

Article

Young Adults' Feelings and Knowledge of Climate Anxiety

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ABSTRACT

This study investigates the impact of climate anxiety on young adults' consumer and social behaviour. Data were collected via a questionnaire survey among 696 university students from Széchenyi István University, Budapest Metropolitan University, and Neumann János University. The survey focused on various aspects of climate anxiety, including its frequency, intensity, perceived life impact, emotional responses, and management strategies. The analysis, supported by AI tools, identified two distinct clusters: one with moderate anxiety levels and a strong interest in learning about climate change, and another with higher anxiety levels but less desire for further information. Various statistical models, including Naive Bayes, logistic regression, and random forests, were employed to identify behavioural patterns, with decision trees showing the lowest classification error. The study highlights the significant influence of climate anxiety on the shift towards sustainable consumption and active engagement in climate action. Recommendations for future research include the broader application of deep learning models and extending the study to other demographic groups. Longitudinal data collection is also suggested to track long-term trends and inform effective public policy and communication strategies. The findings emphasise the need for comprehensive approaches to understanding and addressing climate anxiety's societal impacts.

Open Access

Received: 26 November 2024

Accepted: 31 March 2025

Published: 6 May 2025

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KEYWORDS: climate anxiety; AI analysis; sustainable development; climate change

INTRODUCTION

In the recent period, global economic growth was noteworthy due to the low cost of natural resources. In addition, with the growth of the world's population, energy consumption has also increased significantly, which has played a significant role in climate change [1]. Fortunately, the EU countries have realized that in order to protect the climate, their energy strategy needed to be based on renewables [2]. Global climate

changes and their related socio-environmental impacts elicit heightened emotional responses among young adults. The timeliness and importance of this research are justified by the dramatic effects of climate change and the increasing societal responses to these effects. Economic and ecological systems are closely interconnected on both global and regional levels, offering numerous significant research topics within environmental economics. This study aims to support the development of novel theories, empirical applications, and appropriate policy recommendations. Additionally, the connection of this research to economics lies in the fact that climate anxiety can influence consumer behaviour, labour market decisions, economic outlooks, and the long-term decisions of economic actors.

This study is particularly important because it focuses on a relatively under-researched aspect: the connection between climate anxiety and sustainable consumer behaviour, which holds increasing social significance among young adults. While most prior research has primarily addressed general attitudes toward climate change or political participation [1], few studies examine how climate anxiety influences everyday consumer decisions and the pursuit of sustainability. The novelty of this paper lies in its use of various statistical models and AI-supported cluster analysis to explore the impact of climate anxiety on sustainable behaviour development. Additionally, the research targets a unique demographic, focusing on university students, whose decisions may significantly shape long-term sustainability trends. This study contributes to future public policy and economic decision-making by improving our understanding of societal responses to climate change and consumer behaviour.

UNDERSTANDING THE MEANING OF CLIMATE ANXIETY

Climate anxiety (the worry and fear in response to climate change) is becoming increasingly common among young adults. The growing interest in this topic is driven by climate change becoming a more significant global issue over the past decades, causing anxiety and concern across various segments of the population, including young people [1]. The climate anxiety observed among the younger generation is particularly concerning as their decisions and behaviours can substantially impact the future [2].

The climate anxiety experienced by young people has significant social and economic implications, particularly in consumer behaviour. Individual and collective anxiety often leads to changes in consumption habits, resulting in increased demand for sustainable products and services [3,4]. These changes are noticeable at the individual level and can trigger broader economic trends [5].

Efforts to reduce ecological footprints include the growing demand for organic foods, which can lead to changes in agricultural production and market structures [4]. Interest in sustainable fashion is also increasing,

potentially introducing new standards and practices in the textile industry. Additionally, the rising demand for green technologies, such as renewable energy sources, electric vehicles, and energy-efficient household appliances, can have long-term economic impacts, including the emergence of new industries and the transformation of the labour market [6–8].

From an economic perspective, it is particularly important to understand how climate anxiety influences consumer preferences and market demand [9]. Prioritising sustainability considerations can lead to new market dynamics, reshaping corporate strategies and innovation directions. Understanding young people’s climate awareness and related consumer behaviour is, therefore, essential for developing economic policies and business strategies aimed at supporting sustainable development and mitigating the effects of climate change [10,11].

As a result of climate anxiety, more individuals are adopting a “minimalist” lifestyle, which includes rejecting excessive consumption, achieving greater harmony with nature, and reducing waste and energy use. The growing interest in minimalism aligns well with sustainability efforts, as this lifestyle can significantly reduce one’s ecological footprint and promote environmental protection [12,13].

Some young people, driven by climate anxiety, are also actively combating climate change. This is manifested through participation in protests, climate action events, and joining environmental organisations. These activities not only build community solidarity but also put pressure on policymakers, helping to tighten environmental regulations and policies [14].

According to scientific literature, the relationship between climate anxiety and sustainable consumer behaviour is complex. Not all young people respond to anxiety by adopting sustainable consumption habits. Some studies indicate that anxiety paralyses rather than motivates action in some individuals. This phenomenon is often called “climate apathy”, where excessive anxiety and the accompanying sense of helplessness lead to passivity [15,16].

On the other hand, those who actively respond to the challenges of climate change often develop more sustainable lifestyles and consumption habits. Besides minimalism, practices such as preferring local products, using environmentally friendly modes of transportation, and prioritising community sharing and recycling are becoming more widespread. These changes also generate long-term economic impacts by encouraging the emergence of new markets and business models [17].

While the growing body of literature acknowledges the importance of climate anxiety, few studies specifically investigate its influence on consumer behaviour and decision-making among young adults. Most existing research either focuses on general psychological effects or environmental activism [3,5,10,11], neglecting how this anxiety translates into concrete behavioural patterns in the marketplace [4]. This study aims

to address this gap by exploring how climate anxiety shapes sustainable consumption habits among young adults, particularly university students, who are a key demographic for future sustainability transitions.

The research is guided by the following research questions:

1. How does climate anxiety influence young adults' sustainable consumption behaviours?
2. Are there identifiable clusters within this demographic that exhibit different levels of climate anxiety and engagement with sustainable practices?
3. How do young adults' emotional responses to climate change correlate with their willingness to act, both individually and collectively?

By answering these questions, the study aims to advance the understanding of how climate-related psychological stressors impact economic behaviour and to provide valuable insights for policymakers and businesses aiming to engage with eco-conscious consumers.

This research extends the current understanding of climate anxiety by linking it directly to economic behaviours and market dynamics. By exploring how anxiety-driven consumer choices influence sectors such as green technologies, sustainable fashion, and organic products, the study offers practical implications for businesses aiming to align with sustainability goals and for policymakers focusing on promoting sustainable consumption among younger generations [9,17].

ECONOMIC AND SOCIAL IMPACTS

Climate anxiety, especially among young people, has significant economic impacts that directly influence markets and industries. Alongside the shift towards sustainable consumption, sustainable investments are also gaining more attention. The popularity of ESG (Environmental, Social, and Governance) funds is increasing, and they aim to incorporate environmental and social considerations into investment decisions. This trend not only affects financial markets but also the companies striving to meet these sustainability expectations [18,19].

Some studies suggest that climate anxiety may contribute to the growing demand for green innovations and technologies. The rising interest in electric vehicles, energy-efficient household appliances, and renewable energy sources can stimulate the development of companies producing these products. The resulting new markets and industries can contribute to economic growth while reducing environmental impact [20,21].

Sustainable tourism is also becoming increasingly popular as young people choose their travel destinations and methods more consciously. Green tourism, which emphasises eco-friendly accommodations, supporting local economies, and preserving natural resources, creates new business opportunities in the tourism industry [22,23]. Sustainable tourism is also becoming increasingly popular as young people choose

their travel destinations and methods more consciously. Green tourism, which emphasises eco-friendly accommodations, supporting local economies, and preserving natural resources, creates new business opportunities in the tourism industry [22–24].

SOCIAL AND POLITICAL PARTICIPATION

The social impacts of climate anxiety are significant, particularly concerning community and political participation. Young people increasingly recognise that combating climate change requires individual, community, and systemic solutions. This awareness often leads to political activism and involvement in community movements [25].

Climate change protests, such as the Fridays for Future movement initiated by Greta Thunberg, have become global phenomena, providing a platform for many young people to express their views and call for change. These movements not only draw attention to the climate crisis but can also achieve real political and social changes, including implementing stricter environmental regulations and developing sustainability policies [26].

MENTAL HEALTH

While the positive effects of climate anxiety include the development of more sustainable consumption habits and political activism, it is important to note that excessive anxiety can also have negative impacts on mental health. Constant worry and feelings of helplessness can lead to anxiety disorders, depression, and other mental health problems. Mental health professionals increasingly recognise the significance of climate anxiety and are working to provide appropriate support for those struggling [5,27].

Community support and access to mental health services play crucial roles in addressing climate anxiety. Community initiatives, such as climate clubs and support groups, allow young people to share their concerns and find common solutions. Additionally, educational institutions increasingly acknowledge the importance of climate anxiety and integrate sustainability topics into the curriculum to prepare young people for future challenges [28].

MATERIALS AND METHODS

The questionnaire was newly developed, and we included 30 questions to find all the possible answers to the predefined research questions. The survey was conducted using the Qualtrics online platform, which allowed for secure data collection and comprehensive response management. The platform was chosen due to its capacity for customizable survey logic and data validation options, ensuring high data reliability. We asked as much classes as possible in these three universities; therefore, the number of participants were 696 students.

The study utilized a structured 30-item questionnaire designed to assess various aspects of climate anxiety and related behaviors. The questionnaire covered the following key sections:

1. Frequency and Intensity of Climate Anxiety

- “How often do you feel anxious about climate change?” (1 = never, 5 = always)
- “How strong is your climate anxiety?” (1 = I do not feel anxious, 5 = very strong anxiety)

2. Perceived Impact of Climate Change on Personal Life

- “How does climate change affect your life?” (options: very negative–very positive)
- “Which events trigger your climate anxiety the most?” (e.g., natural disasters, environmental news, etc.)

3. Emotions and Psychological Responses

- “To what extent do you experience the following emotions due to climate change?” (anxiety, fear, irritability, sadness, helplessness, confusion, anger, indifference—measured on a Likert scale)

4. Coping Strategies for Climate Anxiety

- “Which actions help you manage climate anxiety?” (e.g., relaxation techniques, environmental actions, community involvement, consulting a psychologist)

5. Intentions and Climate-Related Behavior

- “How do you participate in public discussions about climate change?” (e.g., attending demonstrations, sharing information on social media)
- “What actions do you take to combat climate change?” (e.g., recycling, purchasing eco-friendly products, using sustainable transportation)

6. Sources of Climate Change Knowledge

- “Where do you obtain information about climate change?” (e.g., news, environmental organizations, friends, educational institutions, social media)

7. Demographic Information

- Gender, age, university affiliation, educational background, occupation

The respondents included students from Széchenyi University, Metropolitan University, and Neumann János University. These institutions were selected for their openness to collaborative research and their willingness to participate in the study, providing a sample of young adults currently enrolled in higher education. Before the full implementation, the questionnaire was pre-tested with a small group of

students to identify any potential issues with wording or understanding. This pilot test allowed for refinements to be made, ensuring the survey's reliability and validity. Exclusion criteria involved incomplete responses and the submission of duplicate entries, which were automatically identified and removed through the survey platform's built-in validation tools.

To ensure data quality, multiple strategies were employed, including:

- attention-check questions placed at random intervals,
- removal of respondents with a completion time significantly shorter than the median duration, and
- screening for straight-lining patterns in responses. These measures aimed to identify and minimize the risk of low-effort or fraudulent responses.

The dataset used in this study consisted of responses from 696 university students across three institutions, representing a specific demographic of young adults. While the sample size may appear limited compared to larger national datasets, it was deemed appropriate for the study's exploratory objectives, which focus on identifying patterns of climate anxiety and behavioral tendencies within a well-defined population segment. The selected sample size allowed for the application of multiple statistical models and the identification of significant clusters without compromising statistical power. Additionally, the sample was diverse across gender and institutional representation, further supporting the reliability and relevance of the results within the scope of this study. Future research could expand the dataset to include broader demographic groups to enhance generalizability.

CONVENIENCE SAMPLING LIMITATIONS

The study employed convenience sampling, which was primarily due to the willingness of these universities to collaborate. While convenience sampling has limitations—such as the potential for sample bias and lack of generalizability to the broader population—it was deemed appropriate given the exploratory nature of this research. To mitigate these limitations, the study aimed to include a broad and diverse sample of students across multiple universities and disciplines. Future research could benefit from a more representative sampling approach, such as stratified random sampling, to improve the generalizability of the findings.

The sample, however, was balanced across the participating institutions and gender representation, reducing the likelihood of severe sampling bias. Future iterations of this study could consider stratified random sampling to improve representativeness.

Subsequently, the collected data were analysed using various AI-supported tools to establish profiles. Nine different statistical models were used for profiling—Naïve Bayes, Generalized Linear Model, Logistic Regression, Fast Large Margin, Deep Learning, Decision Tree, Random

Forest, Gradient-Boosted Trees, Support Vector Machine. Also, cluster analysis was chosen to identify distinct subgroups within the sample, allowing for the exploration of heterogeneous emotional and behavioral patterns related to climate anxiety. This approach was preferred over factorial analysis because the study's objective was to segment young adults based on anxiety levels and sustainable behavior, rather than to explore the underlying dimensions of the questionnaire. However, an exploratory factor analysis was conducted to examine the instrument's factorial structure, ensuring its construct validity.

Below, we summarise the theoretical foundations and characteristics of the nine different statistical models used for profiling and cluster analysis. These models were chosen for their ability to manage complex, non-linear datasets effectively. Each model was implemented using Python's Scikit-Learn library, ensuring standardized and replicable results. The use of these tools enhances the rigor of the study and supports the validity of the findings. These models were employed to understand the behaviours and attitudes of groups of young adults towards the effects of climate change. These models are based on diverse mathematical and statistical procedures, each offering different advantages and limitations for certain aspects of data analysis. The selected models represent almost the full spectrum of predictive analysis, ranging from simple, interpretable algorithms to complex, in-depth analytical systems. When evaluating the effectiveness of each model, we paid particular attention to classification error rates, computational demands, and model complexity to select the most appropriate method for uncovering trends and patterns characteristic of our sample.

The applied statistical procedures can be reviewed in detail on any statistical software website or within the documentation of Python packages. Due to the article's length constraints, a comprehensive mathematical-statistical description is unfortunately not feasible. However, in the following section, we have indicated in each case why the application of the given procedure was appropriate.

RESULTS

The sample analysed in this study consisted of 696 university students with the following demographic characteristics:

Gender: The subjects were nearly evenly distributed between genders, with 48.3% (336 individuals) male and 51.7% (360 individuals) female. This nearly equal distribution provides a solid basis for a rigorous examination of potential gender differences in the context of climate anxiety.

Age: The sample entirely represents young adults, predominantly from Generation Z. Most respondents were born in 2003, making the average age 21. This age represents a specific life stage where individuals transition from youth to adulthood and may be particularly susceptible to social and environmental issues related to climate change.

Educational Institution: The sample includes 54.3% (378 individuals) from Széchenyi István University, 41.8% (291 individuals) from Budapest Metropolitan University, and 3.4% (24 individuals) from Neumann János University. These proportions indicate that the research primarily occurred among active students from these institutions, as the study specifically focuses on young adults.

Model Performance Evaluation

When evaluating the efficiency of each model, particular attention was paid to classification error rates, computational requirements, and model complexity to select the most suitable method for uncovering trends and patterns characteristic of our sample. Based on the performance evaluation of the classification models examined, the following results were applied to profiling and clustering tasks:

1. Naive Bayes:

Classification Error: 40.9%.

Advantages: Naive Bayes learns and scores quickly, making it ideal for simple classification problems.

Disadvantages: Its assumption of variable independence often does not hold for real data, resulting in inadequate modelling of complex patterns.

Naive Bayes was worth exploring because of its efficiency in handling high-dimensional data and its ability to provide baseline classification performance despite the simplifying assumption of feature independence. This was particularly useful for rapidly testing early data patterns in a straightforward manner.

2. Generalized Linear Model (GLM):

Classification Error: 39.2%.

Advantages: GLM is a flexible and interpretable model that can handle relationships beyond linear associations.

Disadvantages: Limited selection of error and link functions may hinder its ability to adequately fit data, especially for non-linear relationships.

The GLM was included due to its flexibility in modeling data with different error distributions and its capacity to capture non-linear effects while remaining interpretable. It allowed the exploration of whether the relationship between climate anxiety and consumer behavior could be adequately captured using a broader class of linear models.

3. Logistic Regression:

Classification Error: 41.0%.

Advantages: Strong generalizability, easy interpretation of results and variable relationships.

Disadvantages: Assumes linear data separability, limiting its application for modelling more complex relationships.

Logistic regression was tested because of its robustness for binary classification tasks and its interpretability in terms of odds ratios. This made it valuable for examining the likelihood of specific behavioral shifts based on levels of climate anxiety among the participants.

4. Fast Large Margin:

Classification Error: 42.4%.

Advantages: Effective for large datasets, accelerates computation with margin maximisation algorithms.

Disadvantages: Prone to overfitting, especially if regularisation parameters are not appropriately set.

This technique was employed because of its focus on maximizing the separation between classes, making it suitable for datasets with well-separated clusters. It was valuable in scenarios where the goal was to clearly distinguish between groups with varying levels of climate anxiety.

5. Deep Learning:

Classification Error: 42.5%.

Advantages: Excels in detecting and modelling non-linear and complex patterns.

Disadvantages: It requires significant computational resources, lengthy training times, and its “black box” nature, which makes results difficult to interpret.

Deep learning was worth considering due to its capacity to capture highly complex, non-linear patterns in large datasets. Given the multifaceted nature of climate anxiety and behavioral patterns, this approach aimed to explore deeper relationships that simpler models might miss.

6. Decision Tree (Best Performing Model):

Classification Error: 22.7%.

Advantages: Provides an intuitive understanding of data structure and important variables.

Disadvantages: Prone to overfitting, reducing generalisation capability due to excessive fit to training data.

Decision trees were chosen for their intuitive rule-based structure and capacity to identify key features influencing climate anxiety. They provided easily interpretable insights into how different variables influenced classification outcomes.

7. Random Forest:

Classification Error: 34.8%.

Advantages: Robust and less prone to overfitting, performs well in variable selection and capturing complex relationships.

Disadvantages: Model building and scoring can be time-consuming for larger datasets.

Random forests were included to improve the stability and generalization of decision trees by averaging results from multiple tree models. This ensemble approach was particularly useful for reducing overfitting while preserving model performance.

8. Gradient Boosted Trees:

Classification Error: 37.9%.

Advantages: Achieves high predictive accuracy, particularly for modeling non-linear and complex relationships.

Disadvantages: The training process can be slow, and the risk of overfitting exists if training iterations are not adequately controlled.

Gradient-boosted trees were used for their ability to iteratively improve classification performance by correcting errors from previous iterations. This method was well-suited for enhancing model accuracy in a dataset with nuanced patterns.

9. Support Vector Machine (SVM):

Classification Error: 36.9%.

Advantages: Efficiently handles high-dimensional data and non-linear relationships using kernels.

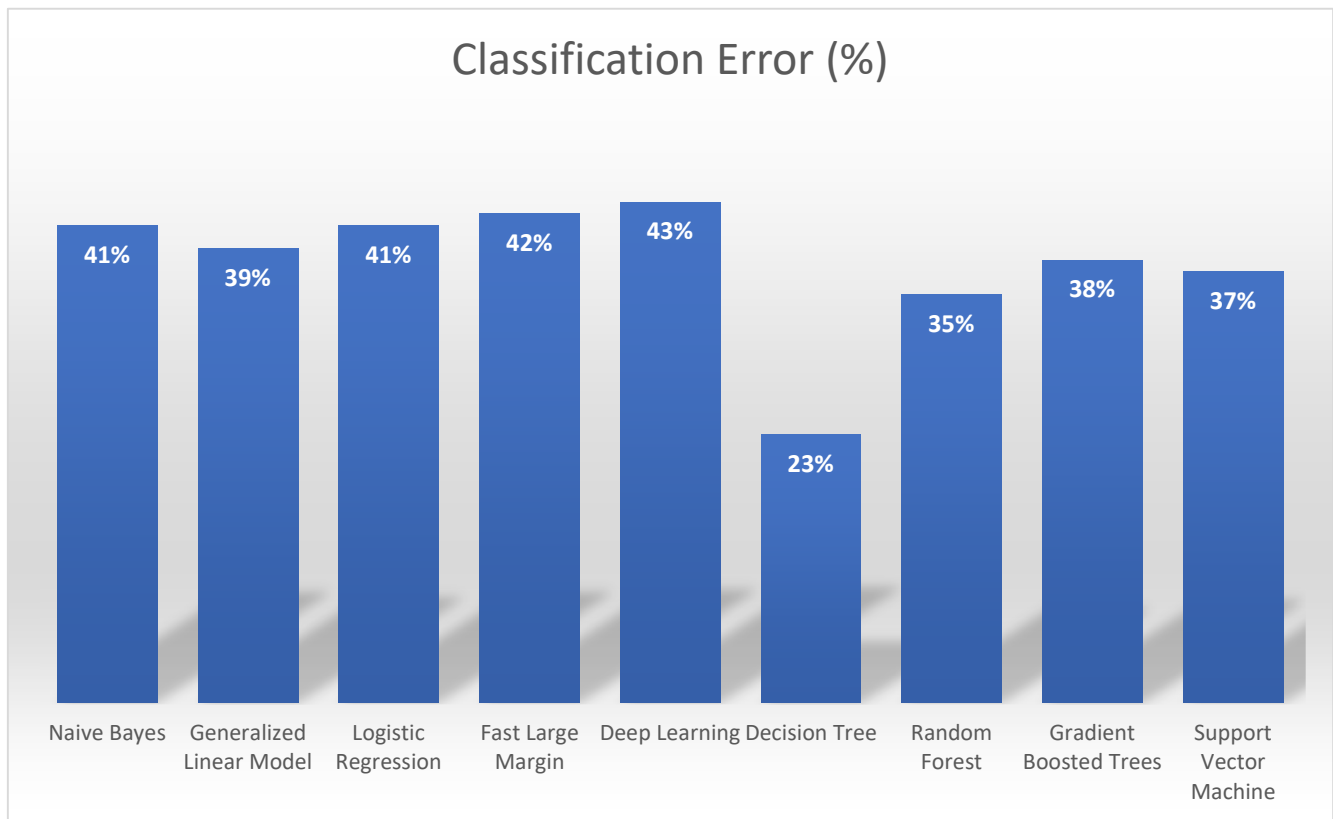
Disadvantages: Performance heavily depends on appropriate kernel selection and parameter tuning, requiring a complex optimisation process.

VM was tested due to its strength in handling both linear and non-linear classification problems through the use of kernel functions. This made it particularly useful for investigating complex decision boundaries in the dataset, such as varying levels of climate anxiety influence.

Based on these evaluations, the Decision Tree model was identified as the best-performing model, showing the lowest classification error and providing intuitive data interpretation. However, care must be taken to avoid overfitting.

The statistical indicators of the models are presented in Figure 1a,b.

(a)



(b)

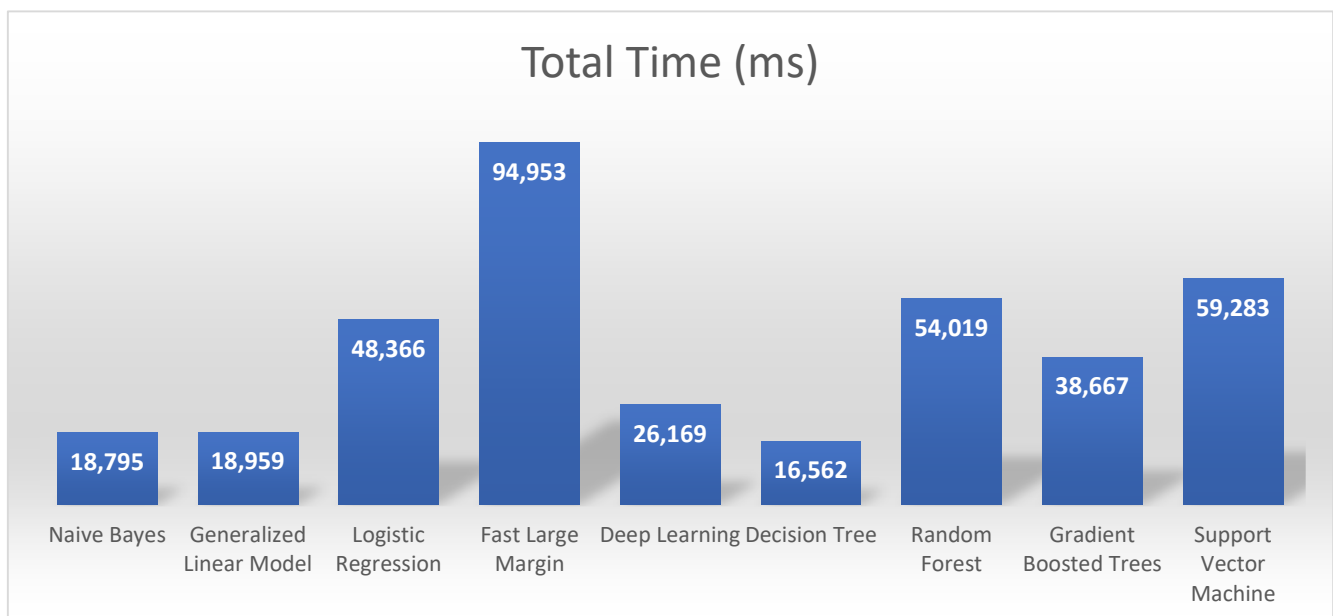


Figure 1. Performance statistics of different methods. (a) Classification Error (%) for different machine learning methods. (b) Total runtime (ms) for different machine learning methods.

Results of the AI-Supported Cluster Analysis

It is important to clarify that comparing the results of the current AI-supported analysis with an analysis conducted using SPSS software would not yield mathematically meaningful insights. The AI-supported methods employed in this study, such as decision trees, random forests, and deep learning models, are designed to handle complex, non-linear patterns in the data and provide advanced clustering and classification capabilities. These methods significantly differ in their underlying assumptions, complexity, and output from traditional methods available in software such as SPSS.

While SPSS is highly effective for conducting linear regression and simpler multivariate analyses, it lacks the sophistication to manage large datasets and non-linear interactions at the same level as AI tools. Therefore, any direct comparison would be inherently flawed due to the different nature of the algorithms and the type of data each method is best suited for. The AI models used in this study were selected precisely because they are better suited to uncovering intricate behavioural patterns and relationships in the data related to climate anxiety.

The current study's focus on AI-supported cluster analysis allows for the identification of more nuanced and complex behavioural segments that might remain undetected using simpler statistical methods. Consequently, while both AI tools and traditional statistical packages like SPSS have their merits, their use is contingent on the specific objectives and the complexity of the data. For the purposes of this research, AI-supported methods offer a superior analytical framework for understanding the multidimensional nature of climate anxiety.

The cluster analysis results can be interpreted as follows: We classified the sample into two distinct clusters based on the responses provided by the subjects. Summarising the results, the following observations can be made:

Cluster 1

The first and largest cluster comprises 72% of the sample. In this cluster, respondents feel anxiety due to climate change 6.73% less frequently on average and are 5.63% less likely to participate in discussions and events about climate change than the overall sample average. However, members of this group feel 4.19% less intense anxiety about climate change but are 78.42% more interested in and eager to learn about the effects of climate change and how they can act against it.

- Negative emotions are less characteristic; their reactions are generally more moderate.

- They are somewhat less in agreement with the negative impacts of climate change, although support is still typical.
- They generally rate environmental measures as neutral or effective.
- Empathy with nature is generally neutral, but they still feel that animals and plants are important in their lives.
- Most of respondents in this cluster are male.

Cluster 2

The second cluster includes 28% of the sample, indicating that it is a significantly smaller group. In this cluster, respondents feel anxiety due to climate change 91.81% more frequently and experience this anxiety 85.46% more intensely than the overall sample average. Concurrently, they are 48.03% less interested in learning more about the effects of climate change and feel anxiety 38.37% more intensely than the average.

- Feelings of anxiety, fear, irritability, sadness, and helplessness are more strongly characteristic of them.
- Most respondents agree or strongly agree with statements about the negative impacts of climate change.
- They find individual environmental actions to be effective.
- Their views on environmental measures are similar to those of the previous cluster.
- Empathy with nature is generally effective, and they attribute significant importance to animals and plants in their lives.
- The majority of respondents in this cluster are female.

DISCUSSION

The results of this study provide important insights into the relationship between climate anxiety and sustainable consumer behaviour among young adults, aligning with some prior research while diverging in key areas. Previous studies, such as Hickman [3], highlighted the growing prevalence of climate anxiety among younger generations, particularly their concern over governmental inaction. The current study corroborates these findings by showing that climate anxiety is widespread among university students, and it significantly influences their consumer choices. However, while Hickman [3] primarily focused on social activism as an outcome of climate anxiety, our research reveals that this anxiety also manifests in everyday sustainable consumption behaviours, such as purchasing environmentally friendly products and minimizing waste.

The cluster analysis revealed two distinct groups: one characterized by moderate anxiety and a proactive approach to learning about climate change, and the other by high anxiety with less engagement in sustainable practices. These findings address the research objective of identifying behavioral patterns associated with climate anxiety—these groups are

consistent with the research by Clayton et al. [5]. The results align with previous studies on climate anxiety's dual impact on activism and apathy [16] but provide new insights by linking these emotional responses to consumer decision-making. This divergence in responses emphasizes the complexity of climate anxiety's impact on behaviour, which previous studies have also noted [15].

Another key difference between our study and prior research lies in the application of advanced AI-supported cluster analysis to identify behavioural patterns. While traditional studies often rely on more straightforward statistical methods (e.g., SPSS), our use of AI tools enabled the identification of more nuanced clusters within the population. For example, deep learning and decision tree models outperformed simpler methods in detecting the subtle variations in how anxiety impacts decision-making. This finding suggests that more advanced analytical tools may be necessary for future research aiming to uncover the multifaceted nature of climate anxiety and its influence on consumer behaviour [4,9].

Last but not least this study primarily focuses on climate anxiety in a university setting, but it is important to recognize that anxiety and related behaviors may be influenced by a broader set of socio-political factors. At the time of data collection, major geopolitical events, such as the war in Ukraine, ongoing economic uncertainty, and the lingering effects of the COVID-19 pandemic, were also shaping public sentiment. Future research should account for these overlapping sources of stress to better isolate the specific impact of climate-related concerns.

Theoretical Implications

From a theoretical standpoint, these findings suggest that climate anxiety functions not only as a psychological stressor but also as a determinant of economic behaviour, particularly among younger consumers. This supports the notion that environmental concerns are becoming a major driver of consumer preferences, as suggested by Whitmarsh et al. [9]. Furthermore, the presence of two distinct behavioural clusters aligns with theories of consumer segmentation, indicating that businesses and policy-makers need to tailor their approaches based on varying levels of climate anxiety. Some individuals may require more education and support to mitigate feelings of helplessness, while others may already be inclined toward sustainable practices and need opportunities to act on their concerns.

Practical Implications

Practically, these findings hold significant value for both businesses and policy-makers. For businesses, understanding the different levels of climate anxiety among consumers allows for more targeted marketing strategies, particularly in promoting sustainable products. Companies that cater to consumers with higher levels of climate anxiety by offering

transparent and impactful environmental solutions may find greater success in appealing to this growing demographic. For policy-makers, the findings highlight the need for more robust public communication strategies and mental health resources that address climate anxiety. As climate change continues to exacerbate these emotional responses, policies that foster community involvement in environmental action and support mental well-being will become increasingly important [16].

In conclusion, while this study aligns with prior research on the psychological impacts of climate anxiety, it advances the literature by highlighting its direct influence on consumer behaviour and offering new insights through the use of AI-supported models. These findings underscore the need for further research into the economic implications of climate anxiety, particularly as it relates to sustainable consumption and market dynamics.

CONCLUSION

The research revealed that climate anxiety significantly influences young adults' consumer and social behaviour, including a shift towards sustainable products and active participation in combating climate change. Various statistical models, including Naive Bayes, logistic regression, and random forests, demonstrated varying effectiveness in identifying and analysing behavioural patterns.

We recommend future research that more extensively applies deep learning models and other complex data analysis techniques. These techniques can facilitate a better understanding of non-linear relationships and complex behavioural patterns. Extending the research to other demographic groups would also be beneficial to gain a more comprehensive understanding of the social impacts of climate anxiety.

Moreover, longitudinal data collection is essential to track long-term trends in climate anxiety and related behavioural changes. This could contribute to developing more effective public policy measures and targeted communication strategies. Further analysis of the advantages and limitations of the models used in this research could aid in developing more accurate and efficient predictive models in the future.

DATA AVAILABILITY

All data generated from the study are available in the manuscript.

AUTHOR CONTRIBUTIONS

Conceptualization, FB and AS; Methodology, FB; Software, FB; Validation, FB and AS; Formal Analysis, FB; Investigation, AS; Resources, FB and AS; Data Curation, FB; Writing—Original Draft Preparation, FB; Writing—Review & Editing, AS; Visualization, FB; Supervision, AS; Project Administration, FB and AS; Funding Acquisition, FB.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1. Galway LP, Field E. Climate emotions and anxiety among young people in Canada: A national survey and call to action. *J Clim Chang Health*. 2023;9:100204.
2. Lucas CH, Earl-Jones CA, Mocatta G, Beasy K, Kelly R, Pecl GT. Analysis of children's questions on climate change reveals that they are most concerned about how to take action. *One Earth*. 2024;7(4):663-73.
3. Hickman C, Marks E, Pihkala P, Clayton S, Lewandowski RE, Mayall EE, et al. Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *Lancet Planet Health*. 2021;5(12):e863-73.
4. Simsar A. Young children's ecological footprint awareness and environmental attitudes in Turkey. *Child Indic Res*. 2021;14(4):1387-413.
5. Clayton SD, Pihkala P, Wray B, Marks E. Psychological and emotional responses to climate change among young people worldwide: Differences associated with gender, age, and country. *Sustainability*. 2023;15(4):3540.
6. Kovács Z, Harangozó G, Szigeti C, Koppány K, Kondor AC, Szabó B. Measuring the impacts of suburbanization with ecological footprint calculations. *Cities*. 2020;101:102715.
7. Szigeti C, Major Z, Szabó DR, Szennay Á. The ecological footprint of construction materials—a standardized approach from Hungary. *Resources*. 2023;12(1):15.
8. Ansari MA. Re-visiting the Environmental Kuznets curve for ASEAN: A comparison between ecological footprint and carbon dioxide emissions. *Renew Sustain Energy Rev*. 2022;168:112867.
9. Whitmarsh L, Player L, Jiongco A, James M, Williams M, Marks E, et al. Climate anxiety: What predicts it and how is it related to climate action? *J Environ Psychol*. 2022;83:101866.
10. Pihkala P. Anxiety and the ecological crisis: An analysis of eco-anxiety and climate anxiety. *Sustainability*. 2020;12(19):7836.
11. Brophy H, Olson J, Paul P. Eco-anxiety in youth: An integrative literature review. *Int J Ment Health Nu*. 2023;32(3):633-61.
12. Kang J, Martinez CMJ, Johnson C. Minimalism as a sustainable lifestyle: Its behavioral representations and contributions to emotional well-being. *Sustain Prod Consump*. 2021;27:802-13.
13. Ojala M. Hope and climate change: The importance of hope for environmental engagement among young people. *Environ Educ Res*. 2012;18(5):625-42.
14. Buics L, Balassa BE. Servitization of public service processes with a simulation modelling approach. *Eng Manage Prod Serv*. 2020;12(3):116-31.

15. Keller V. Sustainable eating habits: Examining beliefs, attitudes, and perceptions of plant-based diets among Hungarians. *Chem Eng Trans.* 2023;107:49-54.
16. Verplanken B, Roy D. Consumer habits and sustainable consumption. In: Reisch LA, Thøgersen J, editors. *Handbook of research on sustainable consumption*. Cheltenham (UK): Edward Elgar Publishing; 2015. p. 243-53.
17. Del Castillo EJ, Díaz Armas RJ, Gutiérrez Taño D. Are local product consumption habits influenced by extreme situations? A case study of wine during the COVID-19 pandemic. *SAGE Open.* 2023;13(3):21582440231193216.
18. Li C, Tang W, Liang F, Wang Z. The impact of climate change on corporate ESG performance: The role of resource misallocation in enterprises. *J Clean Prod.* 2024;445:141263.
19. Resta E, Logroscino G, Tafuri S, Peter P, Noviello C, Costantiello A, et al. The ESG Determinants of Mental Health Index Across Italian Regions: A Machine Learning Approach. Available from: <https://www.preprints.org/manuscript/202406.1093>. Accessed on 20 Jan 2025.
20. McLachlan S, Sanders D. *The adventure of sustainable performance: Beyond ESG compliance to leadership in the new era*. Hoboken (US): John Wiley & Sons; 2023.
21. Solà MM, de Ayala A, Galarraga I, Escapa M. Promoting energy efficiency at household level: A literature review. *Energy Eff.* 2021;14(1):6.
22. Le M, Phung D, Vu MQ, Diep P, Tran Y, Nguyen C. Antecedents influence choosing tourism destination post-COVID-19: Young people case. *J Hosp Tour Insights.* 2023;6(5):2241-56.
23. Horváth ZI, Kupi M, Happ E. The role of tourism management for sustainable tourism development in nature reserves in Hungary. *Geo J Tour Geosites.* 2023;49(3):893-900.
24. Kupi M, Szemerédi E. A magyarok környezettudatos utazással kapcsolatos attitűdjének és egyes magatartásformáinak vizsgálata a Covid-19 járvány tükrében [Examining the attitudes and certain behaviors of Hungarians regarding environmentally conscious travel in light of the Covid-19 pandemic]. *Turizt Vidékfejleszt Tanulm.* 2022;7(2). Hungarian. doi: 10.15170/TVT.2022.07.02.01
25. Crandon TJ, Scott JG, Charlson FJ, Thomas HJ. A social-ecological perspective on climate anxiety in children and adolescents. *Nat Clim Change.* 2022;12(2):123-31.
26. Léger-Goodes T, Malboeuf-Hurtubise C, Mastine T, Généreux M, Paradis PO, Camden C. Eco-anxiety in children: A scoping review of the mental health impacts of the awareness of climate change. *Front Psychol.* 2022;13:872544.
27. Clayton S. Climate anxiety: Psychological responses to climate change. *J Anxiety Disord.* 2020;74:102263.

28. Wu J, Snell G, Samji H. Climate anxiety in young people: A call to action. *Lancet Planet Health*. 2020;4(10):e435-6.

How to cite this article:

Bakó F, Szeberényi A. Young Adults' Feelings and Knowledge of Climate Anxiety. *J Sustain Res*. 2025;7(2):e250025.

<https://doi.org/10.20900/jsr20250025>