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The Psychological Impact of Climate Change on Youth: A Systematic Review

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Abstract

Climate change poses a significant threat to global well-being, with youth identified as a particularly vulnerable population. This systematic literature review explores the psychological impact of climate change on young people. The increasing frequency and intensity of extreme weather events, coupled with the pervasive awareness of environmental degradation, contribute to a range of adverse psychological outcomes in youth. This review addresses the critical need to understand these impacts to inform effective interventions and support systems. Following PRISMA guidelines, we systematically searched electronic databases, including Scopus and Web of Science, for peer-reviewed articles published between 2020 and 2024 that examined the relationship between climate change and youth mental health. Search terms included psychology or attitude or behaviour and climate and change or crisis and youth or teens or teenager. The database found (n=25) final primary data was analysed. The finding was divided into three themes which is (1) climate change impacts and vulnerability, (2) climate change communication, perception, and discourse and (3) climate change education and action. The findings underscore the urgent need for targeted interventions to mitigate the psychological burden of climate change on youth. These interventions should focus on building resilience, promoting coping mechanisms, fostering community support, and empowering young people to engage in climate action. Future research should prioritize longitudinal studies to understand the long-term effects of climate change on youth mental health and explore culturally sensitive approaches to intervention development.

Keywords: Psychological Impact, Climate Change, Youth

Introduction

The Earth's climate is changing at an unprecedented rate, driven by human activities that release greenhouse gases into the atmosphere (Masson et al., 2020; Schoierer et al., 2022). While the physical impacts of climate change, such as rising sea levels and extreme weather events, are well-documented, the psychological consequences, particularly for young people,

are increasingly a cause for concern (Ravikumar, 2023). This article explores the multifaceted ways in which climate change is affecting the mental well-being of youth, a generation that faces the unique challenge of inheriting a planet grappling with the consequences of environmental degradation.

Climate change presents a significant threat to the mental health of young people due to several factors. Firstly, youth are more vulnerable to the direct impacts of climate change, such as displacement, injury, and loss of loved ones due to extreme weather events (Steg, 2023; Valentová & Bostik, 2021). These experiences can lead to post-traumatic stress disorder, anxiety, and depression. Secondly, young people are acutely aware of the long-term implications of climate change for their future, including the potential for environmental degradation, resource scarcity, and social instability. This awareness can lead to feelings of anxiety, fear, and hopelessness, often referred to as eco-anxiety (Ágoston et al., 2022; Coffey et al., 2021). Thirdly, the perceived inaction of adults and decision-makers on climate change can lead to feelings of anger, frustration, and betrayal among young people, further exacerbating their psychological distress.

The psychological impacts of climate change on youth are not limited to negative emotions (Vidović, 2023). Young people are also experiencing a range of other psychological responses, including grief, guilt, and moral injury (Cho & Kim, 2021; Michail et al., 2022). Climate grief arises from the loss of cherished environments, species, and ways of life. Climate guilt stems from the recognition of one's own contribution to the problem, even if it is unintentional. Moral injury occurs when young people feel that they have been forced to witness or participate in actions that violate their own moral compass, such as the destruction of the environment.

The psychological impacts of climate change on youth are not uniform. They vary depending on factors such as age, gender, socioeconomic status, cultural background, and personal experiences (Evans-Winters, 2021). For example, young people from marginalized communities who are already facing social and economic challenges may be disproportionately affected by the psychological impacts of climate change. Indigenous youth, who have a deep connection to the land and its resources, may experience heightened levels of climate grief and moral injury (Henritze et al., 2023).

Understanding the psychological impacts of climate change on youth is crucial for developing effective strategies to support their mental well-being (Lyons et al., 2020). This article examines the various ways in which climate change is affecting the mental health of young people, explores the factors that contribute to these impacts, and discusses the potential consequences for individuals and society. It also highlights the importance of empowering youth to act on climate change and providing them with the resources and support they need to cope with the psychological challenges of living in a changing world.

Literature Review

The psychological impact of climate change on youth is a growing concern, as evidenced by recent literature. Children and adolescents are particularly vulnerable to the mental health effects of climate change due to their developmental stage and limited coping mechanisms. Studies have shown that climate change can lead to a range of psychological issues in young

people, including PTSD, depression, anxiety, and eco-anxiety, which is characterized by feelings of worry, guilt, and hopelessness about the future of the planet (Burke et al., 2018) (Gislason et al., 2021) (Léger-Goodes et al., 2022). These mental health challenges are compounded by the direct and indirect impacts of climate change, such as natural disasters and changes in ecosystems, which can disrupt their sense of security and well-being (Burke et al., 2018) (Vergunst & Berry, 2021a) (Bolek et al., 2024). Furthermore, the social and ecological determinants of health play a significant role in how children and youth experience these impacts, with those from vulnerable communities being more severely affected (Gislason et al., 2021) (Léger-Goodes et al., 2022).

The literature also highlights the importance of addressing these psychological impacts through education and support systems. Climate change education programs that focus on emotional and cognitive transformation can help mitigate negative emotions by fostering pro-environmental attitudes and empowering youth to take action (Trott, 2021). Mental health professionals, educators, and policymakers have crucial roles in developing strategies to support young people in coping with the psychological effects of climate change. This includes integrating mental health considerations into climate change adaptation and vulnerability assessments, as well as promoting healthy coping mechanisms and resilience among youth (Vergunst & Berry, 2021b) (Bolek et al., 2024) (Uçak et al., 2024). Overall, understanding and addressing the psychological impact of climate change on youth is essential for safeguarding their mental health and ensuring their well-being in the face of this global challenge.

Climate change has profound psychological effects on youth, manifesting in various mental health challenges. Young people are increasingly experiencing eco-anxiety, characterized by feelings of worry, guilt, and hopelessness about the future of the planet. This anxiety can lead to more severe mental health issues such as depression, anxiety disorders, and even PTSD, particularly in those who are already vulnerable due to pre-existing mental health conditions (Burke et al., 2018) (Léger-Goodes et al., 2022) (Bolek et al., 2024). The awareness of climate change and its potential impacts can evoke strong emotional responses, including sadness, anger, and fear, which are particularly pronounced in youth from vulnerable communities, such as indigenous groups or those with strong ties to the land (Léger-Goodes et al., 2022). These psychological responses are not only due to direct experiences of climate-related events but also stem from the broader existential threat that climate change poses (Palinkas & Wong, 2020).

The psychological impact of climate change on youth is also influenced by social and ecological determinants of health. Young people's mental well-being is affected by their social environments and the ecological changes they witness, which can lead to feelings of solastalgia—a form of distress caused by environmental change (Gislason et al., 2021). Gender and age also play roles in how youth perceive and react to climate change, with older adolescents and females often expressing greater concern and negative emotions (Clayton et al., 2023). The developmental stage of children and adolescents makes them particularly susceptible to these impacts, as they are still developing coping mechanisms and are more likely to worry about climate change than other age groups (Vergunst & Berry, 2021a) (Vergunst & Berry, 2021b). Addressing these psychological effects requires a comprehensive approach that includes education, mental health support, and empowerment strategies to

help youth cope with the challenges posed by climate change (Léger-Goodes et al., 2022) (Bolek et al., 2024).

Eco-anxiety, a term used to describe the distress and worry related to climate change, significantly impacts the well-being of young people. This phenomenon is increasingly recognized as a public health concern, particularly as young individuals are more exposed to the long-term effects of climate change. Studies have shown that eco-anxiety can manifest as depression, anxiety, and extreme emotions such as sadness, anger, and fear among youth (Léger-Goodes et al., 2022) (Brophy et al., 2022). In Australia, young people report feelings of worry, stress, and hopelessness due to climate change, exacerbated by a sense of powerlessness and lack of voice in climate action (Gunasiri et al., 2022) . The awareness of climate change and its potential impacts can lead to psychological distress, with young people from vulnerable communities, such as indigenous groups, being particularly affected (Léger-Goodes et al., 2022). This emotional burden is compounded by the perception that older generations and authorities are not taking sufficient action to address the climate crisis, leading to feelings of betrayal and frustration (Hickman, 2020).

The impact of eco-anxiety on young people's well-being is multifaceted, affecting their mental health and potentially leading to maladaptive coping mechanisms. However, there are also positive aspects, as some young people channel their eco-anxiety into activism and constructive hope, which can serve as a coping mechanism (Léger-Goodes et al., 2022). Engaging in climate action and participating in community support initiatives can foster a sense of control and optimism, mitigating some of the negative mental health impacts (Gunasiri et al., 2022). It is crucial for educators, mental health professionals, and policymakers to address eco-anxiety by incorporating climate education into curricula and promoting healthy coping strategies. This includes fostering resilience, encouraging open discussions about climate change, and empowering young people to take action (Kankawale & Niedzwiedz, 2023) (Malboeuf-Hurtubise et al., 2024) By understanding and addressing the determinants of eco-anxiety, such as social, political, and geographical factors, society can better support young people in managing their eco-anxiety and enhancing their overall well-being ((Kankawale & Niedzwiedz, 2023).

Education plays a crucial role in addressing eco-anxiety among youth by fostering awareness and resilience. Educators are increasingly aware of the psychological impact of climate change on students, which can manifest as eco-anxiety—a form of distress linked to environmental concerns. To mitigate this, educators emphasize the importance of connecting students with nature and promoting pro-environmental behaviors, which can help alleviate feelings of anxiety and hopelessness (Edwards et al., 2023) (Pihkala, 2020). By integrating discussions about environmental issues into the curriculum, educators aim to balance awareness with hope, encouraging students to engage in positive actions rather than succumb to despair (Edwards et al., 2023) (Malboeuf-Hurtubise et al., 2024). This approach not only addresses eco-anxiety but also empowers students to become active participants in environmental advocacy, as seen in movements led by youth activists (Malboeuf-Hurtubise et al., 2024).

Moreover, partnerships between school counselors and educators are pivotal in reducing eco-anxiety and enhancing students' self-efficacy. School counselors can play a significant role by incorporating frameworks that promote eco-wellness and resilience, helping students

navigate their emotions related to climate change (Nice et al., 2022) (Köse, 2023). By providing safe spaces for students to express their concerns and emotions, educators and counselors can validate their feelings and guide them towards constructive coping mechanisms (Pihkala, 2020) (Léger-Goodes et al., 2022). This collaborative approach ensures that students are not only informed about environmental issues but are also equipped with the emotional tools to handle the associated stress, ultimately fostering a generation that is both environmentally conscious and psychologically resilient (Nice et al., 2022) (Köse, 2023).

Research Question

Research questions are crucial in a systematic literature review (SLR) because they provide the foundation and direction for the entire review process. They guide the scope and focus of the SLR, helping to determine which studies to include or exclude, ensuring that the review remains relevant and specific to the topic of interest. A well-defined research question ensures that the literature search is exhaustive and systematic, covering all relevant studies that address key aspects of the topic. This minimizes the risk of bias and ensures a complete overview of the existing evidence. Additionally, research questions facilitate the categorization and organization of data from included studies, providing a framework for analyzing findings and synthesizing results to draw meaningful conclusions. They also enhance clarity and focus, avoiding ambiguity and keeping the review concentrated on specific issues, making the findings more actionable and relevant. Furthermore, well-formulated research questions contribute to the transparency and reproducibility of the review, allowing other researchers to follow the same process to verify findings or extend the review to related areas. Ultimately, research questions ensure that the review aligns with the overall objectives of the study, whether it is to identify gaps in the literature, evaluate the effectiveness of interventions, or explore trends in a specific field, making them the backbone of a rigorous, focused, and relevant systematic literature review.

Specifying the Research Questions (RQs) is the most important activity at the planning stage but also the most important part of any SLR, because it drives the entire review methodology (Kitchenham, 2007). Considering that the goal of our SLR is to identify and analyze the state of the art in. The PICo framework is a mnemonic style used to formulate research questions, particularly in qualitative research proposed by (Lockwood et al., 2015) was applied in this study. PICo stands for Population, Interest, and Context. Here's what each component means:

1. Population (P): This refers to the group or participants of interest in the study. It specifies who the research is focused on, such as a specific demographic, patient group, or community.
2. Interest (I): This represents the main focus or phenomenon of interest in the study. It could be a particular experience, behavior, intervention, or issue that the research aims to explore or understand.
3. Context (Co): This defines the setting, environment, or specific context in which the population and interest are situated. It might refer to geographical location, cultural or social settings, or any other relevant backdrop for the research.

Using the PICo framework helps in structuring research questions clearly and systematically by breaking down the key elements of the study into these three components. This approach ensures that the research is focused and the questions are well-defined, making it easier to

search for relevant literature or design a study. This study achieved three research questions as below;

1. How do experiences with climate change-related extreme weather events impact the mental well-being of youth in low-income communities?
2. How does exposure to varying narratives about climate change on social media influence climate anxiety and self-efficacy among university students?
3. Does participation in project-based climate change education programs in secondary schools lead to increased pro-environmental behaviors and improved psychological well-being (specifically hope and optimism) among students?

Material and Methods

For conducting systematic literature reviews, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach is a widely accepted standard that guarantees transparency, completeness, and consistency throughout the procedure oleh Page et al., (Page et al., 2021). Researchers can improve the accuracy and rigour of their analysis by adhering to PRISMA guidelines, which provide guidance on how to systematically identify, screen, and include studies in their review. The method also highlights the significance of randomised studies, acknowledging their ability to lessen bias and provide strong evidence for the review. Two important databases, Web of Science and Scopus, were used in this analysis because of their wide coverage and robustness.

The PRISMA approach is organized into four key stages: identification, screening, eligibility, and data abstraction. In the identification phase, databases are searched to locate all relevant studies. The screening phase then involves evaluating these studies against predefined criteria to eliminate irrelevant or low-quality research. During the eligibility phase, the remaining studies are thoroughly assessed to confirm they meet the inclusion criteria. Finally, data abstraction focuses on extracting and synthesizing data from the included studies, which is essential for deriving meaningful and reliable conclusions. This structured method ensures that the systematic review is conducted with rigor, leading to trustworthy results that can guide future research and practice.

Identification

In this study, essential steps of the systematic review process were employed to collect a significant amount of relevant literature. The process started with the selection of keywords, followed by identifying related terms using dictionaries, thesauri, encyclopaedias, and previous research. All relevant terms were identified, and search strings were formulated for the Web of Science and Scopus databases (as shown in Table 1). This initial phase of the systematic review resulted in 1390 publications relevant to the study topic from the two databases.

Table 1
The search strings

Scopus	TITLE-ABS-KEY (((*psychology** OR *attitude** OR *behavior**) AND (*climate* AND (*change** OR *crisis*)) AND (*youth** OR *teens* OR *teenager**))) AND (LIMIT-TO (SUBJAREA , *"PSYC"*)) AND (LIMIT-TO (DOCTYPE , *"ar"*)) AND (LIMIT-TO (PUBSTAGE , *"final"*)) AND (LIMIT-TO (SRCTYPE , *"j"*)) AND (LIMIT-TO (PUBYEAR , *2020*) OR LIMIT-TO (PUBYEAR , *2021*) OR LIMIT-TO (PUBYEAR , *2022*) OR LIMIT-TO (PUBYEAR , *2023*)) Date Access: February 2025
WoS	((psychology* OR attitude* OR behavior*) AND (climate AND (change* OR crisis)) AND (youth* OR teens OR teenager*)) (All Fields) and 2024 or 2023 or 2022 or 2021 or 2020 (Publication Years) and Article (Document Types) and Psychology Multidisciplinary (Web of Science Categories)teenager*)) (All Fields) Date Access: February 2025

Screening

Potentially pertinent research items are assessed in the screening step to make sure they support the predetermined research question or questions. In this phase, the selection of research topics frequently involves considering the psychological impact of climate change on youth. At this point, 7 duplicate documents are eliminated. After 1323 publications were initially discarded, 67 papers were left for additional analysis in accordance with particular inclusion and exclusion standards (refer to Table 2). The literature was the first criterion because it is the primary source of useful advice. This includes book series, book reviews, meta-syntheses, meta-analyses, conference proceedings, and chapters that were not included in the most recent study. Only English-language publications from 2020 to 2024 were included in the review. Due to duplication, 7 publications in total were rejected.

Table 2
The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time line	2020 – 2024	< 2020
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press
Country	Psychology	Besides Psychology

Eligibility

In the third step, known as the eligibility phase, 60 articles were prepared for review. During this stage, the titles and key content of all articles were carefully examined to ensure they met the inclusion criteria and aligned with the current research objectives. Consequently, 33 articles were excluded as they did not qualify as due to the out of due

to the out of field, title not significant, abstract not related on the objective of the study, no full text access founded on empirical evidence. As a result, a total of 27 articles remain for the upcoming review.

Data Abstraction and Analysis

An integrative analysis was used as one of the assessment strategies in this study to examine and synthesise a variety of research designs (quantitative methods). The goal of the competent study was to identify relevant topics and subtopics. The stage of data collection was the first step in the development of the theme. Figure 2 shows how the authors meticulously analysed a compilation of 27 publications for assertions or material relevant to the topics of the current study. The authors then evaluated the current significant studies related to the psychological impact of climate change on youth. The methodology used in all studies, as well as the research results, are being investigated. Next, the author collaborated with other co-authors to develop themes based on the evidence in this study's context. A log was kept throughout the data analysis process to record any analyses, viewpoints, riddles, or other thoughts relevant to the data interpretation. Finally, the authors compared the results to see if there were any inconsistencies in the theme design process. It is worth noting that, if there are any disagreements between the concepts, the authors discuss them amongst themselves.

Table 3
Number and details of Primary Studies Database

NO	Authors	Title	Year	SCOPUS	WoS
1	Shao L., Yu G.	Media coverage of climate change, eco-anxiety and pro-environmental behaviour: Experimental evidence and the resilience paradox	2023	/	/
2	Dangwal A., Kaul S.	Assessment of Climate Change Anxiety and Behavioural Action among Youth in India	2023	/	
3	Plohl N., Mlakar I., Musil B., Smrke U.	Measuring young individuals' responses to climate change: validation of the Slovenian versions of the climate anxiety scale and the climate change worry scale	2023	/	
4	Pereira T., Freire T., Tavares D.	Portuguese Validation of the Climate Change Attitude Survey: Psychometric Properties and Relations with Positive Youth Development	2023	/	
5	Ojala M.	How do children, adolescents, and young adults relate to climate change? Implications for developmental psychology	2023	/	
6	Nongqayi L., Risenga I., Dukhan S.	Youth's knowledge and awareness of human contribution to climate change: the influence of social and cultural contexts within a developing country	2022	/	
7	Simon P.D., Pakingan K.A., Aruta J.J.B.R.	Measurement of climate change anxiety and its mediating effect between experience of climate change and mitigation actions of Filipino youth	2022	/	
8	Geoffrion S., Lamothe J., Fraser S.,	Worker and perceived team climate factors influence the use of restraint and seclusion in youth residential treatment centers: Results from a mixed-method longitudinal study	2021	/	

	Lafortune D., Dumais A.				
9	Bayram Özdemir S., Özdemir M., Boersma K.	How Does Adolescents' Openness to Diversity Change Over Time? The Role of Majority-Minority Friendship, Friends' Views, and Classroom Social Context	2021	/	
10	Ojala M.	To trust or not to trust? Young people's trust in climate change science and implications for climate change engagement	2021	/	
11	Fantus S., Newman P.A.	Promoting a positive school climate for sexual and gender minority youth through a systems approach: A theory-informed qualitative study.	2021	/	
12	Balundė A., Perlaviciute G., Truskauskaitė-Kunevičienė I.	Sustainability in Youth: Environmental Considerations in Adolescence and Their Relationship to Pro-environmental Behaviour	2020	/	/
13	Hogue C.M.	Achievement goal theory-based psychological skills training session buffers youth athletes' psychophysiological responses to performance stress	2020	/	
14	Fernandes-Jesus M., Barnes B., Diniz R.F.	Communities reclaiming power and social justice in the face of climate change	2020	/	
15	Jellason N.P., Conway J.S., Baines R.N.	Exploring smallholders' cultural beliefs and their implication for adaptation to climate change in North-Western Nigeria	2020	/	
16	Warren M.T., Wray-Lake L., Shubert J.	Developmental changes in mindful awareness during adolescence	2020	/	
17	Plohl, N; Mlakar, I; Musil, B; Smrke, U	Measuring young individuals' responses to climate change: validation of the Slovenian versions of the climate anxiety scale and the climate change worry scale	2023		/
18	Newsome, D; Newsome, KB; Miller, SA	Teaching, Learning, and Climate Change: Anticipated Impacts and Mitigation Strategies for Educators	2023		/
19	Teo, SM; Gao, CX; Brennan, N; Fava, N; Simmons, MB; Baker, D; Zbukvic, I; Rickwood, DJ; Brown, E; Smith, CL; Watson, AE; Browne, V; Cotton, S; Mcgorry, P; Killackey, E;	Climate change concerns impact on young Australians' psychological distress and outlook for the future	2024		/

	Freeburn, T; Filia, KM				
20	Marks, E; Atkins, E; Garrett, JK; Abrams, JF; Shackleton, D; Hennessy, L; Mayall, EE; Bennett, J; Leach, I	Stories of hope created together: A pilot, school-based workshop for sharing eco-emotions and creating an actively hopeful vision of the future	2023		/
21	Murry, VM; Gonzalez, CM; Debreaux, ML; Coates, EE; Berkel, C	Implications of built and social environments on the academic success among African American youth: testing Strong African American Families intervention effects on parental academic racial socialization	2023		/
22	Carlo, G; Davis, AN; Taylor, LK	Reducing Youth In-Group Favouritism to Address Social Injustice	2022		/
23	van de Wetering, J; Leijten, P; Spitzer, J; Thomaes, S	Does environmental education benefit environmental outcomes in children and adolescents? A meta-analysis	2022		/
24	Bandeira, M; Graham, MA; Ebersöhn, L	The significance of feeling safe for resilience of adolescents in sub-Saharan Africa	2023		/
25	Yoshinaga, M; Hagiwara, T	DISASTER AND COMMUNITY PSYCHOLOGY Focusing on the power of youth and children and their peer effects in disaster prevention and community empowerment	2022		/

Quality of Appraisal

According to the guidelines proposed by Kitchenham and Charters (Kitchenham, 2007), once we had selected primary studied *(Primary studies refer to the original research articles, papers, or documents that are directly included in the systematic review after the initial selection process. These studies are considered the primary sources of evidence that are analyzed, assessed for quality, and compared quantitatively or qualitatively to answer the research questions defined for the review.)*, we have to assess the quality of the researches they present and quantitatively compare them. In this study we apply quality assessment from Anas Abouzahra et al. (Abouzahra et al., 2020) which consist of six QAs for our SLR. The scoring procedure for evaluating each criterion involves three possible ratings: "Yes" (Y) with a score of 1 if the criterion is fully met, "Partly" (P) with a score of 0.5 if the criterion is somewhat met but contains some gaps or shortcomings, and "No" (N) with a score of 0 if the criterion is not met at all.

- QA1. Is the purpose of the study clearly stated?
- QA2. Is the interest and the usefulness of the work clearly presented?
- QA3. Is the study methodology clearly established?
- QA4. Are the concepts of the approach clearly defined?

• QA5. Is the work compared and measured with other similar work?
• QA6. Are the limitations of the work clearly mentioned?

The table outlines a quality assessment (QA) process used to evaluate a study based on specific criteria. Three experts assess the study using the criteria listed, and each criterion is scored as "Yes" (Y), "Partly" (P), or "No" (N). Here's a detailed explanation:

1. **Is the purpose of the study clearly stated?**
   - This criterion checks whether the study's objectives are clearly defined and articulated. A clear purpose helps set the direction and scope of the research.

2. **Is the interest and usefulness of the work clearly presented?**
   - This criterion evaluates whether the study's significance and potential contributions are well-explained. It measures the relevance and impact of the research.

3. **Is the study methodology clearly established?**
   - This assesses whether the research methodology is well-defined and appropriate for achieving the study's objectives. Clarity in methodology is crucial for the study's validity and reproducibility.

4. **Are the concepts of the approach clearly defined?**
   - This criterion looks at whether the theoretical framework and key concepts are clearly articulated. Clear definitions are essential for understanding the study's approach.

5. **Is the work compared and measured with other similar work?**
   - This evaluates whether the study has been benchmarked against existing research. Comparing with other studies helps position the work within the broader academic context and highlights its contributions.

6. **Are the limitations of the work clearly mentioned?**

   Each expert independently assesses the study according to these criteria, and the scores are then totaled across all experts to determine the overall mark. For a study to be accepted for the next process, the total mark, derived from summing the scores from all three experts, must exceed 3.0. This threshold ensures that only studies meeting a certain quality standard proceed further.

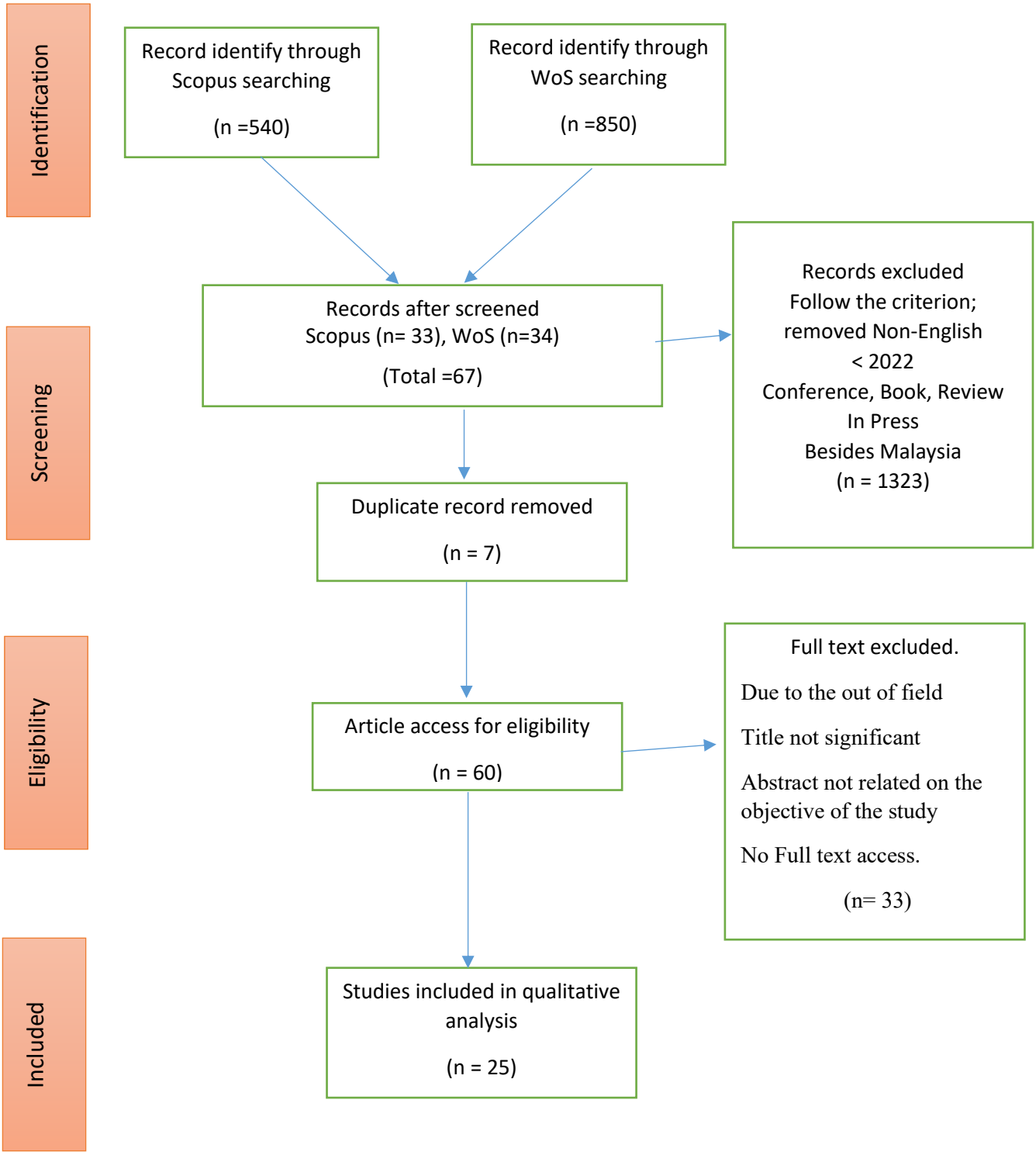


Figure 2. Flow diagram of the proposed searching study [1]

Result and Finding

Background of selected study: based on quality assessment, table 4 shown the result of assessment performance for selected primary studies.

The quality assessment reveals a generally strong set of papers, with the vast majority (22 out of 25) achieving a perfect score of 100% across all evaluated criteria. This indicates that these studies excel in clearly stating their purpose, demonstrating the interest and usefulness

of their work, establishing a robust methodology, defining key concepts, comparing their findings with existing literature, and acknowledging limitations. Such comprehensive reporting suggests a high level of rigor and contributes to the overall trustworthiness of the research.

A small subset of papers (3 out of 25) scored slightly lower, at 91.67%. The minor difference stems from a partial fulfilment of the comparison criterion (QA5). While these papers demonstrated strength in all other areas, they only partially compared their work with similar studies. This suggests a potential area for improvement in these specific papers, as a more thorough engagement with existing research strengthens the context and impact of the current findings. Nevertheless, the overall quality of these papers remains high, and the minor shortcoming in comparative analysis does not significantly detract from their overall contribution. It's worth noting that even with the slightly lower score, these papers still meet a high standard of research reporting.

Table 4
Assessment Table

Paper ID	QA1	QA2	QA3	QA4	QA5	QA6	Total Mark	Percentage (%)
PS1	Y	Y	Y	Y	Y	Y	6	100%
PS2	Y	Y	Y	Y	P	Y	5.5	91.67%
PS3	Y	Y	Y	Y	Y	Y	6	100%
PS4	Y	Y	Y	Y	Y	Y	6	100%
PS5	Y	Y	Y	Y	Y	Y	6	100%
PS6	Y	Y	Y	Y	P	Y	5.5	91.67%
PS7	Y	Y	Y	Y	Y	Y	6	100%
PS8	Y	Y	Y	Y	P	Y	5.5	91.67%
PS9	Y	Y	Y	Y	Y	Y	6	100%
PS10	Y	Y	Y	Y	Y	Y	6	100%
PS11	Y	Y	Y	Y	Y	Y	6	100%
PS12	Y	Y	Y	Y	Y	Y	6	100%
PS13	Y	Y	Y	Y	Y	Y	6	100%
PS14	Y	Y	Y	Y	Y	Y	6	100%
PS15	Y	Y	Y	Y	P	Y	5.5	91.67%
PS16	Y	Y	Y	Y	Y	Y	6	100%
PS17	Y	Y	Y	Y	Y	Y	6	100%
PS18	Y	Y	Y	Y	Y	Y	6	100%
PS19	Y	Y	Y	Y	Y	Y	6	100%
PS20	Y	Y	Y	Y	Y	Y	6	100%
PS21	Y	Y	Y	Y	Y	Y	6	100%
PS22	Y	Y	Y	Y	Y	Y	6	100%
PS23	Y	Y	Y	Y	Y	Y	6	100%
PS24	Y	Y	Y	Y	Y	Y	6	100%
PS25	Y	Y	Y	Y	Y	Y	6	100%

The produced themes were eventually tweaked to ensure consistency. The analysis selection was carried out by four experts to determine the validity of the problems. The expert review phase ensures the clarity, importance, and suitability of each subtheme by establishing the domain validity. The authors also compared the findings to resolve any discrepancies in the theme creation process. Note that if any inconsistencies on the themes arose, the authors address them with one another. Finally, the developed themes were tweaked to ensure their consistency. To ensure the validity of the problems, the examinations were performed by two experts, one specialising in oncology and the other in biomedical science. The expert review phase helped ensure each sub-theme's clarity, importance, and adequacy by establishing domain validity. Adjustments based on the discretion of the author based on feedback and comments by experts have been made.

Climate Change Impacts and Vulnerability

Climate change exerts a significant influence on the psychological well-being of young people, often manifesting as heightened anxiety and a diminished sense of purpose. (Dangwal & Kaul, 2023) suggest a clear link between climate change anxiety and its impact on behaviour. This emotional distress can impede positive development and reduce the capacity of youth to actively engage in finding solutions, a point also raised by (Pedro et al., 2022). The tangible realities of climate change, including extreme weather events and environmental degradation, contribute to this anxiety and foster a sense of vulnerability, particularly among adolescents whose future is directly threatened by these environmental shifts (Balunde et al., 2020). This perceived lack of control over the unfolding environmental crisis can further exacerbate such feelings, potentially leading to helplessness and despair.

The psychological burden of climate change on youth extends beyond anxiety to encompass the potential amplification of social injustices. (Carlo et al., 2022) posit that the impacts of climate change may worsen existing inequalities, resulting in increased in-group favouritism and the potential for conflict as resources become scarcer. This can create an especially challenging environment for young people who must not only grapple with the direct effects of climate change but also navigate its broader societal consequences. The complex interplay between environmental degradation and social dynamics highlights the multifaceted challenges faced by youth in the climate change era, necessitating solutions that address both the environmental crisis and its social repercussions.

In response to the psychological impact of climate change on youth, environmental education is frequently highlighted as a critical tool for building resilience and encouraging pro-environmental behaviour. (van de Wetering et al., 2022)and (Ojala, 2021) propose that education can empower young people to become agents of sustainable change. By imparting knowledge and skills, environmental education may transform anxiety into proactive engagement. This approach seeks to shift the narrative from vulnerability and helplessness to one of empowerment and action. It instils a sense of agency, enabling youth to contribute meaningfully to solutions and build a more sustainable future for themselves and their communities. This empowerment is essential for fostering hope and counteracting the psychological weight of climate change.

Climate Change Communication, Perception, and Discourse

Youth are increasingly aware of climate change and its potential consequences, leading to a range of emotional responses. (Ojala, 2021) explored how children and adolescents navigate climate change as an existential threat, highlighting the psychological burden it places on young people. This resonates with the findings of Teo et al. (2021) who emphasized the escalating nature of climate change and its disproportionate impact on youth, further exacerbating their concerns. These emotional responses are deeply intertwined with how young people perceive and interpret climate change information. (Ojala, 2021) delved into the complexities of trust and distrust in climate change science among young people, demonstrating that their emotional engagement is influenced by their confidence in the information they receive. This underscores the importance of clear and accessible communication about climate change, as highlighted by (Shao & Yu, 2023)and (Coffey et al., 2021)(Shao & Yu, 2023), who emphasized the role of media coverage in shaping public perception and amplifying concerns about environmental risks. It is crucial to acknowledge that these emotional responses are not uniform. As (Plohl et al., 2023) suggest, measuring young individuals' emotional responses requires careful consideration, as these responses can be multifaceted and vary greatly depending on individual experiences and coping mechanisms.

Media plays a crucial role in shaping young people's understanding and emotional responses to climate change. (Shao & Yu, 2023) argue that media acts as a risk amplification station, influencing public concerns about environmental issues. This suggests that the way climate change is portrayed in the media can significantly impact how young people perceive the threat and experience related emotions. Furthermore, societal factors, such as cultural background and community experiences, also contribute to the diverse range of emotional responses to climate change. (Bayram Özdemir et al., 2021)explored how adolescents' openness to cultural diversity influences their understanding of global issues, highlighting the importance of considering diverse perspectives in climate change communication. Therefore, effective climate change communication should consider the interplay of media influence, societal factors, and individual experiences to resonate with diverse youth audiences.

While acknowledging the emotional challenges associated with climate change, it is equally important to foster resilience and empower young people to act. (Fantus & Newman, 2021) further emphasize the importance of creating positive school climates that support the well-being of all students, including addressing anxieties related to climate change. By fostering a sense of safety and belonging, schools can provide crucial support for young people grappling with these complex emotions. In addition, (Bandeira et al., 2023) highlight the significance of feeling safe for adolescents in challenging environments, suggesting that creating supportive communities can enhance resilience in the face of adversity, including climate change impacts. This reinforces the need for holistic approaches that not only address the emotional challenges of climate change but also promote well-being and empower youth to contribute to solutions.

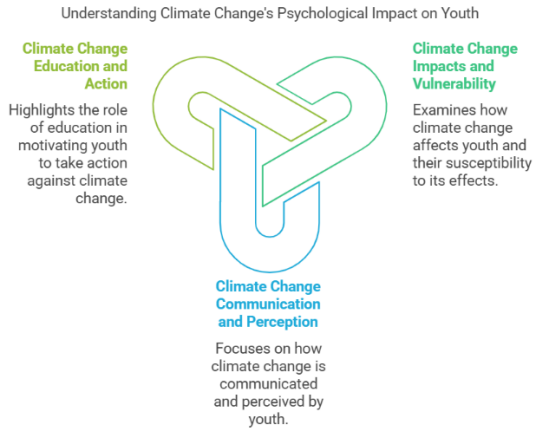
Climate Change Education and Action

Climate change significantly impacts the mental well-being of young people, leading to a range of emotional responses including anxiety, fear, and grief (Balunde et al., 2020). This emotional distress is often exacerbated by a lack of understanding and awareness about

climate change and its potential consequences (Nongqayi et al., 2022). Effective climate change education plays a crucial role in equipping youth with the knowledge and skills needed to understand and address these challenges. (Newsome et al., 2023) highlight the importance of education in fostering a sense of agency and empowerment among young people, enabling them to take action and participate in climate change mitigation and adaptation efforts. By providing accurate and accessible information, education can help to dispel misinformation and promote a deeper understanding of the complex issues surrounding climate change. This, in turn, can help to alleviate anxiety and empower youth to become active agents of change (Balunde et al., 2020; Nongqayi et al., 2022; Newsome et al., 2023).

Furthermore, fostering a sense of connection to nature and promoting pro-environmental behaviors are essential components of climate change education. (Balunde et al., 2020) suggest that encouraging youth to engage in sustainable practices and connect with their local environment can foster a sense of responsibility and motivate them to act. This approach not only benefits the environment but also enhances the psychological well-being of young people by providing them with a sense of purpose and control. By empowering youth to participate in meaningful actions, education can help to transform feelings of helplessness into proactive engagement. This can involve participating in community initiatives, advocating for policy changes, or adopting sustainable lifestyles. These actions not only contribute to addressing climate change but also foster resilience and promote mental well-being among young people (Balunde et al., 2020). The development of mindfulness and mindful awareness can also play a significant role in helping individuals regulate their emotions related to climate change (Warren et al., 2020). By cultivating present moment awareness, individuals can better manage feelings of anxiety and distress, fostering a greater sense of calm and promoting emotional resilience.

In addition to knowledge and skills, climate change education should also focus on developing critical thinking and problem-solving skills. Young people need to be able to critically evaluate information, identify misinformation, and develop creative solutions to the challenges posed by climate change. This requires an educational approach that encourages inquiry-based learning, collaboration, and active participation. By engaging in authentic research projects, simulations, and community-based initiatives, young people can develop the skills and confidence needed to address complex environmental issues. This approach not only empowers youth to take action but also fosters a deeper understanding of the interconnectedness of social, economic, and environmental systems (Newsome et al., 2023). Furthermore, exploring the cultural beliefs and practices of different communities can provide valuable insights into diverse approaches to climate change adaptation (Jellason et al., 2020). Understanding these diverse perspectives can enrich climate change education and promote culturally sensitive and effective solutions. It is also important to acknowledge the role of racialized stress in contributing to academic disparities, as highlighted by (Murry et al., 2023). Addressing these disparities requires creating supportive learning environments that acknowledge and address the unique challenges faced by students from marginalized communities.



Discussion and Conclusion

Climate change significantly impacts young people's mental well-being, often causing anxiety and a sense of lost purpose. This anxiety can hinder positive development and limit youth engagement in finding solutions. Visible climate change effects, like extreme weather and environmental damage, contribute to this anxiety and create vulnerability, especially for adolescents whose futures are threatened. This perceived lack of control can intensify these feelings, potentially leading to helplessness. Climate change's psychological burden also includes amplifying social injustices. Its effects can worsen existing inequalities, leading to increased in-group preference and potential conflict over scarce resources. This creates a challenging environment for youth who must navigate both direct climate impacts and broader social consequences. Environmental education is crucial for building resilience and promoting pro-environmental behavior. It can empower youth to become agents of change, transforming anxiety into proactive involvement. This approach shifts the narrative from vulnerability to empowerment, enabling youth to contribute to solutions and build a sustainable future.

Youth are increasingly aware of climate change, experiencing diverse emotional responses, including anxiety stemming from its existential threat. This burden is amplified by the escalating crisis and its disproportionate impact on young people. Emotional engagement is linked to how youth perceive climate information; trust in climate science is crucial, demanding clear communication. Media significantly influences public perception, potentially amplifying environmental risk concerns, highlighting the need for responsible reporting. Emotional responses vary based on individual experiences and coping mechanisms. Media acts as a risk amplifier, shaping youth understanding and emotional reactions. Media portrayals impact threat perception and related emotions. Societal factors, like cultural background, contribute to diverse responses. Openness to cultural diversity influences understanding of global issues, emphasizing the importance of varied perspectives in climate communication. Effective communication must consider media influence, societal factors, and individual experiences to resonate with diverse youth. While acknowledging emotional challenges, fostering resilience and empowering action are vital. Positive school climates supporting well-being and addressing climate anxieties are essential. Schools can provide support by fostering safety and belonging. Feeling safe enhances resilience against adversity, including climate impacts. Holistic approaches are needed, addressing emotional challenges while promoting well-being and empowering youth to contribute to solutions.

Climate change significantly impacts youth mental well-being, triggering anxiety, fear, and grief, often intensified by limited understanding. Effective climate change education is crucial, equipping youth with knowledge and skills to understand and address these challenges. Education fosters agency, empowering youth to participate in mitigation and adaptation efforts. Accurate information dispels misinformation, promoting deeper understanding and alleviating anxiety. Connecting with nature and promoting pro-environmental behaviours are essential, fostering responsibility and enhancing well-being. Empowering meaningful action transforms helplessness into proactive engagement, contributing to climate action and building resilience. Mindfulness practices also aid emotional regulation. Beyond knowledge, education must develop critical thinking and problem-solving skills. Youth need to evaluate information, identify misinformation, and devise creative solutions. Inquiry-based learning, collaboration, and active participation are key. Engaging in research and community initiatives develops necessary skills and confidence, fostering deeper understanding of interconnected systems. Exploring diverse cultural beliefs offers insights into varied adaptation approaches, enriching education and promoting culturally sensitive solutions. Addressing disparities requires supportive learning environments acknowledging the unique challenges faced by marginalized students. Ultimately, climate change education must empower youth to become informed, engaged, and resilient agents of change.

This research makes significant theoretical contributions by integrating psychological frameworks of anxiety and resilience with the sociological impacts of climate change on youth. It extends existing knowledge by specifically examining how perceived control, societal inequalities, and media influence interact to shape youth's emotional responses to climate change. Contextually, this study highlights the critical role of environmental education as a transformative tool, moving beyond merely imparting knowledge to actively fostering agency and empowerment. It provides a practical framework for educators and policymakers to design interventions that not only mitigate climate anxiety but also cultivate pro-environmental behaviors and meaningful youth engagement, thereby contributing to both individual well-being and collective climate action within diverse societal settings.

Conflicts of Interest

The authors declare that they have no conflicts of interest to report regarding the present study.

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