privacy independently of gender identity. However, in adolescent school-based research, non-disclosure has itself been found to reflect uncertainty, discomfort, or negotiation around gender identity within institutional contexts (Renold et al. 2017). We therefore retained these responses within the broader gender-diverse category, while interpreting all findings from this group with particular caution.

We conducted independent-samples t-tests to measure significant differences between males and females, both in the cohort as a whole and within specific year groups, primarily conducting our analysis using R. For questions in which students were asked to state levels of agreement or disagreement with statements, 'agree' and 'strongly agree', and 'disagree' and 'strongly disagree' responses were bundled together to allow for more effective significance testing. We define 'significant' differences as those exhibiting p values less than 0.05.

Supplementary analyses compared gender-diverse students (non-binary and 'other' categories) with those identifying within the gender binary as a whole, and boys and girls respectively. Our 'diverse student' category includes students who reported their gender as non-binary or 'prefer not to say'; it excludes respondents who used the free-text field to input terms not corresponding to recognised gender identities (for example, 'croissant' and 'helicopter'). Following methodological guidance on mitigating 'mischievous responders' in adolescent research (Robinson-Cimpian 2014), the latter were excluded to preserve data integrity.

We acknowledge that aggregating non-binary and 'other' identities into a single 'gender diverse' category is an imperfect but necessary methodological step given small sample sizes. Findings are therefore interpreted cautiously.

### 3. Results

Our analysis of disaggregated gender- and age-based data highlights patterns shaping students' responses to the study's three central research questions. Using descriptive statistics, t-test comparisons, and visualisations, we examined the emotional, cognitive, and behavioural dimensions of how young people in England experience and respond to climate change. A synthesis of findings across all three research questions is provided in [Table 1](#), following the detailed results below.

#### 3.1. *Concerns, emotions, agency (RQ1)*

Across the sample as a whole, negative emotional responses to climate change were widespread: more than half of all respondents reported feeling sad, guilty, anxious, or afraid, and substantial proportions also reported helplessness and powerlessness ([Figure 1](#)). These patterns provide the backdrop against which the gender and age differences described below should be read.

We find clear evidence that gender strongly influences climate emotions and sense of responsibility, while age effects are weaker but detectable, particularly in how students frame climate change as a systemic versus individual issue. The extent of gender disparities also varies significantly by age. Differences in climate knowledge and beliefs were smaller and less consistent, though boys were marginally more likely to endorse the faulty view that climate change is 'slowing down naturally' ([Figure 3](#)).

Gender differences in emotional responses to climate change were pronounced. Girls consistently report higher levels of guilt (24pp difference), anxiety (16pp difference), fear (16pp difference), shame (15pp difference), sadness (15pp difference), anger (13pp difference), helplessness (12pp difference) and powerlessness (10pp difference) in relation to climate change than boys ([Figure 2](#)). Conversely, boys were more likely to state that climate change made them feel brave (6pp difference), uninterested (5pp difference), optimistic (4pp difference) or happy (4pp difference). The only emotional responses that did not exhibit significant disparity between boys and girls to a  $p < 0.05$  level were feelings of depression or empowerment.

Some variation in emotional responses was also evident across age groups. Among boys, those in Year 9 were 12pp more likely to report feeling uninterested in climate change, 5pp more likely to report feeling happy, and 8pp less likely to report guilt than Year 7 boys. Among girls, Year 9 students were 10pp less likely than Year 7 to report feeling sad, and significantly less likely to describe themselves as feeling brave in relation to climate change.

#### 3.2. *Understandings of climate action and opportunities (RQ2)*

Overall levels of interest in learning about climate change and sustainability topics were high across the sample ([Figure 4](#)). For the most popular themes, such as climate

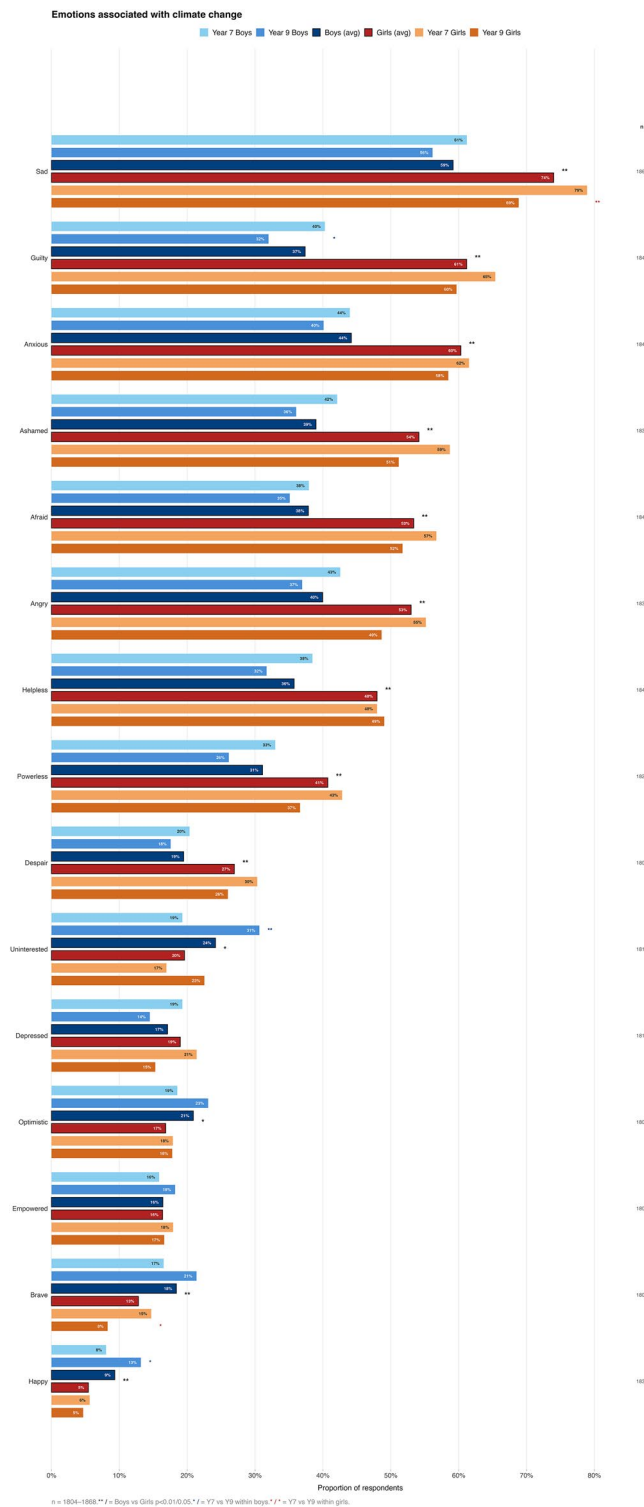
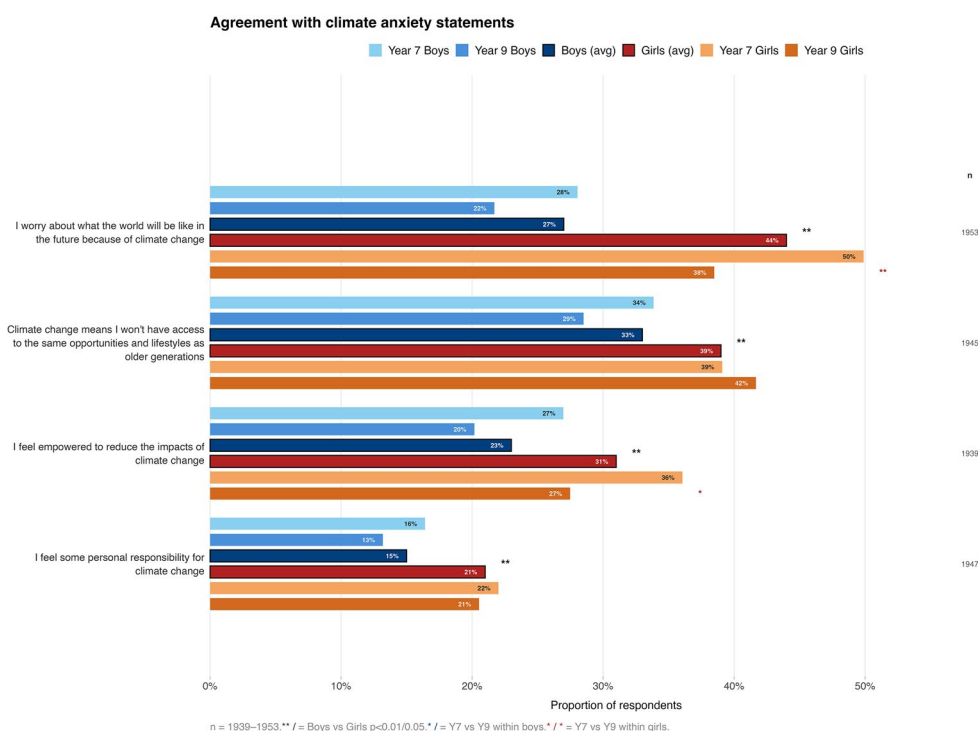


Figure 1. Question 12 — emotional responses.



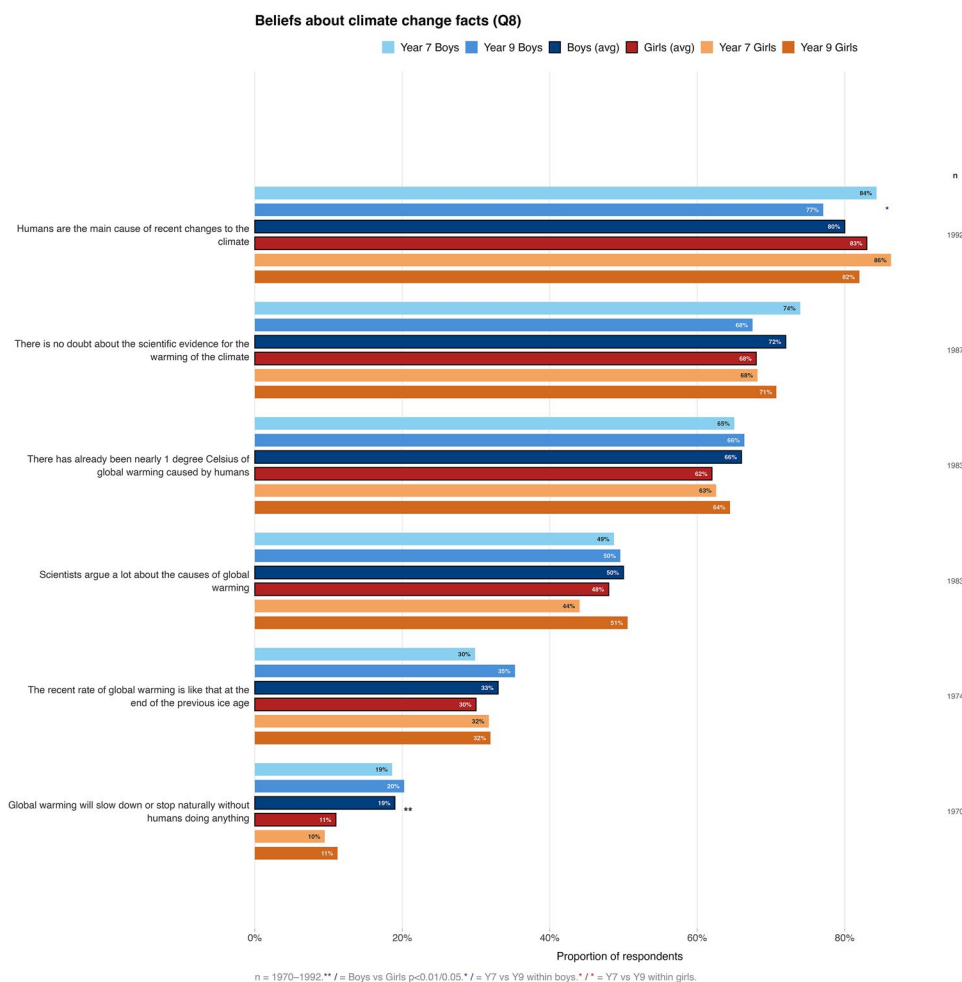
**Figure 2.** Question 13 — personal concern, sense of responsibility and empowerment.

change and impacts on future people and global impacts of climate change, more than two-thirds of all respondents expressed interest, irrespective of gender. The gender and age differences described below operate within this broadly engaged baseline.

We find significant gender-based differences in students' stated preferences for learning about themes related to sustainability and climate change. For each theme, participants answered 'Yes' or 'No' to whether they would like to learn more about it.

Across every theme surveyed, girls were more likely than boys to express interest in learning about the topic. All but one of these disparities were statistically significant to a  $p < 0.05$  specification; the exception was 'indigenous knowledge and practice', which reached significance at  $p < 0.1$ . Though the differences varied in magnitude, there was no year group in which boys were more likely than girls to want to learn more about any of the fifteen proposed themes. This pattern suggests a consistently higher baseline appetite among girls for engagement with climate change and sustainability learning.

Across all year groups, the greatest gender gaps were observed in preferences for learning about sustainability and climate change through the arts (58% of girls versus 43% of boys), the intersection between climate change and human health and well-being (75% of girls versus 60% of boys), and the impacts of climate change on future people (80% of girls versus 66% of boys). The smallest gender differences appeared in preferences for learning about indigenous knowledge and practice (51% of girls versus 47% of boys;  $p < 0.1$ ), the links between books studied and climate change (48% of girls versus 42% of boys), and how to engage critically with news and social media (52% of girls versus 47% of boys).



**Figure 3.** Question 8 — climate beliefs.

Age accentuated some of these patterns. Students in Year 9 exhibited the largest gender gaps overall: while the mean difference across themes was 9pp for Year 7s and 10pp for Year 8s, it rose to 13pp for Year 9s. Among Year 9 respondents, 83% of girls reported wanting to learn about the impact of climate change on future people compared with 62% of boys. Similarly large gaps appeared for learning about sustainability and climate change through the arts (19pp difference), links between climate change and human health and wellbeing (18pp difference), protecting the natural environment (15pp difference), and issues of fairness and climate change (15pp difference). Among Year 7s, the greatest disparity appeared in interest in local climate impacts (72% of girls versus 58% of boys), and among Year 8s, in human health and wellbeing (74% of girls versus 59% of boys).

We also surveyed students' perceived opportunities to take action related to climate change. For each activity, participants indicated whether they had not had the opportunity, had the opportunity but not participated, or both had the opportunity and participated. Here, we analyse only disparities among those who reported having a

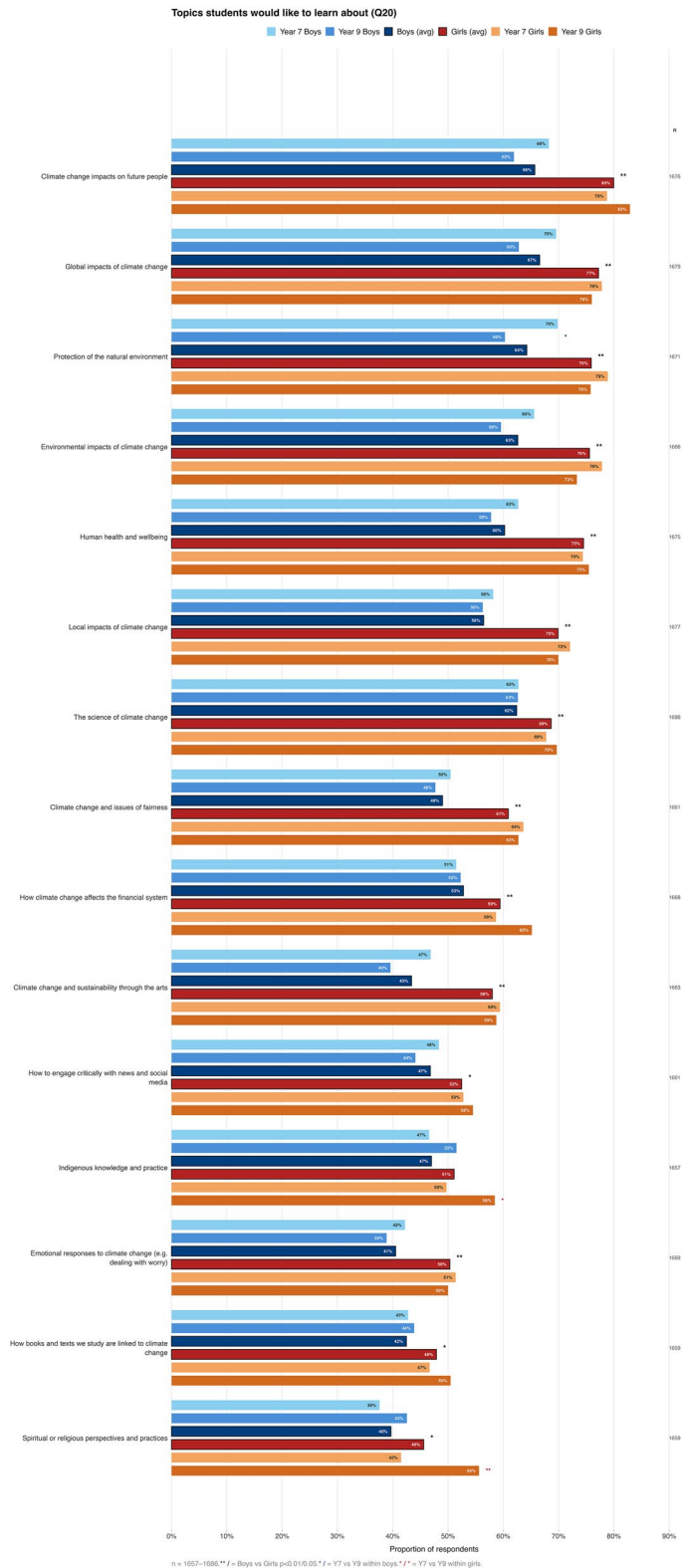


Figure 4. Question 20 — learning interests.

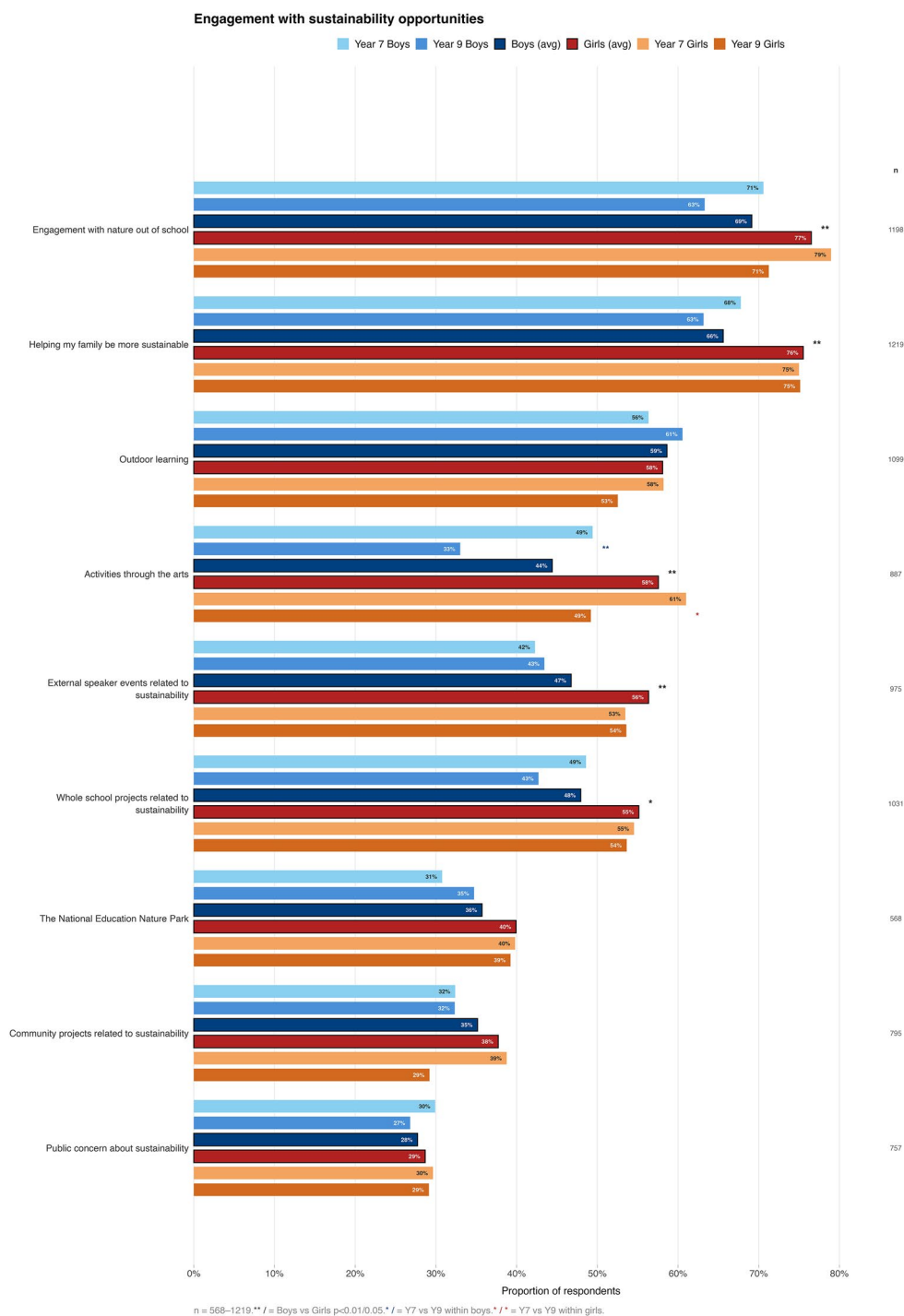


Figure 5. Question 16 — engagement with opportunities for action in and beyond school.

given opportunity, while recognising that perceptions of opportunity themselves may differ in ways our data cannot capture.

No significant gender differences were found in uptake of perceived opportunities for outdoor learning, community projects, public advocacy about climate change, or activities linked to the National Education Nature Park. Where differences did emerge, boys were consistently less likely to report engagement. Among those who perceived themselves as having opportunities, boys were 13pp less likely than girls to participate in arts-related initiatives, 10pp less likely to have helped family members adopt sustainable practices, 10pp less likely to engage with external speakers, and 7pp less likely to participate in whole-school projects.

Taken together, these patterns suggest that while boys and girls may encounter similar formal opportunities, the motivations, perceived relevance, and emotional investment that underpin engagement appear to diverge—echoing wider gendered patterns in climate concern and agency identified elsewhere in this study.

### ***3.3. School-based learning experiences (RQ3)***

Across the full sample, large majorities of students agreed that it is important to learn about climate change and sustainability, and that they knew what they could do to look after the environment (Figure 6). The disparities described below therefore reflect differentiation within a generally engaged cohort, rather than widespread disengagement.

We identified clear disparities in students' responses to descriptive and normative questions about climate action, both within school contexts and more broadly. Students indicated whether they strongly agreed, agreed, neither agreed or disagreed, disagreed or strongly disagreed with a series of statements. Our analysis compares the proportions of students from each gender group who agreed or strongly agreed.

Girls were 20pp more likely than boys to state that they would like to do more to look after the environment, 15pp more likely to believe that learning about climate change will help them in their daily life, 13pp more likely to want to learn more about climate change, and 11pp more likely to report that they enjoy learning about it. Girls also expressed greater confidence in their understanding of how to care for the environment: 72% of girls stated that they knew what they could do to look after the environment compared with 61% of boys. Some of these disparities were compounded by age. The gender gap in students' desire to do more for the environment widened from 18pp in Year 7 to 23pp in Year 9. In contrast, for statements such as 'I enjoy learning about climate change and sustainability', the difference narrowed with age, from 14pp in Year 7 to 3pp in Year 9. This may suggest that while interest in climate learning remains high among young girls, older students of all genders encounter broader curricular or motivational constraints that temper enjoyment.

Results concerning perceived influence within school settings were particularly notable. Across all year groups, boys were 6pp more likely than girls to state that their teachers listened to them about climate change—an effect more pronounced in Year 8 (15pp) but reversed in Year 9 (3pp); Year 9 girls were marginally more likely (3pp) to feel heard. Across all year groups, however, boys were more likely to report that they could influence their school's response to sustainability and climate change.

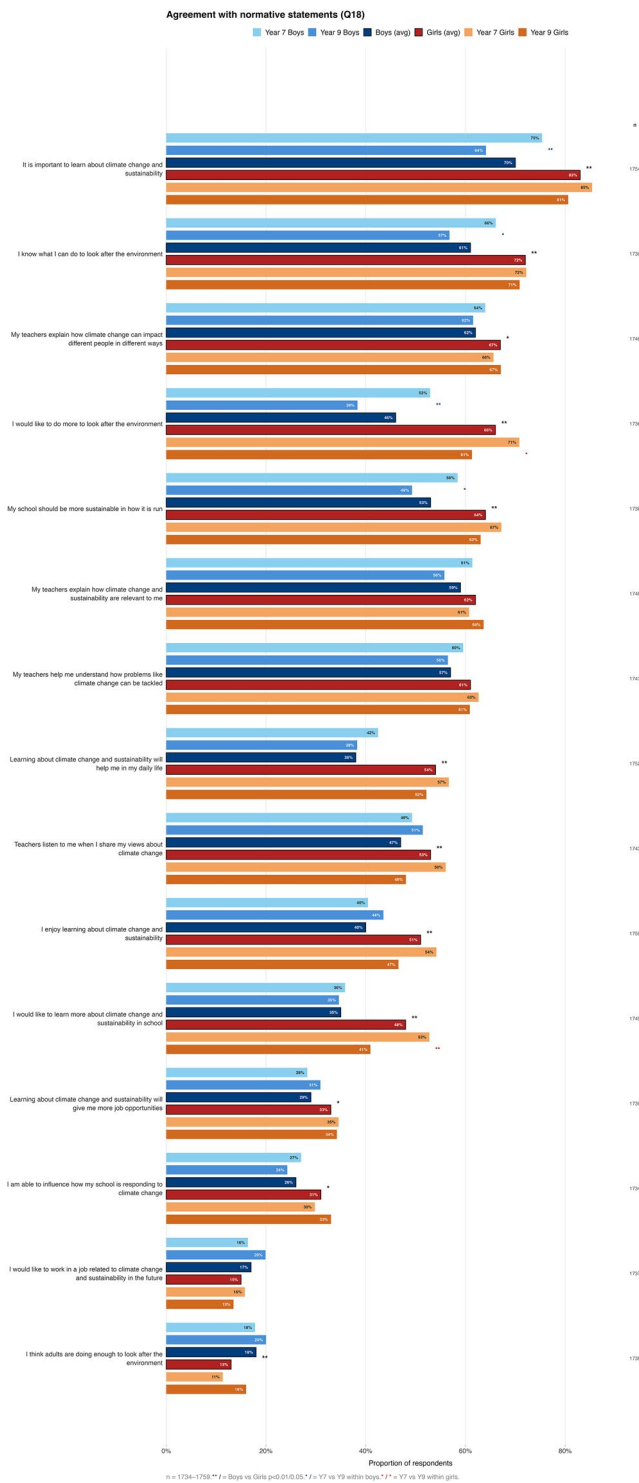


Figure 6. Question 18 — teacher influence and climate education experience.

This gap was largest in Year 9, where 33% of boys compared with 24% of girls stated that they had influence over their school.

Taken together, these results indicate that despite girls reporting greater concern, guilt, and anxiety about climate crisis (RQ1), and a stronger inclination towards learning and engagement (RQ2), their sense of influence and institutional recognition appears more limited. This points to an emerging pattern in which structural factors and self-perception constrain girls' realised agency in school-based climate action—particularly in later adolescence, when students become more aware of decision-making hierarchies within educational settings.

### **3.4. Summary of results**

To support interpretation, [Table 1](#) consolidates the most robust t-test results by research question, highlighting where gender and age differences were most pronounced. Gender differences were more consistent and statistically significant across emotional responses, engagement opportunities, and school-based learning, whereas age differences were selective and often amplified in Year 9. These patterns reinforce the central argument of the paper: the so-called 'climate generation' is differentiated, with gender emerging as the stronger axis of division and age serving to intensify these divides during later adolescence.

### **3.5. Disparities among non-binary/gender diverse students**

While gender differences between boys and girls dominated across most measures, additional disparities emerged when comparing gender diverse students with binary peers. Gender diverse students were far more likely to report negative emotional responses to climate change: 52% reported feeling depressed (vs. 18% of binary students,  $p < 0.001$ , Cohen's  $d = 0.86$ ), 49% powerless (vs. 36%,  $p < 0.05$ ), and 40% despair (vs. 24%,  $p < 0.01$ ). At the same time, they also reported higher rates of positive emotions such as empowerment (31% vs. 16%,  $p < 0.01$ ) and bravery (29% vs. 15%,  $p < 0.01$ ). This suggests that climate change is more emotionally salient—both distressing and motivating—for gender diverse students.

In terms of educational engagement, gender diverse students were substantially more likely to report participation in whole-school climate projects (81% vs. 52%,  $p < 0.01$ ) and to express interest in learning about climate change through spiritual and indigenous perspectives, the arts, and critical media engagement. These differences were not marginal but consistent across measures, with moderate-to-large effect sizes (Cohen's  $d$  ranging from 0.3 to 0.6).

Notably, disparities between males and gender diverse students were greater than those between female and gender diverse students (25 vs. 14 significant variables). This indicates that males are the least aligned with gender diverse peers' experiences, while females are somewhat closer, though still significantly different. Taken together, these findings reinforce that the most pronounced divides in our sample are not only along male-female lines but between binary and gender diverse identities. Rather than treating gender-diverse students as a marginal category, their responses help illuminate the instability of gendered norms around climate engagement (Halberstam

2018). Their emotional intensity and holistic engagement challenge binary patterns and highlight gender as a dynamic social process. However, given the small number of gender-diverse respondents, these patterns should be interpreted as indicative, rather than representative.

## 4. Discussion

This discussion interprets the empirical patterns outlined above and considers their implications for climate change education. It examines how unequal emotional burdens, widening disparities with age, and uneven access to empowering opportunities in schools shape students' sense of agency and belonging within the 'climate generation'. The findings challenge the idea of a unified cohort of environmentally conscious youth and instead reveal differentiated affective and educational experiences structured by gender identity and developmental stage.

### 4.1. *Gendered and age-based differentiation*

Our results demonstrate that gender is the most powerful differentiator of students' climate emotions and engagement, with age amplifying these divides during later adolescence. Girls consistently reported stronger emotional responses to climate change—particularly guilt, fear, and helplessness—while boys expressed lower concern and a greater tendency toward emotional detachment or optimism. These findings echo earlier research linking gendered socialisation to emotional expression and moral responsibility in environmental contexts (Ojala 2012; Corner et al. 2015; Hickman et al. 2021). Yet, in this study, emotional intensity does not translate directly into agency. Girls' higher sense of responsibility is not matched by a corresponding sense of influence, suggesting a form of responsibilised climate citizenship (see Mustalahti et al. 2023) in which affective labour and moral burden fall disproportionately on those least empowered to act. These patterns also reflect wider gendered norms within schools, where emotional expressiveness, care, and responsibility are often feminised, while influence and authority are more readily afforded to boys (Bragg et al. 2020).

Including gender-diverse students further complicates the picture. These students reported the strongest emotional responses—higher levels of climate-related depression, despair, and powerlessness, while also showing higher empowerment and bravery. Their educational priorities also diverged: they expressed greater interest in spiritual and indigenous knowledge, interconnection with nature, and critical engagement with news and media. These findings suggest that gender-diverse students not only feel climate change more intensely but also interpret it through more holistic and justice-oriented lenses. However, the pronounced emotional toll reported by this group signals the need for schools to create psychologically safe and identity-affirming spaces for climate change education.

Importantly, the disparities between males and gender-diverse students were greater than those between females and gender-diverse students, implying that gendered social norms surrounding emotional expression, care, and moral responsibility continue to shape young people's climate responses. Addressing these layered inequities requires recognising both the disengagement that some boys experience and the

over-responsibilisation experienced by girls and gender-diverse students. A justice-oriented approach to climate change education must, therefore, be attentive to who is carrying the emotional and motivational load and whose voices are legitimised in the process.

#### ***4.2. Implications for school-based climate change education***

This study situates these dynamics within the framework of climate change education, emphasising that emotional intensity is not synonymous with agency. Girls' greater anxiety and moral concern coexist with reduced feelings of influence in school decision-making. This misalignment highlights the need for educational approaches that pair affective support with genuine opportunities to achieve agency. Climate change education that only heightens awareness or anxiety—without connecting emotions to meaningful collective action—risks deepening rather than alleviating distress.

Schools thus face a dual task: supporting emotional wellbeing while expanding students' capacity to act. An ecological conception of agency (Biesta and Tedder 2007) helps illuminate how this might be achieved. Agency is not a personal trait, but something achieved through the interaction of individuals, relationships, and institutional contexts. In the present study, girls' and gender-diverse students' strong motivation to engage coexists with constrained contexts for action, suggesting that their ecological conditions for agency remain limited. Conversely, boys' higher perceptions of influence may stem from social positioning rather than deeper engagement. Both tendencies underscore the relational nature of agency: it is something young people achieve, or struggle to achieve, within the social and material conditions of their school.

These findings resonate with wider debates across climate change education policy in England. The Department for Education's Sustainability and Climate Change Strategy (Department for Education (DfE) 2022) has raised visibility for climate issues but has not yet delivered a statutory framework capable of addressing emotional and equity dimensions. Its initiatives—particularly the as yet unimplemented Climate Leaders Award—remain largely voluntary and resource-dependent, placing the onus on individual schools and teachers. Recent recommendations from the Curriculum and Assessment Review (Department for Education (DfE) 2025a) also highlight the potential of citizenship education to support political literacy, deliberation, and participatory skills, yet this remains an underutilised space for developing the justice-oriented and agency-enhancing dimensions identified in our findings. Without systemic investment in teacher training and curriculum development, the affective and justice-oriented aspects of climate change education remain underdeveloped and largely absent from statutory provision. Young people's testimonies of insufficient preparation for climate-altered futures (Teach the Future n.d.; Dunlop and Rushton 2022; Walshe et al. 2024) echo this study's evidence that emotional concern is not matched by institutional support or participatory space.

To move beyond awareness-raising, schools need pedagogies that normalise emotional expression, foster solidarity, and connect personal feelings of anxiety or guilt with systemic understandings of power and responsibility. Teachers and school leaders should have access to professional learning that equips them to engage with climate

emotions, facilitate participatory practices, and navigate the politics of sustainability traditions. Such preparation would enable educators to translate concern into collective action rather than individualised worry. Integrating affective literacy and justice frameworks into climate change education is not an optional supplement—it is fundamental to enabling agency equitably across diverse learners.

### **4.3. Towards equitable climate change education**

This study provides one of the first large-scale, school-based analyses in England to disaggregate young people's climate attitudes and emotions by both gender (including gender-diverse identities) and age. It empirically substantiates calls for intersectional and justice-oriented approaches to climate education (Stevenson et al. 2019; Han and Ahn 2020). The findings indicate that disparities in climate engagement are not primarily cognitive; they do not reflect deficits in knowledge, but rather differences in emotional experience, perceived agency, and the ecological conditions that support participation.

What this requires, in practice, is curricular and institutional change. Schools can create more equitable climates of learning by:

1. Embedding learning about climate change across school subjects, including arts and social studies, where emotional and ethical reflection can be explored;
2. Structuring participatory opportunities (e.g., student-led sustainability councils, community projects, or partnerships with industry) that make achieving agency tangible; and
3. Ensuring pastoral, wellbeing and safeguarding frameworks explicitly acknowledge climate emotions and provide safe spaces for discussion.

Policy frameworks must also continue to evolve such that they create the conditions through which young people can achieve agency in relation to climate and other environmental concerns. Climate change education strategies should prioritise emotional literacy, social justice, and collective action alongside scientific understanding. This aligns with the ecological view of agency underpinning this study, recognising that young people's capacity to act is contingent upon supportive relationships, resources, and institutional trust.

Finally, the open-ended responses collected in this survey—which are not analysed in the present paper—reveal rich qualitative insights into students' emotional landscapes and their visions for climate futures. These warrant separate, deeper analysis. Future research could build on this dataset to explore how affective narratives evolve through adolescence and how school contexts can better mediate between personal emotion and civic empowerment.

Looking ahead, a next phase of our research will extend this analysis to 14-19-year-olds from across the UK through a mixed-methods study planned for 2026. This continuity will help establish a longer-term research agenda on differentiated experiences of climate change education in the UK, bridging empirical evidence and policy dialogue.

## 5. Conclusion

Overall, the findings unsettle the notion of a homogenous ‘climate generation’. Instead, they depict a diverse cohort in which gender identity and age profoundly shape how young people feel, learn, and act on climate change. Emotional intensity, while a source of empathy and motivation, can become burdensome when unaccompanied by agency. Recognising and responding to these differentiated experiences is not only a matter of educational equity but also a prerequisite for cultivating a generation capable of shaping just and sustainable futures.

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## Author contributions

CRedit: **Joy Perry**: Conceptualization, Writing – original draft, Writing – review & editing; **Will Wale**: Conceptualization, Investigation, Writing – original draft, Writing – review & editing; **Nicola Walshe**: Conceptualization, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing; **Elizabeth A. C. Rushton**: Conceptualization, Writing – original draft, Writing – review & editing.

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## Data availability statement

The data that support the findings of this study are available from the corresponding author, JP, upon reasonable request.

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