

**Complexities of Young People's Climate Change Meanings
and Emotions for Motivating Climate Action:
A Scoping Review**

Eleanor Pōtaka

A thesis submitted to Auckland University of Technology in partial fulfilment of the requirements for
the degree of Master of Disaster Risk Management and Development

2025

School of Public Health and Interdisciplinary Sciences

ABSTRACT

Anthropogenic climate change and the related disasters pose a real and urgent threat to the human population. As the upcoming leaders of the world, young people will be among those most seriously affected by these climate hazards, and it is vital to have their engagement in disaster risk management to ensure the health and safety of the planet and its ecosystems, including human life. Emerging research is highlighting the role of climate literacy and emotions for motivating climate action. However, little is understood regarding climate emotions, and much of the current literature does not explore the experiences of young people. It is this research gap that is explored in this thesis. Using a psychological lens based on Lazarus theory of emotion, a scoping review methodology was used to achieve three objectives. The first objective was to explore the ways in which climate change meaning is developed. The second objective was to understand the range of climate change emotions experienced, and what factors might influence these. Finally, the third objective was to investigate the relationships among climate change meanings, emotions, and motivation towards climate actions. Through a process of reflective thematic analysis, this study highlighted various findings. First is the role of climate meaning and how this influences climate emotions, both positive and negative. Second is the vital role of climate emotions, which can be activating or deactivating emotions, directly influencing motivation towards climate action. And finally, this study has highlighted that there are complex relationships among the four concepts of meaning, emotion, motivation and action, which can be further complicated through factors such as gender. Summarising these findings, this study contributes a basis for a practical guide to support young people to engage in climate action while maintaining their mental health. This guide includes four practical elements which include affective education, active learning, connection with nature and connection to others. Through this study, this scoping review has provided a map for designing future research to inform the development of tools, policies and strategies to offer better education, build psychosocial resilience, build capacity and ultimately mobilize and encourage the youth population that clearly wants to be heard in the global climate change arena.

Key words: Climate change, youth, climate emotions, climate action, mental health, motivation

CONTENTS

Abstract.....	ii
List of Figures	v
List of Tables	vi
Attestation of Authorship	vii
Acknowledgements	viii
Abbreviations.....	ix
1 Introduction	1
1.1 Introduction	1
1.2 The Complexity of Climate Change and Disasters	2
1.3 Climate Change Emotions.....	6
1.4 Research Question and Objectives.....	9
1.5 Chapter Summary	10
1.5.1 A Thesis Roadmap.....	10
2 Literature Review.....	11
2.1 Introduction	11
2.2 Climate Change Science: An Overview	12
2.3 Meaning: Climate Literacy and Risk Perceptions	14
2.3.1 Developing Climate Knowledge.....	14
2.3.2 Cultivating Climate Skills.....	15
2.3.3 Recognising Climate Values	16
2.3.4 Understanding Risk Perceptions.....	17
2.4 Emotions: Climate Change Emotions in Young People	19
2.4.1 Origins of Climate Emotions	20
2.4.2 Climate Anxiety and Climate Hope	21
2.5 Motivation for Action: Employing Models to Understand Young People’s Motivation Towards Climate Action	25
2.6 Chapter Summary	28
3 Methodology	29
3.1 Introduction	29
3.2 Scoping Review Methodology	29
3.2.1 Inclusion Criteria	30
3.2.2 Search Strategy	31

3.2.3	Source of Evidence Selection	35
3.2.4	Data Extraction	36
3.2.5	Analysis	46
3.3	Researcher's Positionality	46
3.4	Chapter Summary	47
4	Results.....	48
4.1	Introduction	48
4.2	Summary of Data and Demographics	48
4.3	Topic Summaries, Codes and Themes	49
4.3.1	The Relationships Among Climate Change Meaning, Emotion, Motivation and Action 50	
4.3.2	Theme 1: The Role of Emotion in Climate Action.....	59
4.3.3	Theme 2: Gender Differences.....	61
4.3.4	Theme 3: Connection to Nature Supports Climate Action and Improved Mental Health 62	
4.3.5	Theme 4: Connections with Others Supports Climate Action and Improved Mental Health63	
4.4	Chapter Summary	64
5	Discussion	66
5.1	Introduction	66
5.2	A Complex Web of Climate Change Meaning, Emotion, Motivation and Action.....	67
5.3	Emotion as a Risk Factor	71
5.4	A Practical Guide: Mobilising Climate Action and Maintaining Mental Health.....	74
5.5	Conclusion.....	77
5.5.1	Reflection on Research Objectives and Findings.....	77
5.5.2	Study Limitations	78
5.5.3	Recommendations for Future Research.....	79
5.6	Chapter Summary	80
	References	82

LIST OF FIGURES

Figure 1.1 Comparison of Life Experiences of Climate-related Hazards for Those Born in 1960 and 2020	1
Figure 1.2 400 Million Years of Carbon Dioxide, Temperature and Sea Level Fluctuations	3
Figure 1.3 A Complex Web of Factors Influencing Climate Change and the Associated Greenhouse Gases.....	6
Figure 1.4 The Relationship Between Climate Change Meaning, Emotion, Motivation, and Action	8
Figure 2.1 CO ₂ at Normal and Rampant Levels Demonstrating the Greenhouse Effect.....	13
Figure 2.2 A Model of the Development of Risk Perception of Climate Change	17
Figure 2.3 Climate Emotions Wheel	19
Figure 2.4 Climate Doomism in the Media Headlines	23
Figure 2.5 Climate Hope in the Media Headlines.....	23
Figure 2.6 A Theory of Motivation: Extended Parallel Processing Model.....	27
Figure 3.1 PRISMA Flow Diagram and the Identification of Literature	36
Figure 4.1 Geographic Location of Young People in the Scoping Review	49
Figure 5.1 A Model of Multi-directional Relationships Among Climate Change Meaning, Emotion, Motivation and Action	67
Figure 5.2 A Complex Model of Multi-directional Relationship Among Climate Change Meaning, Emotion, Motivation and Action	68
Figure 5.3 An Emotionally Driven and Complex Model of Multi-directional Relationships Among Climate Change Meaning, Emotion, Motivation and Action	72
Figure 5.4 Examples of Practical Elements that can Support Climate Action in the Home, Formal Education and Media	76

LIST OF TABLES

Table 2.1 <i>Definitions of Anxiety Related to Climate Change</i>	22
Table 3.1 <i>Scoping Review Inclusion Criteria</i>	30
Table 3.2 <i>Scoping Review Final Search Strategy and Search Limits</i>	33
Table 3.3 <i>List of Articles Analysed in the Scoping Review</i>	38
Table 4.1 <i>Topic Summaries and Codes from the Scoping Review Analysis</i>	50
Table 4.2 <i>Themes from the Scoping Review Analysis</i>	50

ATTESTATION OF AUTHORSHIP

"I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning."

Signed: _____ 18th March 2025

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisors for their dedication and support throughout the course of this thesis. First, to Julie, thank you for your guidance, expertise, and patience during this process. Your encouragement has been invaluable. Next, I would like to thank Loïc. Thank you for your mentorship and the support throughout the whole degree, and particularly during the course of this research.

To all the other lecturers, administration staff and library staff who supported me in this thesis, thank you! Your support and advice were always greatly appreciated!

To my husband, Dane, I look forward to us living in our Earthship one day and living the sustainable lifestyle we dream of. There aren't enough words to thank you for your relentless patience while I tucked myself away while I worked on this research. To my son, you have been a driving force for the completion of this thesis – this work is dedicated to you, your cousins and your friends. I hope to “practice what I preach” in the following 90+ pages and support you all on your journeys with climate action.

Finally, I want to acknowledge all the young people who continue to advocate and fight for a healthier planet. Your passion, resilience and courage fuels hope for a better world. This thesis is my promise to continue to fight alongside you.

ABBREVIATIONS

CCA	Climate change adaptation
DRM	Disaster risk management
DRR	Disaster risk reduction
EPPM	Extended Parallel Processing Model
GHG	Greenhouse gases
IPCC	Intergovernmental Panel on Climate Change
JB	Joanna Briggs Institute
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
PRISMA-ScR	Preferred Reporting Items for Systematic reviews and Meta-Analyses – Scoping Reviews
RTA	Reflective thematic analysis
UN	United Nations

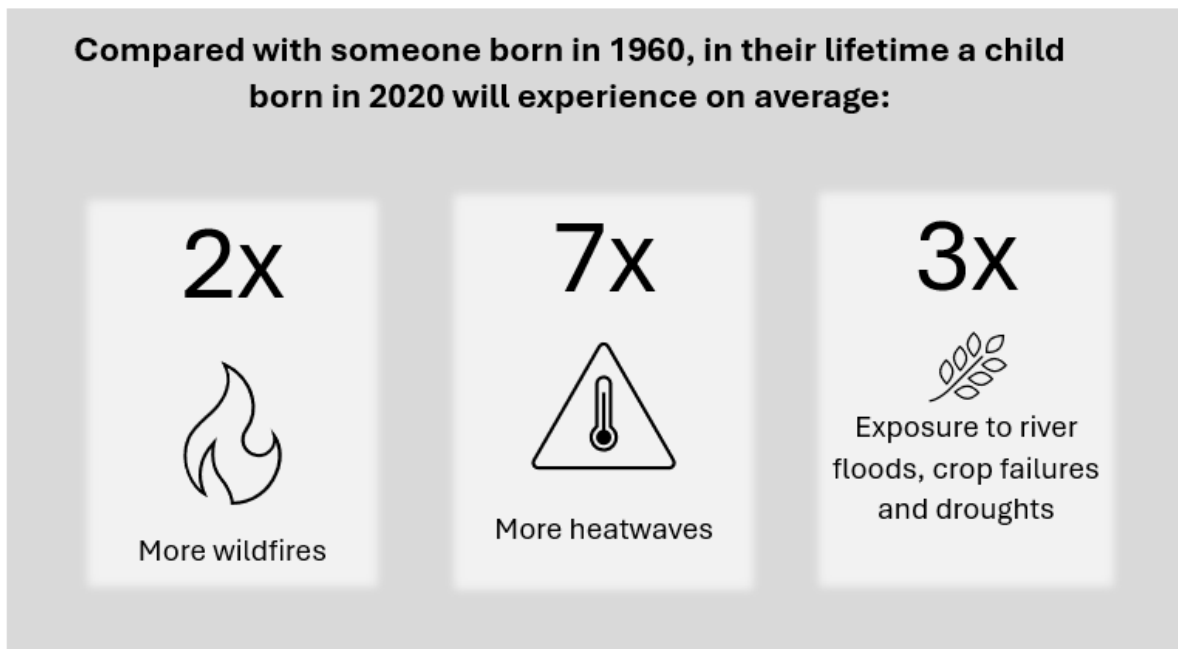
1 INTRODUCTION

1.1 INTRODUCTION

Recent headlines and international reports have highlighted the need for urgent action if humanity is to survive the increasingly tough climatic conditions that our planet is experiencing (Intergovernmental Panel on Climate Change [IPCC], 2022b). Climate change (CC) is a driver for many weather-related disasters, which are occurring globally with greater frequency and intensity (Jetten et al., 2021). By the end of the 21st century, it is expected there will be 3.4 million deaths per year related to these disasters (El-Sheikh, 2021). Thus, the need for innovative disaster risk management (DRM) through climate change adaptation (CCA) and mitigation is increasingly emphasised in global and national policy frameworks (El-Sheikh, 2021). Climate-related hazards, such as flooding, storm surges and wildfires, are expected to affect young people more than past generations, as demonstrated in Figure 1.1, below. Based on various simulations of current climate change predictions, this figure suggests that those born in 2020 will experience more climate hazards in their lifetime than those born in 1960.

Figure 1.1

Comparison of Life Experiences of Climate-related Hazards for Those Born in 1960 and 2020



Note. This figure illustrates the predicted frequency of climate-related hazards that a person born in 2020 may experience in their lifetime compared with a person born in 1960. The data is cited by Luthen et al. (2021, p. 7).

In response to the growing concern about anthropogenic climate change and the ensuing disasters, the call for action from young people has been evident. Across the globe, they have been taking legal action and regular protests have occurred in over 200 countries to raise awareness of anthropogenic climate change in the hope of creating political change (Fridays for Futures, n.d.; Sanson et al., 2019). Young people have demonstrated that they are driven and, when given the opportunity, they have shown they have the power to build capacity, increase resilience, and reduce vulnerabilities (Haynes & Tanner, 2015).

However, as young people develop climate literacy and risk perceptions (defined in section 2.3), their motivation for engaging in climate action is being impacted by their negative emotions relating to climate change, with serious concerns being raised for their mental health (Kurth & Pihkala, 2022; McBride et al., 2021). climate change can elicit both positive and negative emotions, and both can either motivate or demotivate climate action. Therefore, understanding and managing young people's climate emotions is important to ensure they are motivated towards CCA and mitigation actions such as advocating, recycling, water management, and educating others (Pihkala, 2018; Voices of Youth, n.d.).

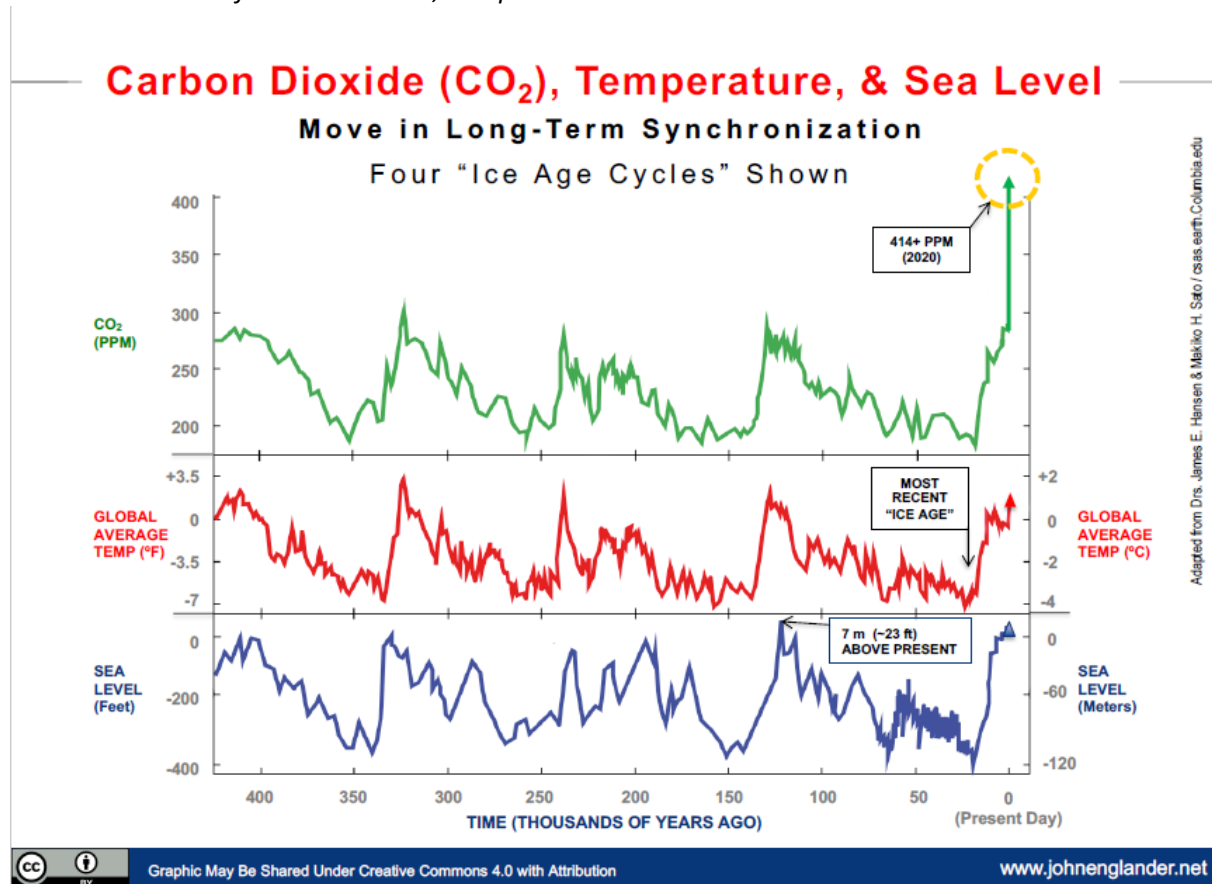
While climate change is said to be the greatest challenge to global health in the 21st century, these mental health impacts on young people seem scarcely understood (Ma et al., 2022; World Health Organization, 2018). There is a range of emerging global literature on climate emotions, and some reviews have attempted to capture this information and elicit knowledge gaps (Benevolenza & DeRigne, 2019; Lee et al., 2020; Ojala et al., 2021). However, no review has brought together the various aspects of young people's understanding and meaning derived from climate change, their emotions related to climate change and how those emotions impact their motivation towards CCA and mitigation. To create effective tools, policies and strategies to support young people's motivation for climate action, the relationships among the concepts of meaning, emotion, motivation and action must be better understood.

1.2 THE COMPLEXITY OF CLIMATE CHANGE AND DISASTERS

CC is a normal part of the Earth's cycle. These changes have occurred through natural processes over millions of years, mostly unaffected by anthropogenic changes, as demonstrated in Figure 1.2, below (Herring & Lindsey, 2020). This figure demonstrates the natural fluctuations of the earth's carbon dioxide levels, global temperature and sea level. When considering the history of the Earth, the planet is at present in a relatively cool phase of the planet's cycle, technically sitting in an ice age (Scott, 2021).

Figure 1.2

400 Million Years of Carbon Dioxide, Temperature and Sea Level Fluctuations



Note. This figure depicts the changing carbon dioxide, global temperature and sea level from the last 400 million years, demonstrating the natural fluctuations in carbon dioxide, temperature and sea level. From "Sea level rise now." by J. Englander, 2020 (<https://johnenglander.net/400000-year-graphic-shows-sea-level-temperature-and-co2/>). CC BY 4.0.

The rapidly increasing temperatures offer a novel challenge to humans. History tells us that the planet is resilient and can adapt to these temperature changes. However, humanity cannot survive these harsh conditions without significant adaptation or mitigation (Edwards et al., 2023). This can be seen in the increasingly extreme weather events that are occurring, with some countries struggling to adapt and manage the related disasters. This is clearly seen in the Pacific nations which are the most affected area globally (Ghosh, 2024). The climate hazards in this region have resulted in land loss, ocean acidification and other environmental changes, often causing the displacement of more vulnerable communities (Ghosh, 2024).

There are many factors that can impact a person vulnerability to disasters related to climate change. These include cultural norms, gender, socio-economic status and geographic location (Polcarová & Pupíková, 2022). For example, south Asian women have been identified as a vulnerable community due various compounding factors, such as patriarchal norms, their access to resources to contribute to adaptation strategies and their ability to "cope" in changing socio-ecological environment (Sultana, 2014). These individual factors demonstrate how the context of a person can

influence how a person engages with climate change meaning, emotions, motivation and action. The ongoing combination of extreme weather events, alongside vulnerable and exposed communities, will result in further global disasters (Newman & Noy, 2023).

For the purposes of this thesis, climate change is defined as:

a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use. (IPCC, 2022a, p. 544)

The IPCC definition stated above has been selected because it makes an important distinction between climate change relating to natural processes and climate change relating to external forces such as anthropogenic changes (Eyring et al., 2021). While it is important to recognise that the earth's changing temperature can be part of a natural process, the rate at which anthropogenic change is accelerating the rising temperature is a serious concern (IPCC, 2023). This pace of heating poses a significant risk and will continue to increase the likelihood of hazards such as droughts, flooding and cyclones (Clarke et al., 2022).

However, climate change consists of a complex web of processes, as shown in Figure 1.3, below. All these factors must be considered if humanity is to adapt to and mitigate the risks relating to climate change. It is within this complexity that disaster management and climate change science become intrinsically linked. Without significant changes to human behaviours, the temperature of the planet will continue to increase, the likelihood of hazards will increase and the chances of adaptation and mitigation will reduce (Clarke et al., 2022).

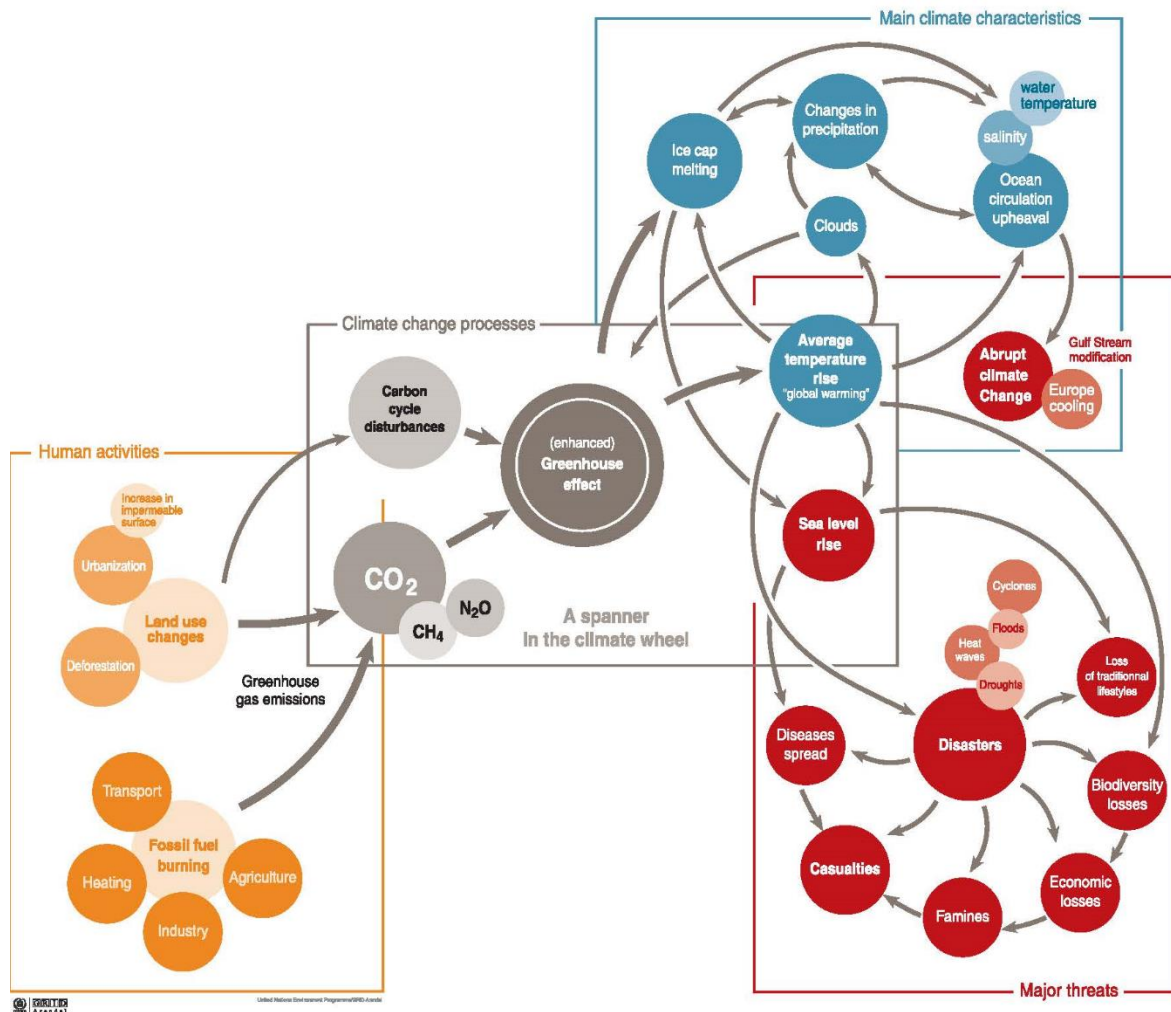
Due to this complex web, an interdisciplinary and global approach is required to understand how to best manage climate change. The United Nations (UN) and many other international organisations are creating policies and guidelines to help countries work together and commit to disaster risk reduction (DRR) and CCA. However, such strategies take a co-ordinated effort and are often expensive, becoming unattainable for many countries that do not have the financial means to support mitigation and adaptation strategies, further adding to the complexity of managing climate change at a global level. Political environments can also impact the management of anthropogenic climate change, such as the United States of America's withdrawal from the Paris agreement in 2017, which was predicted to have long term financial impacts for developing economies and their ability to engage in climate action (Chestnoy & Gershinkova, 2017). This highlights how economic status of a country can influence their resources to engage in DRR and CCA.

Adding to the complexity of an interdisciplinary and global response is the diverse understandings and views relating to anthropogenic climate change and the suggested urgency of mitigation and adaptation. Within this study, this will be referred to climate meaning and is based on the definition of climate literacy by Kolenatý et al. (2022). They state that climate literacy is the process upon which one builds climate knowledge and values/attitudes and skills or competencies. These authors report that climate literacy increases awareness and thus concern, and that it is fundamental for increasing motivation towards climate action. Risk perception is also considered in as a factor of climate meaning it is an important aspect of DRM, and can be influenced by climate literacy (Libarkin et al., 2018).

A person's climate literacy may impact their willingness to engage in climate action. An example includes some views of contrarian scientists who have denied the existence of a threat to the planet (Dunlap & Brulle, 2020). There are others outside of the scientific community whose religious views impact their perception and attitudes towards climate change and their perceived lack of efficacy (Morrison et al., 2015). Other arguments propose that statistics are not being accurately reflected in climate reports, and those reports are exaggerating the urgency and impacts relating to climate change (Lomborg, 2021). Such views can be supported by a range of actors such as contrarian scientists, corporations and the media, with the motivators of these views relating to economic and/or ideological views (Dunlap & Brulle, 2020).

Figure 1.3

A Complex Web of Factors Influencing Climate Change and the Associated Greenhouse Gases



Note. This image represents the complex web of process that affect climate change and the associated greenhouse effect. All factors must be considered to reduce risk and minimise hazards. From *Climate change: Processes, characteristics and threats*, by P. Rekacewicz, E. Bournay & UNEP/GRID-Arenda, 2005. (<https://www.grida.no/resources/6889>).

This variety within the climate change discourse creates lively debates, often polarising people and, in turn, impacting the communication and sharing of knowledge about verified information (Bolsen & Shapiro, 2018). All views must be explored and understood because these beliefs, values and perceptions affect the meaning one attributes to climate change, and can hinder efforts for DRR and CCA (Dunlap & Brulle, 2020). It is through developing this meaning that a young person may experience climate change emotions.

1.3 CLIMATE CHANGE EMOTIONS

As a person develops their knowledge, values and perceptions in regard to climate change (meaning), emotions may be elicited. People across the planet are experiencing climate emotions

which are defined as “affective phenomena [that] are significantly related to the climate crisis” such as climate anxiety and climate grief (Pihkala, 2022, p. 1). Research has found that some negative climate change emotions have had such a negative impact on people’s mental health that it has led them to seek therapy to manage the challenging emotions they are experiencing (McBride et al., 2021; Tsjeng, 2019). This poor mental health associated with climate emotions has become particularly concerning for youth populations (Ma et al., 2022; McBride et al., 2021). Due to such findings, in a 2022 policy brief, the World Health Organization (2022) stated that governmental responses to climate action must include mental health support.

The emotions that a young person may experience can vary wildly. A commonly cited emotion is that of anxiety. Anxiety can hinder a person’s motivation or ability to engage in pro-environmental behaviours (also referred to as climate action throughout this thesis). Pro-environmental behaviours are described as behaviours that improve environmental conditions, such as mitigation and adaptation strategies (Kurth & Pihkala, 2022; Tian & Liu, 2022). It is estimated that 70% of people aged 18-24 experience some kind of climate anxiety and this anxiety can be debilitating, resulting in worsened mental health, creating a spiral of negative outcomes (Friends of the Earth, 2020; Taylor & Murray, 2020). On the other hand, the literature emphasises that there are forms of anxiety that can motivate people to engage in pro-environmental behaviours, such as practical anxiety (Kurth & Pihkala, 2022; Tian & Liu, 2022). Thus, as demonstrated, although anxiety is a stereotypical “negative” emotion, it can have a positive outcome.

Regarding the positive emotions elicited by climate change, one commonly cited emotion is hope. Research has found that when a person has a feeling of hope, it can increase their motivation to act (Kelsey, 2020). However, just as anxiety can have negative and positive outcomes, hope has also been argued to decrease motivation by creating a sense of easement, resulting in demotivation (Kelsey, 2020; Pihkala, 2018). Considering just these two emotions, anxiety and hope, demonstrates that there is much to be understood when considering how emotions may influence a young person’s engagement in climate action.

Young people have loudly shared these complex emotions through avenues such as the Fridays for Futures global climate protests. They have even taken legal action for climate justice (Sanson et al., 2019), a process of advocating for fairness in decision-making, sharing the responsibilities relating to climate change, and supporting smaller countries that may not have the resourcing for adaptation and mitigation (Arcaya & Gribkoff, 2022). While the global Fridays for Futures brought a wave of youth engagement in more recent years, many other activist groups predate this group. For example, Friends of the Earth conducted their first march in 1972, and now

continue to fight for climate justice across 71 countries (Friends of the Earth, n.d.). With over 50 years of well-documented activist activity, there is limited data to understand how activism has changed over time. An article by the British House of Commons Library suggests that there has been a rise of concern about climate change since 2018 and this has resulted in increased activist activities (Ares & Bolton, 2020). They write that 2018 was a pivotal point as the IPCC publishing a report detailing the actions required to limit the global temperatures in line with the Paris agreement. They also note that 2018 is the year that Greta Thunberg began her solo school strike, leading to the Fridays for Futures movement, and Extinction Rebellion was formed as a non-violent civil disobedience group in the UK.

Regardless of this passion from previous generations and the current generation of young people, young people are often perceived as victims in need of protection due to their lack of voice and reduced capacity to inform decision-making processes, communicate risks and take action (Haynes & Tanner, 2015). Yet, young people have demonstrated otherwise; they have shown that, when able to, they can effectively be involved in communicating risks, prioritising actions and influencing decision-making (Haynes & Tanner, 2015). Thus, given the right resources, youth have the power to inform capacity building, resilience building and reducing vulnerabilities relating to climate change.

As the next generation of scientists, politicians, social workers, engineers and much more, it is vital to support and encourage young people to be motivated to engage in climate action. To do this, research must be undertaken to better understand what influences young people to be motivated to engage in climate action. The literature suggests that as a young person develops their meaning of climate change, they will develop emotions, which in turn influence their motivation towards climate action (as shown in Figure 1.4). This idea is supported by authors such as Kurth and Pihkala (2022) and Kelsey (2020), who strongly emphasise the role of emotions in engaging people in climate action. To support action towards CCA and mitigation, it is beneficial to understand the relationships among these concepts of meaning, emotion, motivation and action so that tools, policies and strategies are created that will successfully support young people to engage with and manage climate change, while maintaining their mental health.

Figure 1.4
The Relationship Between Climate Change Meaning, Emotion, Motivation, and Action



Note. This figure shows how a young person may experience the relationship between meaning, emotion, motivation and, finally, action.

1.4 RESEARCH QUESTION AND OBJECTIVES

Anthropogenic climate change is a clear concern for young people. Without significant changes in human behaviour, the hazards associated with climate change have the potential to limit life and change the way in which life can survive (IPCC, 2023). Young people are those who will be leading the climate change discourse in the near future and will therefore be at the forefront of conversations, policies, and actions to adapt to and mitigate the negative impacts of anthropogenic climate change. However, the emotions they are developing are impacting their mental health and thus their ability to engage in climate action (Kurth & Pihkala, 2022; McBride et al., 2021).

It is these emotions that need to be understood in relation to how a young person develops meaning and motivation towards action. By understanding the relationships among the concepts of meaning, emotion, motivation and action, educators, policy makers, and significant people in the lives of youth will be able to support them to be motivated to engage in climate action while maintaining their mental health. The study of climate emotions is an emerging field of psychology within disaster management research, and various reviews have been conducted to explore perceptions of climate change and related emotions (Benevolenza & DeRigne, 2019; Lee et al., 2020; Ma et al., 2022; Ojala et al., 2021). However, this research largely explores adult emotions and adult motivation towards CCA and mitigation, and the global youth population is not adequately represented or understood in the literature.

This thesis aims to address this research gap. Building upon the author's background in psychology and youth work (more on the author's positionality can be found in section 3.3), this thesis utilised a scoping review methodology to map the current knowledge base on the relationships among the four concepts of meaning (defined through climate literacy and risk perception), climate emotion, motivation and climate action. Through identifying any gaps and inconsistencies in the literature, further research can be designed to inform the development of tools, policies and strategies to improve education, build psychosocial resilience, build capacity and ultimately mobilise and encourage the youth population that clearly wants to be heard in the global climate change arena.

The overarching question this thesis aims to address is 'How do anthropogenic climate change meanings and emotions influence youths' motivation towards climate action?'

This overarching question is addressed through three objectives, which are:

- to explore the ways in which climate change meaning is developed;
- to understand the range of climate change emotions experienced, and what factors might influence these; and
- to investigate the relationships among climate change meanings, emotions, and motivation towards adaptation and mitigation behaviours and actions.

1.5 CHAPTER SUMMARY

This chapter has identified the urgency relating to climate change, and the growing concern that if an interdisciplinary and global response is not forthcoming, there is a risk of creating uninhabitable conditions (Edwards et al., 2023). This chapter also highlighted the mental health impacts of climate change, and how this is impacting young people in particular. As upcoming leaders, it is important to ensure that young people are given the resources to manage climate change while maintaining their mental health. As this is an emerging area of research within disaster management, a scoping review design was created to map out the literature relating to the relationships among climate change meaning, emotion, motivation and action in young people. This will enable future research to explore any gaps and inconsistencies in this emerging knowledge base.

1.5.1 A Thesis Roadmap

The following chapter, the literature review, expands on this introduction chapter by delving deeper into this topic. The literature review uses Lazarus' (1991) theory of emotions to define and separate the concepts of meaning, emotion, motivation and action. Within this framework the literature review explores climate change science and how young people engage in this knowledge to develop meaning, emotion, motivation and action. Chapter 3, the methodology chapter, describes the process by which the scoping review was conducted using PRIMA and JBI guidelines, leading to thematic analysis as described by Braun et al. (2019). Chapter 4 describes the results of this scoping review, outlining topic summaries, codes and themes. Finally, in Chapter 5, these results are discussed alongside the current knowledge base as outlined in Chapter 2, providing a base from which future research can be conducted.

2 LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 provided an overview and rationale for this scoping review by highlighting the need to understand how young people engage in CCA and mitigation actions to manage anthropogenic climate change. To understand this, the relationships among the concepts of meaning, emotion, motivation and action are to be explored. This chapter provides an overview of the current research relating to these four concepts. To complete this literature review, a narrative approach was adopted to enable the author to encompass a broad range of literature and sources which included academic literature including review articles as well as grey literature.

As an overarching framework for this literature review, this thesis considers Lazarus' (1991) cognitive theory of emotion to understand the relationships between meaning, emotion, motivation and behaviour. This psychological theory highlights the role of meaning-generation that influence emotional responses, which in turn impact human behaviour. Lazarus' definition of meaning making suggests that meaning is generated via various cognitive processes such as conscious processing (i.e. knowledge acquisition and reasoning) and subjective interpretations of events (cognitive appraisal). These cognitive processes reflect the concept of climate literacy as defined in section 1.2. Lazarus then suggests these cognitive processes influence emotions and behavioural responses (Lazarus, 1991). When these theories are adapted to the concept of climate change, this would suggest that a young person's emotion will arise from their meaning-generation, in turn influencing their motivation for engage (or not) in climate action.

As this study explores young people globally, experiences of factors such as gender, geographical location, socio-economic and political environments will be diverse and this individual context is important for understanding meaning, emotion, motivation and climate action. A theory that can account for these individual differences in the meaning-making process is Kahan's (2012) cultural cognition theory of risk. This theory suggests that individuals interpret information such as scientific knowledge and experiences through their cultural lens and group identification. This theory offers an additional layer of cognitive processing that accounts for diversity of young people's individual contexts. This subjective experience lends itself to the interpretivist nature of this study which acknowledges that people have different realities based on social constructions, which is further discussed in section 3.3.

While this study predominantly uses a psychological lens to understand the concepts of meaning, emotion, motivation and action, it is acknowledged that these concepts are broadly used across various disciplines. Examples of this diversity include philosophical theories on meaning

(Speaks, 2010), biological theories on emotions (Pribram, 1980), evolutionary theories on motivation (Schaller et al., 2017) and sociological behavioural theories of behaviour (Agoben, 2017). These diverse yet overlapping knowledge bases are acknowledged in this literature review by discussing findings from various disciplines.

In this chapter, section 2.2 expands on the climate change science identified in Chapter 1, exploring the controversy that is often seen throughout this discourse. Section 2.3 considers how climate change literacy is developed, shaped and then reflected in one's risk perception. Section 2.4 considers how emotions are impacted by this meaning, exploring emotions such as anxiety and hope. Finally, in section 2.5, these emotions are discussed in relation to the facilitation of engagement and motivation for climate action and the actualised CCA and mitigation behaviours. The chapter is summarised in section 2.6.

2.2 CLIMATE CHANGE SCIENCE: AN OVERVIEW

As noted in the previous chapter, climate change is a natural process by which the earth's atmospheric and surface temperature increases and decreases. Chapter 1 also identified that anthropogenic climate change is a rising concern, and an interdisciplinary and global approach is required to manage this in the future. As referenced in section 1.1, the causes of climate change have long been debated, with often varying views on the causes and urgency to act, if at all, to manage anthropogenic climate change. It is this knowledge or belief about climate change that is attributed to a person's meaning and it can have serious implications for a person's motivation to engage in climate action. It is therefore important to understand such controversies and debates within climate science to understand how they may impact a young person's meaning and emotions.

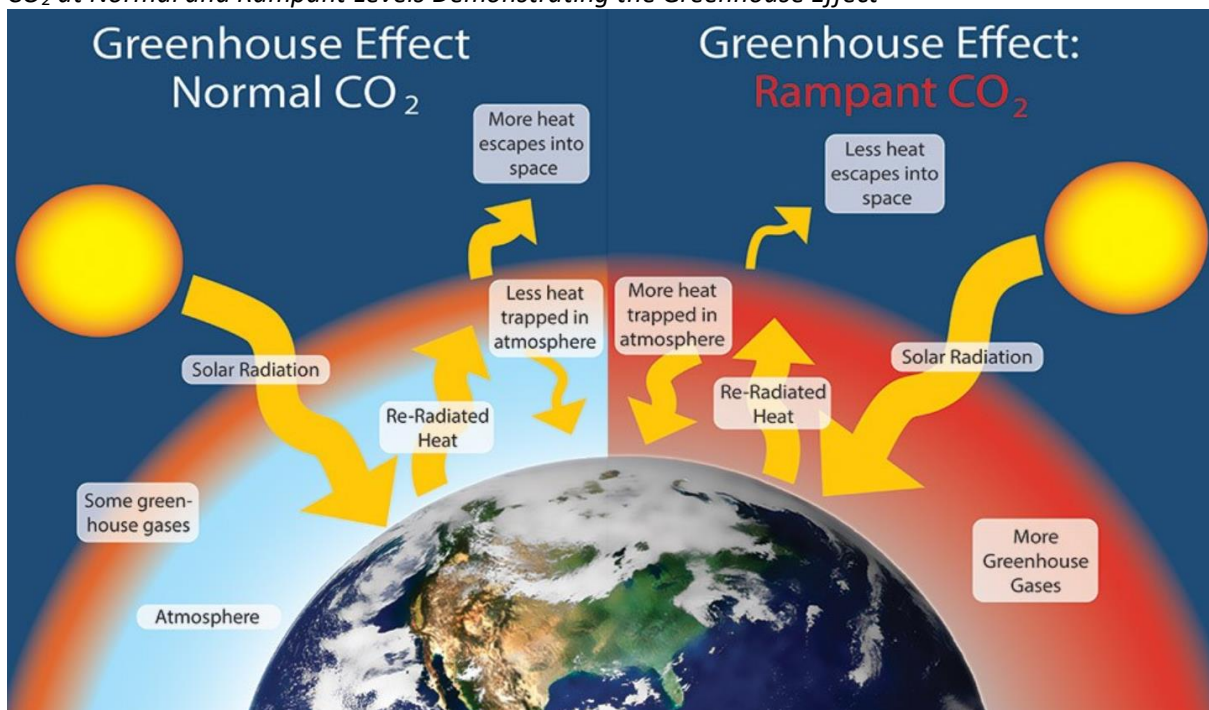
Controversies about climate change can be seen in various forms of misinformation and disinformation. This can have significant impacts on human behaviour, increasing disaster risk and DRM efforts (Omar & Van Belle, 2024). The risks of incorrect knowledge were highlighted in the 'infodemic' during the Coronavirus pandemic. During this time, an overwhelming amount of information was available which included many falsehoods. Having a false understanding, or meaning, changed some people's risk-taking behaviours and hindered efforts to control the virus (Zarocostas, 2020). This infodemic highlights the importance of ensuring youth are armed with valid and reliable information pertaining to climate change meaning. This section now delves further into the science of climate change.

The climate change process has historically been a slow process, as previously identified in Figure 1.2. Drivers of this change can be attributed to a range of factors, such as the sun's activity or volcanic eruptions (UN, n.d.-b). However, since the 1800s, anthropogenic changes have been the

biggest driver of climate change with a sudden increase in atmospheric temperature being observed (UN, n.d.-b). Anthropogenic drivers of climate change include actions such as fossil fuel consumption, land use changes and agricultural methods (Zkilibar, 2023). Through various modelling systems, 2032 is predicted to be the time when the negative outcomes of climate change will be irreversible, making human survival an everyday challenge (Hausfather, 2020). While the urgency of managing anthropogenic climate change is now generally accepted among the scientific community, many contrarians report otherwise, creating doubt about the need for urgent DRM, and affecting societal views and motivation for action (Shepherd, 2011).

The primary anthropogenic actions that are driving this accelerated climate change is from the burning of fossil fuels, such as coal, oil and gas, which contribute to the greenhouse effect (UN, n.d.-b). These fuels are used in numerous ways, from fuel for transportation to coal fires in the home. In the burning of fossil fuels, gases are released into the atmosphere, adding to the volume of greenhouse gases (GHGs) that naturally occur. GHGs are essential for the functioning of a habitable planet and are often referred to as a 'blanket' keeping the planet at an ideal temperature to support life by trapping heat (National Aeronautics and Space Administration, n.d.). This is known as the greenhouse effect, as shown in Figure 2.1. However, when the level of GHGs is too high, this blanket becomes too "thick", resulting in too much heat being trapped. Aside from the burning of fossil fuels, GHGs are also released into the atmosphere by deforestation and agriculture (UN, n.d.-b).

Figure 2.1
CO₂ at Normal and Rampant Levels Demonstrating the Greenhouse Effect



Note. This image illustrates the ‘blanket’ of GHGs, and how heat becomes trapped, increasing the atmospheric temperature. From "What is Climate Change?" by National Park Service, 2020, October 16 (<https://home.nps.gov/goga/learn/nature/climate-change-causes.htm>).

This resulting increase in temperature from GHG emissions is a risk driver for many hazards, such as species loss, forest fires and increased rainfall (Clarke et al., 2022). Deforestation is of particular concern as this vegetation also helps to absorb extra excess carbon dioxide from the atmosphere, supporting the balance of GHGs (Ministry for the Environment, 2024). However, despite this awareness of the impacts of anthropogenic climate change, humans continue to engage in anti-environmental behaviours and inaction towards CCA and mitigation. As discussed later in this thesis, the psychology behind inaction is complex, with climate literacy and perceptions relating to climate science impacting a person’s climate emotions, and their motivation towards climate action.

2.3 MEANING: CLIMATE LITERACY AND RISK PERCEPTIONS

This section expands on the literature outlined in the introduction chapter by growing an understanding of how a person makes meaning relating to climate change through developing climate literacy (climate knowledge, climate values, climate skills) and risk perception. ‘Climate literacy’ is a relatively new term that has been described by Kolenatý et al. (2022) (as defined in section 1.2). It is through developing climate literacy and risk perceptions that emotions may arise. The concepts of climate literacy and risk perceptions are explored below. Section 2.4 then discusses the emotions that may be elicited by this meaning.

2.3.1 Developing Climate Knowledge

Young people’s climate knowledge can be developed through three avenues: the home environment, formal education in school/university, and via the media. Primarily, young people may begin to learn about climate change in their home environment from, for example, direct experiences (such as severe weather events) or indirect experiences (such as cartoons or local museums). This knowledge developed at a young age creates a solid foundation upon which all other climate change knowledge rests (Lee et al., 2020). In the home environment, intergenerational learning has also proven important for improving climate knowledge, with young people positively improving older generations’ climate knowledge, and vice versa (Lawson et al., 2018). In the home environment, young people may also begin to experience physical and psychological proximity to climate-related disasters, and this is associated with better levels of climate knowledge (Lee et al., 2018).

The second avenue along which a young person may develop climate knowledge is formal education in school or university. This space of learning is where young people begin to strengthen

their climate knowledge, as defined by Kolenatý et al. (2022). This formal education plays an important role in challenging previously held beliefs and misconceptions about climate change that may have developed at a younger age (Lee et al., 2020). Formal education therefore has a vital opportunity to improve climate knowledge by creating fun, interactive and engaging materials, which can result in empowerment and motivation to take action against climate change (UN, n.d.-a).

A third avenue on which young people develop climate knowledge is media. In particular, social media can have a significant influence on young people, making both negative and positive impacts on knowledge sharing (Sivakumar et al., 2023). Social media can be positive environments for young people, offering places to seek community, information, and news. However, it is also a platform for the sharing of misinformation which can contribute to climate alarmism, 'doomism', climate change scepticism and climate change denial (Treen et al., 2020), as well as creating false climate meaning.

Despite the multiple avenues for improving climate knowledge, international research provides mixed findings regarding young people's knowledge of climate change. Some research shows that young people aged 18-25 years are the most informed about climate change compared with other age groups. On the other hand, some research suggests that climate knowledge is lacking in young people who often confuse climate change terms and the causal effects associated with climate change, potentially resulting from an inadequate school curriculum (Corner et al., 2015). With research indicating that climate change literacy is important for motivation towards pro-environmental behaviours (Kolenatý et al., 2022), this lack of climate literacy observed in youth is of concern.

2.3.2 Cultivating Climate Skills

Climate skills, or competencies, include, for example, communicating and assessing risks. These skills are often developed as people build on their climate knowledge, occurring in the home, education and media. Such skills are vital, particularly for decision-making relating to climate action (Kolenatý et al., 2022). An important skill is critical thinking, which enables young people to decipher and filter information through what they already know about climate change. When exposed to misinformation and disinformation, some young people may not yet have the skills to recognise what is a credible and reliable source of information. Research suggests that once these scientific misconceptions are in place, it is challenging for them to be overwritten, particularly in older children and teenagers (Lee et al., 2020). This particularly emphasises the importance of digital literacy skills to ensure young people can sort fact from fiction.

Climate skills also teach young people about self-efficacy and how they can manage climate change through mitigation and CCA. Many skills can directly translate into climate action, such as being able to effectively communicate may allow a young person to advocate for the importance of recycling. Critical thinking skill may support a young person to find innovative DRM strategies. All these skills can be developed in the home, through formal education and through the media, which together provide many opportunities for young people to improve their climate literacy and thus increase motivation for action.

2.3.3 Recognising Climate Values

As suggested by Kolenatý et al. (2022), values are an important domain for developing climate literacy. Understanding the values associated with climate change is important for creating fair and effective local policies and solutions (Graham et al., 2014). By incorporating values in disaster management, social accountability increases, as well as support for disaster management plans (Rawluk et al., 2017). Like climate literacy, values relating to climate change can be developed in the home environment, through formal education and through the media.

In the home environment, an example may be through religious and cultural beliefs or family attitudes towards the environment. An example relating to religious beliefs is using the story of Noah's Ark to help teach and inform disaster preparedness during extreme weather events (Sun et al., 2018). Such values may then be challenged when entering the school system and learning of other worldviews and developing further climate knowledge and skills. Finally, as young people begin to engage with media and explore worldviews outside of their home and school, their values once again may be impacted. One prominent value observed in youth culture that is often demonstrated through social media is that of activism and standing up for one's beliefs. This can be seen by the climate strikes happening globally, with youth being outspoken about the need to protect each other with increased concerns for the environment.

When considering values, it is important to recognise the cultural influence. For example, the current values system often seen in the Global North encourages the exploitation of our environmental resources, such as land, crops and forests (Kelman et al., 2015). This value is embedded in many societies that value money and a linear economy, where products are made with natural resources with the end purpose of them being disposable. This is the opposite of a circular economy where products are created with the intention of them being reused, recycled or repurposed (Ekins et al., 2020). This value can be seen in certain Indigenous societies where a circular economy is central to some of their fundamental beliefs. Such societies and belief systems

could provide important understandings of how to implement sustainable methods of DRM (Al Mamun et al., 2024).

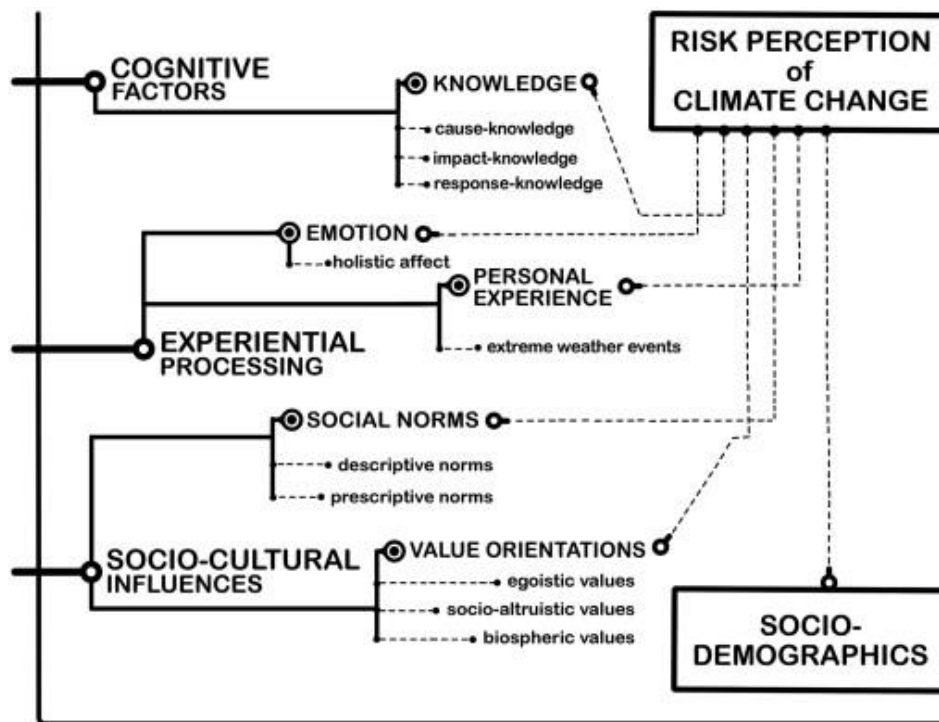
2.3.4 Understanding Risk Perceptions

Risk perceptions are an important consideration for DRM as they can impact the extent to which policies and strategies are effective (Mañez et al., 2016). This is because risk perceptions have the potential to transform a person's motivation to act, learn, and to understand consequences, which in turn can impact the effectiveness of plans and policies for environmental management (Ford et al., 2012). Therefore, when considering how to increase engagement in CCA and mitigation efforts, it is important to incorporate public risk perceptions to help motivation towards pro-environmental behaviours.

Risk perceptions are a result of external information being filtered through the lens of a person's existing knowledge, values and personal experiences, among other filters, as demonstrated in Figure 2.2 (Talwar, 2021). Therefore, as a young person develops their climate literacy through knowledge, skills and values, they can use this literacy as a lens to understand risk perceptions. One factor that influences risk perceptions is physical proximity. Research shows that those who experience damaging outcomes after climate-related weather events are most likely to perceive risk and to be concerned about future events (Lujala et al., 2015). Lee et al.'s (2020) systematic review of studies from 51 countries argued that young people of the Global South expressed higher levels of belief and concern than those in the Global North. They believed this was due to the perception for those in the Global North that climate change was something that happened far away whereas, in the Global South, the proximity to the adverse effects of climate change is high, and this appears to be reflected in their higher risk perceptions. This highlights how proximity and geographic context of a young person can influence their risk perception.

Figure 2.2

A Model of the Development of Risk Perception of Climate Change



Note. Various factors must be considered to understand a person's risk perceptions of climate change. From "The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model," by S. Van Der Linden, 2015, *The Journal of Environmental Psychology*, 41, p. 117. (<https://doi.org/10.1016/j.jenvp.2014.11.012>). Copyright 2025 by Sage Publications. Reprinted with permission.

Another factor influencing risk perceptions is psychological distance (or psychological proximity). This refers to those issues that are subjectively experienced as being close or far away from a person in both time and space. This distance can influence how people understand information relating to the issue, and also behaviours relating to them (Lee et al., 2018). If people feel "close" to an issue, they are more likely to engage in pro-environmental behaviours. A 2019 study found that young people from places such as the United Kingdom and Australia perceived climate change to affect "other people and places", rather than themselves, and thus may be less likely to engage in pro-environmental behaviours (Gubler et al., 2019).

The perception of risk is therefore a complex process that a young person may experience, with physical and psychological proximity affecting their risk perceptions and climate literacy, and thus their meaning of climate change. Once climate literacy is combined with risk perceptions, it is understandable that young people may become overwhelmed when learning about the risks associated with anthropogenic climate change. The following section discusses these complex emotions that can arise from developing this meaning associated with climate change.

2.4 EMOTIONS: CLIMATE CHANGE EMOTIONS IN YOUNG PEOPLE

Emotions are an intricate and frankly overwhelming experience for young people, adding to the deeply complex nature of this research. The word 'emotion' is derived from the Latin 'ēmovēre' which means to disturb or to move (Albrecht, 2019). One definition of emotions is that they are neurological responses to events or experiences, and they can be experienced differently by different people (Šimić et al., 2021). Emotions specific to climate change can be complex and can vary greatly from person to person, as demonstrated in the climate emotions wheel in Figure 2.3.

Figure 2.3
Climate Emotions Wheel

Climate Emotions Wheel



Climate Emotions Wheel © 2024



ClimateMentalHealth.Net

Note. This emotions wheel expresses the complexity of emotions experienced due to climate change. From *Climate emotion wheel*, by A. Kamenetz and P. Pihkala, 2023. (<https://www.climatementalhealth.net/wheel>). CC BY-SA.

The literature on climate change emotions extends to a diverse range of disciplines and from this is an array of climate emotions, as demonstrated in Figure 2.3. Diverse perspectives include

Pihkala's (2025) view on theology and eco-spiritual grief, Kevorkian (2019) research on environmental grief which can be impacted by geographic location and using this grief to motivate lifestyle and political change, and Lertzman's (2015) psychoanalytical research on environmental melancholia. These contribute to the diverse climate emotions tapestry and suggest that emotions are not only a cognitive and psychological reaction as suggested by Lazarus (1991), but often an existential and moral one, rooted in the broader context of a person, such as culture, geographic and socio-political environments (Marczak et al., 2023; Woodbury, 2019).

Recent empirical research suggests that emotions are one of the biggest predictors of climate change action (Brosch, 2021). Therefore, it is important to unpack this concept to best understand what may influence these emotions and how they are experienced. Section 2.4.1 details the origins of climate emotions, followed by a more detailed review of some of these emotions, particularly anxiety and hope, in section 2.4.2.

2.4.1 Origins of Climate Emotions

Throughout the literature, there are various origins of climate emotions. A study of 323 North Americans adults found the possible predictors of poor mental health related to climate change were climate change knowledge, prior experience with impacts of climate change, pre-existing generalised anxiety disorders, climate change worry, climate change risk perceptions, and media exposure to climate change information (Asgarizadeh et al., 2023). All these factors reflect the ideas set out in section 2.3, combining climate literacy and risk perceptions. While Asgarizadeh et al.'s (2023) study related to adults, it may indicate some factors that result in poor mental health among young people also. To add to these predictors of poor mental health related to climate change, the period of youth often has additional challenges which can impact a person's mental health. The UN defines youth as a time of transition from the dependence of childhood to the independence of adulthood. During this transitional period, many changes may happen, such as becoming financially independent and transitioning out of school and into the workforce. Such life changes can be stressful and therefore could exasperate emotional challenges, which adds to the complexity of climate change emotions for young people (Pihkala, 2022; Young et al., 2011).

As alluded to in the study by Asgarizadeh et al. (2023), there is an important distinction between the types of situations that can evoke emotions relating to climate change. Ma et al. (2022) analysed 92 articles exploring risk factors and protective factors of mental health in young people. They described three pathways to poor mental health relating to climate change: direct exposure, indirect exposure, and flow-on effect pathways. Direct exposure refers to first-hand experiences of climate-related hazards, such as wildfires, flooding and cyclones, relating to the aforementioned physical proximity. They suggest that this direct exposure creates a significant burden on young

people's mental health and can lead to post-traumatic stress disorder (PTSD), anxiety, depression and, in some cases, higher suicide rates. Such experiences could then be compounded by other factors such as media, cultural views and values, as mentioned in section 2.3.

Indirect exposure pathways occur through thinking, perceiving, and observing climate change, without necessarily experiencing a climate-related hazard; this is also referred to as psychological proximity, as mentioned in section 2.3.4. This could be experienced through formal education, witnessing environmental changes such as biodiversity loss, or through the media. Such exposure can also result in feelings of depression, anxiety, sadness and hopelessness (Ma et al., 2022).

The third pathway is the flow-on effect pathway, referring to those impacts that may be broader reaching, such as the impacts on physical health, conflict, interruption to family function and food shortages. These secondary effects also carry with them the possibility of depression, anxiety and PTSD (Ma et al., 2022). An example of this is forced migration, which has been shown to significantly impact young people's psychosocial recovery from disaster (Sanson et al., 2019).

Regardless of the pathway along which a young person's climate emotions originate, it is particularly important to note that due to young people's ongoing neural and cognitive development, their capacity to manage stress and uncertainty, as often presented with climate change, is reduced, and therefore psychosocial wellbeing is reduced (Bartlett, 2008). As a result, young people can feel powerlessness or a loss of control (Bartlett, 2008; Clayton et al., 2017). These suggestions paint a picture of helpless young people. However, as can be seen in the uprising of youth climate leaders, there is a sense of passion and determination among young people. This provides a more positive outlook for our young people's mental health, demonstrating resiliency, capacity and resourcefulness. Such views of young people may relate more to the "positive" emotions in the climate emotions wheel, such as hope, empowerment and empathy.

2.4.2 Climate Anxiety and Climate Hope

As noted above, climate emotions originate through various pathways. Of these emotions, anxiety and hope are two commonly cited emotions that are often discussed in term of motivation towards climate action (Lawrance et al., 2022a; Sangervo et al., 2022). Climate anxiety has a higher prevalence in young people compared with other age groups, and it can be experienced in many different ways; it has various names and definitions, as demonstrated in Table 2.1 (Hickman et al., 2021; Pihkala, 2020). These definitions further depict the complexity of this emotion by recognising a range of other challenging emotions such as grief, shame, guilt, and desperation. The study of climate anxiety has produced a growing body of research, and further work is needed to define the

concept of climate anxiety, in order to support the ongoing progress in this sub-field of psychology and DRM.

Table 2.1
Definitions of Anxiety Related to Climate Change

Term	Definition
Climate anxiety (Browne, 2023, para. 1)	“a state of heightened anxiousness, climate anxiety is often described with terms like guilt, grief, and desperation as an overwhelming sense of doom about the state of the environment arises”
Climate change anxiety (Health Navigator New Zealand, 2023, in "What is climate change anxiety" section)	“a sense of fear, worry or tension linked to climate change”
Climate anxiety (Climate Psychology Alliance, 2020, p. 22)	“heightened emotional, mental or somatic distress in response to dangerous changes in the climate system”
Climate anxiety (Pihkala, 2019, p. 25)	“challenging emotions, experienced to a significant degree, due to environmental issues and the threats they pose”
Eco-anxiety (Pihkala, 2018, p. 546)	“various difficult emotions and mental states arising from environmental conditions and knowledge about them”
Ecoanxiety (Clayton et al., 2017, p. 29)	“a chronic fear of environmental doom”
Solastalgia (Albrecht et al., 2007, p. 95)	“distress that is produced by environmental change impacting on people while they are directly connected to their home environment”

Note. This table lists various definitions related to climate change and anxiety, expressing the complex nature of this topic.

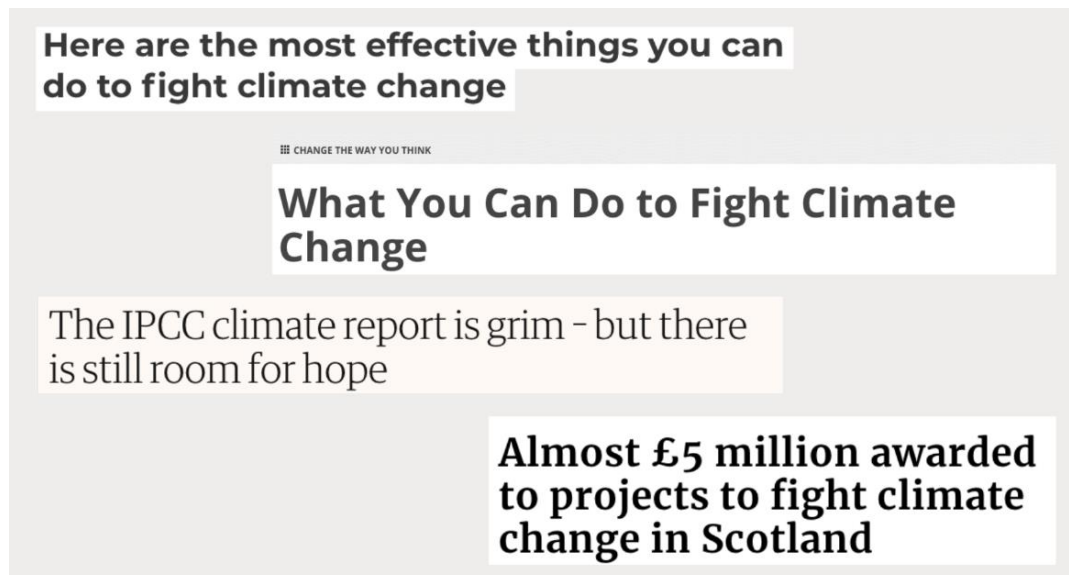
One way in which climate anxiety is expressed is through the media. This can have a significant impact on young people’s mental health. The media often portrays a doomist perspective of climate change, as demonstrated in Figure 2.4, below, intensifying feelings of anxiety that can create inaction (Pihkala, 2018). Kelsey (2016) commented that this negative outlook is due to the problem-orientated attitude of the media. Kelsey thus proposed a healthier approach, using a solution-focused response, with some examples given in Figure 2.5, below.

Figure 2.4
Climate Doomism in the Media Headlines



Note. This image presents some of the doomist narrative in the media, eliciting fear and hopelessness. From *Climate doom-ism isn't helping anybody*, by I. Drury, 2022 (<https://www.linkedin.com/pulse/climate-doom-ism-isnt-helping-anybody-isabelle-drury>). Image used for the purposes of criticism and review under Fair Dealing exception.

Figure 2.5
Climate Hope in the Media Headlines



Note. This image presents some of the “hopeful” headlines in the media which can support motivation towards climate action. From *Climate doom-ism isn't helping anybody*, by I. Drury, 2022 (<https://www.linkedin.com/pulse/climate-doom-ism-isnt-helping-anybody-isabelle-drury>). Image used for the purposes of criticism and review under Fair Dealing exception.

Kelsey (2020) reported that both the media and academia reinforce this doomist perspective, and that it can be difficult to find media outlets actively encouraging positive and hopeful stories. Kelsey (2020) proposed that feelings of hope can offer an outlet to navigate around

negative emotions, such as anxiety. Kelsey shared the view that hopefulness is a source of “motivation and coping ... grounded in a sense of meaningful presence”, whereas hopelessness comes from debilitating fear (Kelsey, 2016, p. 28). This hope can play a significant role in a person’s mental health and thus is important when considering climate change emotions and their impact on motivating climate action.

The notion of hope as a tool for action is reflected in research by Sharp et al. (2021) who discussed doomism in the educational context. Sharp et al. (2021) found that doomism expresses what some have called “wicked problems”: problems with complex societal, cultural, economic and environmental factors, contributing to a feeling that these problems are unsolvable. The authors suggest that providing hope through teaching, and using local knowledge and experiences, provides young people with a sense of agency and control. By utilising hope, young people can discover creative and innovative solutions for CCA and mitigation. This research suggests that developing climate meaning by using hope can, in turn, support climate action. Thus, there is a clear role for education in promoting this hopeful perspective to enable these innovative mitigation and adaptive approaches to climate change.

Ongoing work needs to be done to upskill teachers so they can effectively manage difficult conversations with their students. This would help mitigate the risk of creating or increasing any climate anxiety. The New Zealand Association for Environmental Education (n.d.) suggested that reframing language, sharing hope and facilitating collective actions are key to engaging in wellbeing and climate change discourses. Such an approach can be adopted to support psychological resiliency and build capacity among young people. One way in which the school curriculum can incorporate hope is to reflect on past events that felt “hopeless” or held a sense of powerlessness (Sanson et al., 2019). Events such as the end of apartheid can demonstrate to young people that while the challenge appeared to be a wicked problem and unsolvable, solutions can be found by determination and problem-solving. This problem-solving approach to coping is utilised in Sweden and has yielded positive responses (Ojala, 2015).

Regarding the concept of doomism as a negative perspective has been criticised. Doomism, also referred to as ‘societal collapse anticipation’, has been reported to be psychologically healthy (Bendell, 2021). Acknowledging and discussing these perspectives assists with problem identification, adapting to new ways of being and finding a way forward with collective action (Bendell, 2021). An Australian study found that those who felt anxiety about climate change were less likely to engage than those who felt depressed about climate change, suggesting this doomism perspective to be more useful for mobilising action (Stanley et al., 2021).

A further criticism lies in the question of who is responsible for doomism. For example, while the media has a responsibility to offer quality information, there is also a personal responsibility to limit interactions with this type of negative information, should it be having negative impacts such as the experience of negative emotions. Kelsey (2016) referred to this as a 'media diet' by which a person limits negative media and actively engages with positive media to enable a balanced perspective on climate change. Kelsey reported that this results in more feelings of hope and therefore improved wellbeing and motivation to engage in pro-environmental behaviours.

However, there are also criticisms of hope. One such criticism is that one must avoid being overly optimistic (also referred to as optimism bias) as people often misunderstand the seriousness of anthropogenic climate change. This optimistic attitude can backfire and cause further feelings of frustration and disrespect, particularly among marginalised communities who may feel that climate change is another tragedy that has been imposed by the oppressors (Pihkala, 2018). Other terms have been discussed which acknowledge the negative emotions that may be associated with climate change, while also retaining the concept of hope and agency. Such terms are "tragic optimism", "tragic hope" and "dark optimism" (Pihkala, 2018). This criticism of hope and the development of more climate emotion terms further highlights the nuanced and complex nature of this topic.

It is thus clear that the meaning of climate change can elicit a range of complex emotions, and these can vary based on a range of factors, such as level of climate literacy, engagement with media, values and proximity. These factors can elicit both positive and negative emotions, and all emotions can serve as a tool or a barrier to climate action. It is then the turn of motivation to play a role as the process by which climate meaning and emotions evolve into action or inaction, as will be discussed in the following section.

2.5 MOTIVATION FOR ACTION: EMPLOYING MODELS TO UNDERSTAND YOUNG PEOPLE'S MOTIVATION TOWARDS CLIMATE ACTION

As established above, climate emotions can lead to positive and negative influences on a person's motivation towards climate action. Little research has been conducted regarding young people and their motivation towards climate action, however. One specific study found that young people of the Global South expressed higher willingness to act, compared to those in the Global North (Lee et al., 2020). This could be related to previously mentioned research about the perception of proximity.

Looking outside of youth-specific findings reveals there has been some research about which emotions may create behavioural change. Research by Weber (2006) found that negative emotions

are drivers for human behaviour relating to climate change, and suggested that the emotion of “concern” can be used to elicit motivation towards pro-environmental behaviours. Fear is another emotion that has historically been used to motivate behaviour, traditionally being used in public health campaigns. An example of this can be seen in advertising aimed to reduce smoking behaviours. These largely focus on the negative health impacts of smoking to deter this behaviour. However, research has shown that such campaigns rarely instil a sense of motivation or result in the desired behaviour (Peters et al., 2014). This suggests that fear is not a good motivator for action.

There may be many reasons for negative emotions, such as fear and anxiety, decreasing motivation towards positive behavioural change and climate action. For example, by creating feelings of uncertainty for the future, complacency, defensive behaviours or denial may occur, resulting in reduced motivation (Ettinger et al., 2021; Gifford, 2011; Markowitz & Shariff, 2012). Uncertainty can also encourage a more conservative approach to minimising risks (Wade-Benzoni et al., 2008). Mann (2021, p. 179) described how fostering a sense of anxiety through fear can be connected to doomism, and explained that this can result in inaction:

Exaggeration of the climate threat by purveyors of doom – we’ll call them “doomists” – is unhelpful at best. Indeed, doomism today arguably poses a greater threat to climate action than outright denial. For if catastrophic warming of the planet were truly inevitable and there were no agency on our part on averting it, why should we do anything? Doomism potentially leads us down the same path of inaction as outright denial of the threat.

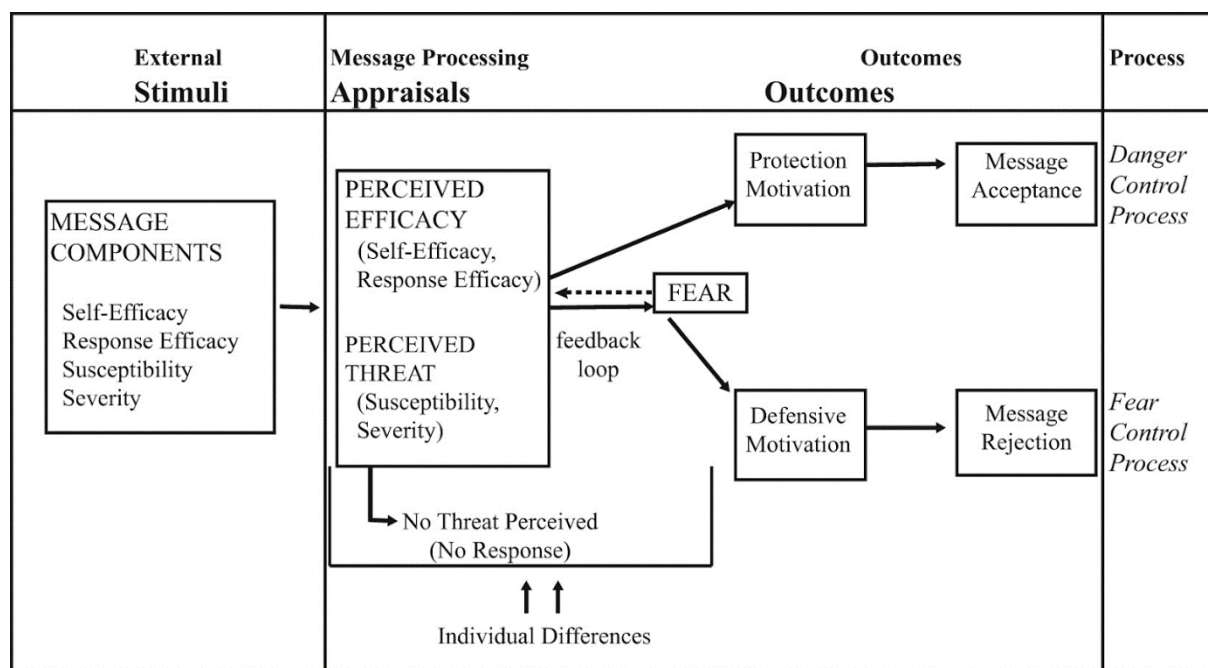
On the other hand, emotions that create motivation towards pro-environmental behaviours have been explored by Kurth and Pihkala (2022). They proposed that the level of anxiety one has affects how able or willing one may be to act. This balance of anxiety and the motivation to engage in pro-environmental behaviours is referred to as ‘practical anxiety’. This concept describes a level of anxiety that not only acts as a warning system but as a motivation for engagement in pro-environmental behaviour. Practical anxiety is not a psychological diagnosis, but is a state when one feels anxious, but with this emotion comes motivation to act. This type of anxiety, Kurth and Pihkala (2022) stated, is imperative for motivation towards climate action.

This practical anxiety implies that when a person is concerned about the future, they can also understand there are solutions to manage climate change. This notion of practical anxiety expresses a sense of hope, by recognising that climate change is anxiety-provoking but also that there is “hope” that effective solutions exist. As discussed by Kelsey (2016), this hope is fundamental to the equation for motivation towards pro-environmental behaviours; hope is described as being an activating emotion. Combined, this body of research may suggest that rather than hope and anxiety

being separate and at opposite ends of the emotional spectrum, they can be held concurrently, resulting in an optimal emotional balance for motivation towards CCA and mitigation behaviours.

Kurth and Pihkala (2022) compared their concept of practical anxiety to the Extended Parallel Processing Model (EPPM). This model describes how perceived susceptibility and severity of threat, along with self-efficacy and response efficacy, can lead to action being taken, as shown in Figure 2.6. In line with this model, it can be suggested that climate anxiety reflects the appraisal stage where one defines the perceived threat, and hope reflects the self-efficacy stage where one considers whether one has the ability to make behavioural changes. Viewing the EPPM with this psychological lens helps to identify the stages that a person may go through that result in pro-environmental behaviours, emphasising the potential roles of hope and fear. While it is beyond the scope of this thesis to go into further detail in this model, the author recommends referring to Popova (2012) for more information.

Figure 2.6
A Theory of Motivation: Extended Parallel Processing Model



Note. This image depicts how a person may decide whether to engage in pro-environmental behaviours when considering threats such as climate change. From "The Extended Parallel Process Model: Illuminating the gaps in research," by L. Popova, 2012, *Education & Behavior*, 39(4), p. 456. (<https://doi.org/10.1177/1090198111418108>). Copyright 2025 by Sage Publications. Reprinted with permission.

Research has demonstrated the role of anxiety in motivating and demotivating climate action, and there are similar findings for hope. Some authors have suggested that hope is part of the mechanism for action (Kelsey, 2020; Ojala, 2015). However, some refer to this as 'optimism bias', as

discussed in section 2.4.2, which can pose a further barrier to climate actions (Gifford, 2011). The literature discussed in this chapter has focused on anxiety and hope but it is apparent that, within these two terms, there is great variability in the experiences of these emotions and the outcomes relating to motivation for climate action. The literature provides mixed findings, and thus more research is required (Atkinson & Jacquet, 2022; Ettinger et al., 2021; Hasan-Aslih et al., 2019).

2.6 CHAPTER SUMMARY

This literature review has explored research relating to how one develops climate change meaning through climate literacy and risk perceptions. This meaning can then elicit emotions relating to climate change, particular the commonly cited emotions of anxiety and hope. These are complex emotions that can have both positive and negative outcomes for motivation towards climate action. This was explored through models and theories regarding motivation towards pro-environmental behaviours. However, much of the research discussed above is not specific to young people, while the present research aims to explore young people's motivation towards climate action. Furthermore, the above research has mostly been conducted in the Global North where individualistic and non-circular values are predominant, thus missing vital lessons that can be found in the many other countries that have differing values.

While the concepts of meaning, emotion, motivation and action are becoming more fully understood as single entities, the intersections among them are much less apparent, and it is these relationships that are investigated in the present research. Research relating to the role of emotions in engaging in climate action is also in its infancy, and thus this study further explores the range of emotions experienced, and what may influence them. The research design of this study utilises a scoping review methodology to thread together the current knowledge base and explore any gaps or inconsistencies in the research relating to the research objectives outlined in section 1.4. The next chapter describes this process in detail.

3 METHODOLOGY

3.1 INTRODUCTION

The previous chapter explored the literature relating to the research question and objectives of this thesis. This exploration demonstrated how a person may experience meaning, emotion, motivation and action and considered the relationships among these concepts. From this literature, it is evident there are many complex factors that are involved when a young person develops climate literacy and risk perception, and a variety of emotions may impact their motivation to engage with CCA and mitigation actions. However, much of the current literature focuses on adults, and also does not look at the relationship among the relevant concepts to understand how they work together, particular with regard to the role of emotions. This thesis addresses these areas to map out the current knowledge base.

This chapter describes the methodology and the relevant considerations for this scoping review, using the Preferred Reporting Items for Systematic Reviews and Meta-analysis Protocols (PRISMA-P) and Joanna Briggs Institute (JBI) guidelines (Aromataris. E et al., 2024; Tricco et al., 2018). The JBI guidelines are reflected in the subheadings in section 3.2, using the inclusion criteria, search strategy, source of evidence selection, data extraction and analysis to describe the methodology. The analysis of this study utilised Braun and Clarke's (2019) process of Reflective Thematic Analysis (RTA), which is discussed further in section 3.2.5. Section 3.3 discusses the positionality of the researcher and potential influences on the knowledge generated in the review, and is followed by section 3.4 which summarises the chapter.

3.2 SCOPING REVIEW METHODOLOGY

To undertake this research, a scoping review design was chosen as it is an ideal methodology to assess the current literature and understand what is known of a particular topic, and to identify gaps or inconsistencies (Arksey & O'Malley, 2005). By mapping the current evidence, a scoping review can provide a foundation for further research to investigate more specific areas of a topic (Aromataris. E et al., 2024). Typically, a scoping review methodology aligns with an interpretivist approach (Mak & Thomas, 2022). This paradigmatic orientation is noted in this chapter in several ways. For example, due to the subjective nature of conducting a scoping review, defensible arguments are demonstrated for the inclusion criteria. The researcher also maintained reflexivity

throughout the research process to reflect on any decisions about and interpretations of the data. Further information regarding the researcher's positionality and paradigm can be found below in section 3.3.

To ensure a rigorous and a systematic approach, guidelines from the PRISMA-P were used, specifically the extension for scoping reviews (PRISMA-ScR). The PRISMA guidelines, created in 2009, guide researchers to be transparent in their reporting when designing a systematic review. This has proven to be an effective and popular tool (Page et al., 2021). The present research endeavoured to adhere to the recommendations as outlined by PRISMA, and used tools such as their flow diagram (see Figure 3.1) to enhance the academic rigour and transparency of the methodological process and decision-making (Tricco et al., 2018). The PRISMA-ScR checklist was used to ensure all relevant information was shared within this report, further enhancing academic rigour (Tricco et al., 2018).

The remainder of section 3.2 describes the process upon which this research was undertaken, using the JBI guides to structure this information under the following subheadings: inclusion criteria, search strategy, source of evidence selection, data extraction, and analysis.

3.2.1 Inclusion Criteria

The inclusion criteria were based on the PEO framework (Population, Exposure, Outcome), which allows for a broad understanding of the emerging research (Moola et al., 2015). This broad understanding is ideal for a scoping review. The PEO framework in this research context is identified as follows:

- Population – Young people
- Exposure – climate change
- Outcome – Meaning/emotion/motivation/action

The detailed inclusion criteria were created alongside a specialist librarian to assist the researcher in capturing as much relevant information as possible while retrieving a manageable amount of data for the purpose of this review. The decision and rationale for these inclusion criteria are detailed in Table 3.1 below.

Table 3.1
Scoping Review Inclusion Criteria

Criteria type	Inclusions/Exclusions	Rationale
Geographic location	Unlimited.	To encompass as much global literature as possible.

Date	2018-2024.	2018 is the year the global youth protests began and awareness of climate change, DRM and CCA became more mainstream. 2018 + also ensures a manageable amount of data was extracted for the purpose of this thesis.
Participants	Young people aged 13-24.	Based on the (UN, n.d.-c) definition of 15-24 years old, as it is this “older” age group of young people who have more autonomy in their actions towards CCA and mitigation. During search trials, it was found that 15-24 criteria did not return enough articles, as thus it was expanded to 13–24-year-olds to capture a reasonable number of articles.
Language	English only.	To avoid translation issues or misinterpretations.
Peer reviewed	Peer-reviewed only.	To ensure academic rigour in all analysed literature.
Study design	Primary research only, both qualitative and quantitative research accepted.	To gather maximum understanding of the current literature.
Databases	Scopus, OVID, PsychInfo, EBSCO and Google Scholar.	Databases were chosen based on their relevancy to the topic of this review. Further details below.

The five databases (EBSCO, Scopus, OVID, PsychInfo, and Google Scholar) were chosen due to their relevance for the disciplines required for this scoping review. EBSCO, Scopus and Ovid each contain a wide range of databases relating to health sciences, psychology and disaster management. Psychinfo was selected because climate emotions fall under the umbrella of psychology. Finally, Google Scholar was selected due to the high return of results in the retrieval of many articles that did not show in the other databases. It was thus important to include this database to ensure as much of the contemporary literature was included as possible.

3.2.2 Search Strategy

Once the inclusion criteria were set, the researcher worked alongside the specialist librarian to create the search strategy. This was tested and refined by searching the chosen databases with the automated search functions available that could filter some of the inclusion criteria. From this search, the titles and abstracts of the first 20 articles were manually assessed to ensure a high level

of relevancy to the research aims was retrieved. Once the researcher was satisfied with the retrieved data, the search strategy was confirmed, as shown in Table 3.2.

Table 3.2*Scoping Review Final Search Strategy and Search Limits*

Database	Outcome	Population	Exposure	Search limits and functions
PsychInfo	(motivat* OR *inspir* OR initiative* OR act* OR "pro-environmental behavio*" OR Behav* OR View* OR mean* OR perception* OR perceive* OR attitude* OR knowledge* OR understand* OR Emot* OR feel* OR "mental health" OR anxi* OR hope*)	(teen* OR youth* OR "young person*" OR "young people" OR "high school*" OR highschool* OR "secondary school*" OR student* OR tertiary OR university OR college)	AND ("Climate change" OR "Climate-change" OR "Global warming" OR "Climate Crisis" OR "Greenhouse effect")	• No proximity option (used "AND" function) • Peer reviewed • 2018-2024 • Under psych articles
EBSCO	(motivat* OR *inspir* OR initiative* OR act* OR "pro-environmental behavio*" OR Behav* OR View* OR mean* OR perception* OR perceive* OR attitude* OR knowledge* OR understand* OR Emot* OR feel* OR "mental health" OR anxi* OR hope*)	(teen* OR youth* OR adolescen* OR "young adult" OR "young person*" OR "young people" OR "high school*" OR highschool* OR "secondary school*" OR student* OR tertiary OR university OR college)	("Climate change" OR "Climate-change" OR "climate-change" OR "Global warming" OR "Climate Crisis" OR "Greenhouse effect")	• N6 as proximity • find in full text • peer-reviewed only • academic journals • English, • ages 13-19, 18-24
OVID	(motivat* OR *inspir* OR initiative* OR act* OR "pro-environmental behavio*" OR Behav* OR View* OR	(teen* OR adolescen* OR youth* OR "young adult*" OR "young person*" OR "young people" OR	("Climate change" OR "Climate-change" OR "climate-change" OR	• Adj8 as proximity • full text • journal articles

	mean* OR perception* OR perceive* OR attitude* OR knowledge* OR understand* OR Emot* OR feel* OR "mental health" OR anxi* OR hope*)	"high school*" OR highschool* OR "secondary school*" OR student* OR tertiary OR University OR College)	"Global warming" OR "Climate Crisis" OR "Greenhouse effect")	• English only • peer reviewed • 2018-2024 • de-duplicate
Scopus	(motivat* OR *inspir* OR initiative* OR act* OR "pro-environmental behavio*" OR Behav* OR View* OR mean* OR perception* OR perceive* OR attitude* OR knowledge* OR understand* OR Emot* OR feel* OR "mental health" OR anxi* OR hope*)	(teen* OR adolescen* OR youth* OR "young adult*" OR "young person*" OR "young people" OR "high school*" OR highschool* OR "secondary school*" OR student* OR tertiary OR University OR College)	("Climate change" OR "Climate-change" OR "climate-change" OR "Global warming" OR "Climate Crisis" OR "Greenhouse effect")	• w/5 as proximity • English only • journals articles only • final versions • 2018-2024
Google Scholar	(motivation OR inspiration OR initiative OR action OR pro-environmental behavior OR Behavior OR View OR meaning OR perception OR attitude OR knowledge OR understanding OR Emotion OR feeling OR mental health OR anxiety OR hope)	(teenager OR youth OR young person OR student OR young adult OR university OR college)	(Climate change OR Global warming OR Climate Crisis OR Greenhouse effect)	• 2018-2024 • No proximity option (used "AND" function)

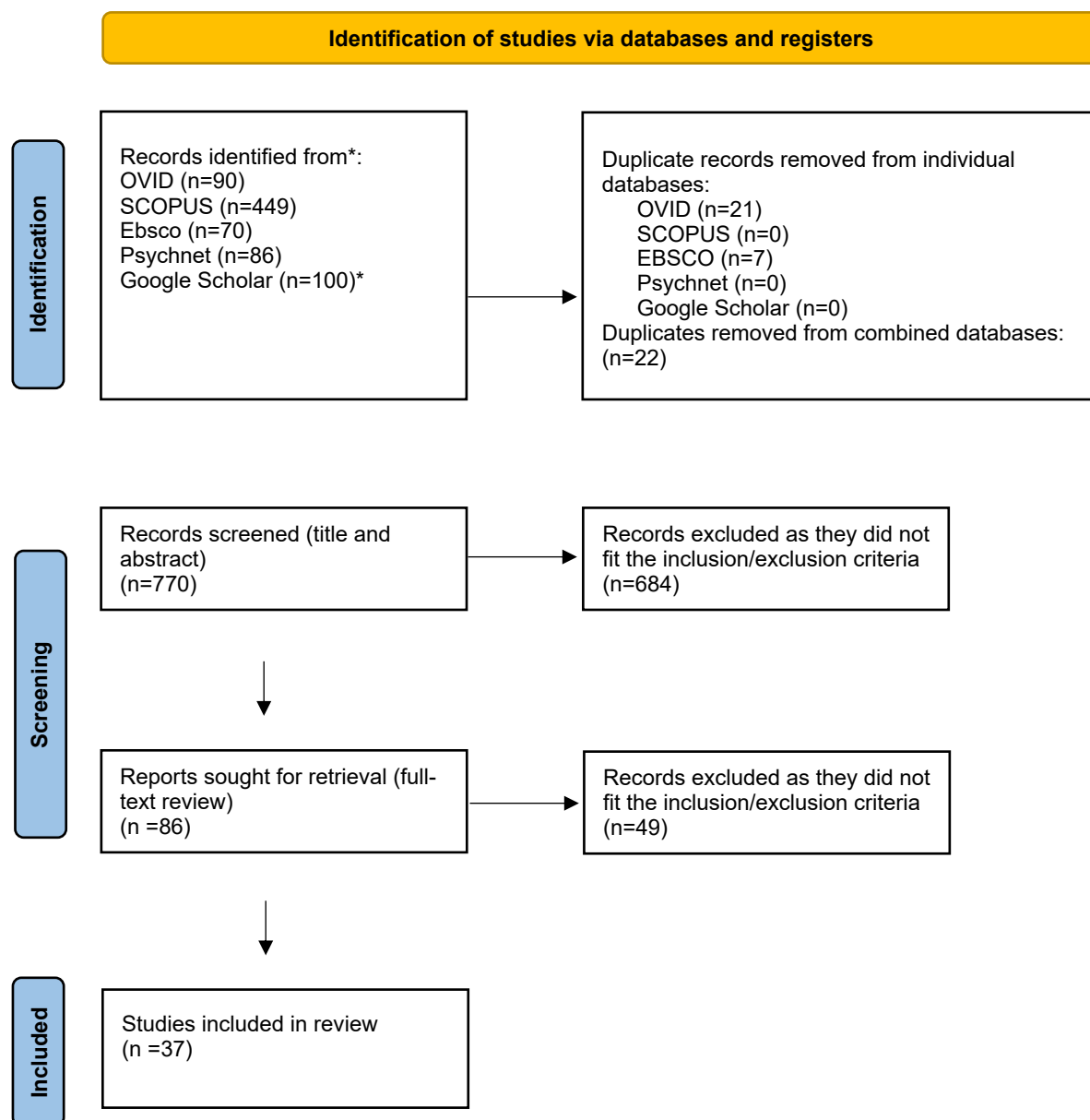
Note. This table shows the search strategy for each database including search limits and functions.

The final search strategy used the same words and order of words for each database to ensure consistency (except Google Scholar, as explained below). The proximity searches were chosen based on the accuracy required for each individual database to ensure that the search captured as much of the relevant literature as possible, without returning too many articles. As mentioned above, Google Scholar has a different search strategy as this database searches for meaning, rather than exact words as seen in the other databases. For example, if one searches for “young people”, Google Scholar will also return articles with similar meanings such as youth, children, students, etc. This meant the words used in the Google Scholar search strategy could be more general. It is particularly due to this approach that Google Scholar can extract vast amounts of literature. Therefore, to make the search on Google Scholar practicable for the researcher to analyse, only the first 100 articles were screened.

3.2.3 Source of Evidence Selection

Once the researcher was satisfied that the search strategy alongside the inclusion criteria was retrieving sufficient and relevant data for analysis, the titles and abstract of all articles were screened to ensure they met the inclusion criteria. After this, all articles that were suitable for this study were downloaded. This resulted in 86 articles remaining for in-depth screening. The screening and selection process is reported using the PRISMA flow diagram shown in Figure 3.1, below.

Figure 3.1
PRISMA Flow Diagram and the Identification of Literature



Note. This table depicts the screening and selection process using the PRISMA flow diagram template for reporting. *= Records were limited to 100 to ensure a manageable amount of data was retrieved.

3.2.4 Data Extraction

With these 86 articles identified, the JBI guidelines for data charting were used, with adaptations to their template which included aspects such as population, exposure and outcome. By extracting the data in this systematic way, consistency in the reporting was maintained. It also helped to manage the large number of articles identified for deeper analysis. Throughout this process, any uncertainty within the inclusion criteria was discussed with the researcher's supervisors

to ensure that a thorough and correct examination of the literature was conducted. This phase identified the key concepts in the articles along with key information such as author, date and reason for exclusion (if relevant). This information ensured a consistent approach to the initial data extraction phase and clear references to any decisions made by the researcher. Once this stage was complete, there was a total of 37 articles to be used for analysis. The full list of articles can be found in table 3.3 below, which encompasses the JBI guidelines for data charting.

Table 3.3*List of Articles Analysed in the Scoping Review*

Article	Author/s	Year	Publication	Methodology	Data collection method	Geographic Location	Population (demographics)	Main concept	Context
After the forum I realized there is more I can do: Communicating climate change to youth using public deliberation	Li et al.	2022	Applied Environmental Education & Communication	Mixed	Surveys, discussions	Saint Louis, USA (urban)	16–18-year-olds, male and female	Meaning-emotion, Action-emotion	FutureCoast Youth programme
Analysis of emotions of high school students participating in a school SSI Club project related to climate change	Kim & Kim	2020	Asia Pacific Science Education	Mixed	Surveys, interviews	Gimpo, Korea (urban)	Age/gender not specified	Action-emotion	High school club project
Climate change perception by adolescents: Reflections on sustainable lifestyle, local impacts and optimism bias	Barros & Pinheiro	2020	Bilingual Journal of Environmental Psychology	Mixed	Questionnaire and focus groups	Natal, Brazil (urban)	Age not specified, male and female	Meaning-action	High school students
Climate distress, climate-sensitive risk factors, and mental health among Tanzanian youth: A cross-sectional study	Prencipe et al.	2023	Lancet Planet Health	Mixed	Interviews	Iringa and Mbeya, Tanzania (rural)	18–21-year-olds, male and female, 87% religious	Meaning-emotion	Cash Plus intervention

Creative communication approaches to youth climate engagement: Using speculative fiction and participatory play to facilitate young people's multidimensional engagement with climate change	Doyle	2020	International Journal of Communication	Mixed	Participatory workshops	Brighton, UK (urban)	14–15-year-olds, "mainly" white British, gender not identified	Meaning-emotion-motivation	FurtureCoast Youth programme
Hope, coping and eco-anxiety: Young people's mental health in a climate-impacted Australia	Gunasiri et al.	2022	International Journal of Environmental Research and Public Health	Mixed	Interviews	Australia (multiple locations, not identified)	18–24-year-olds, gender not identified	Emotion-action	Social media, networks and local organisations
Promoting climate change awareness with high school students for a sustainable community	Mebane et al.	2023	Sustainability	Mixed	Project	Rome, Italy (urban)	16–17-year-olds, male and female	Meaning-emotion	High school students- Future generation programme
The impact of project activities on the cultivation of ecological citizenship in a high school climate change club	Park & Kim	2020	Asia-Pacific Science Education	Mixed	Interviews and questionnaires	Seoul, Korea (urban)	Age/gender not specified	Meaning action	10th grade High school students
"It shows we are serious": Young people in Australia discuss climate justice protests as a mechanism for climate change advocacy and action	Arnot et al.	2023	Environmental Health	Qualitative	Surveys	Australia (multiple locations, not identified)	15–24-year-olds, male and female	Knowledge-Action	Survey hosting company
"It's like youth are talking into a microphone that is not plugged in": Engaging youth in disaster risk reduction through photovoice	Pickering et al.	2022	Qualitative Health Research	Qualitative	Focus groups	Ottawa, Canada (urban)	Teenagers, age/gender not specified	Action-meaning/motivation	Youth group

Co-envisioning the social-ecological transition through youth eco-activists' narratives: Toward a relational approach to ecological justice	Larocque	2023	Journal of Community Practice	Qualitative	Interviews and focus group	Ottawa ($n = 3$), Montréal ($n = 3$), Québec ($n = 3$) and Vancouver ($n = 1$), Canada (urban)	18–23-year-olds, 9 females and 1 male	Meaning-action	Youth eco-activists
Youth engagement in climate change action: Case study on Indigenous youth at COP24	MacKay et al.	2020	Sustainability	Qualitative	Interviews	Mackenzie River Basin, Canada (exact locations not identified)	Age/ gender not specified	Action-meaning	Grade 10-11, Indigenous youth
A cross-sectional survey of climate and COVID-19 crises in young people in Indian slums: Context, psychological responses, and agency	Yatirajula et al.	2023	Lancet Reg Health Southeast Asia	Quantitative	Survey	Faridabad and Hyderabad, India (urban)	16–24-year-olds, male and female	Meaning-emotion	Slums
Childhood origins of young adult environmental behavior	Evans et al.	2018	Psychological Science	Quantitative	Surveys	New York, USA (urban)	16-18 years olds, gender not identified	Meaning-action	Public school
Climate change knowledge, concerns and experiences in secondary school learners in South Africa	Kutywayo et al.	2022	Journal of Disaster Risk Studies	Quantitative	Survey	Khayelitsha, South Africa (peri-urban)	Age not specified, “predominantly” female	Meaning-emotion-motivation-behaviour	High school students

Climate competencies of Finnish gifted and average-ability high school students	Tolppanen	2023	Education Science	Quantitative	Survey	Helsinki, Vantaa, Tampere, Mikkeli and Kajaani, Finland (urban)	Age not specified, male and female	Meaning-emotion-motivation-action	High school students
Czech students and mitigation of global warming: Beliefs and willingness to take action	Lehnert et al.	2019	Environmental Education Research	Quantitative	Questionnaire	Czech Republic (various urban and rural locations)	14–19-year-olds, gender not identified	Meaning-motivation	Geography classes in 49 upper primary and lower secondary
Effect of a single one-hour teaching session about environmental pollutants and climate change on the understanding and behavioral choices of adolescents: The BREATHE pilot randomized controlled trial	Abrham & Zeng	2023	PLoS ONE	Quantitative	Surveys	San Jose, USA	13–15-year-olds, male and female, 60% hispanic	Meaning-Action	Middle school students
Environmental literacy in practice: Education on tropical rainforests and climate change	Bissinger & Bogner	2018	Environment, Development and Sustainability	Quantitative	Questionnaires	Bavaria (various urban locations)	15-year-olds, male and female	Meaning-action	Multiple schools
Evaluating the purchase behaviour of organic food by young consumers in an emerging market economy	Pham et al.	2018	Journal of Strategic Marketing	Quantitative	Surveys	Vietnam (3 locations not identified)	18–21-year-olds, male and female	Motivation-action	Under and postgraduate students interested in organic vegetables

Factors shaping students' perception of climate change in the western Himalayas, Jammu & Kashmir, India	Zeeshan et al.	2021	Current Research in Environmental Sustainability	Quantitative	Questionnaire	India (urban and rural locations)	13–18-year-olds, male and female	Meaning-action	Secondary and higher secondary level school students
How is cognitive reappraisal related to adolescents' willingness to act on mitigating climate change? The mediating role of climate change risk perception and believed usefulness of actions	Dong et al.	2023	Environmental Education Research	Quantitative	Questionnaire	Cities in Anhui province, China (urban)	13-16 years olds, male and female	Meaning-motivation	Unclear
Improving student learning outcomes using narrative virtual reality as pre training	Calvert & Hume	2022	Virtual Reality	Quantitative	Questionnaire	Australia (exact locations (2) not identified)	14-year-olds, male and female	Meaning-emotion-motivation	High school
Indirect effect of climate change experience on household energy conservation behavior of college students through risk perception and intention	Bordallo	2023	Asia-Pacific Social Science Review	Quantitative	Survey	Manila, Philippines (urban)	18–23-year-olds, male and female	Meaning-emotion-motivation-action	Private, higher education
Lifestyle decisions and climate mitigation: Current action and behavioural intent of youth	Pickering et al.	2021	Mitigation and Adaptation Strategies for Global Change	Quantitative	Survey	Canada (various urban and rural locations)	17–18-year-olds, male and female	Motivation-action	Online data collection company
Mastery experiences in immersive virtual reality promote pro-environmental waste-sorting behavior	Stenberdt & Makransky	2023	Computers & Education	Quantitative	Questionnaire	Denmark (exact locations not identified)	Age not specified, male, female and non-binary	Meaning-motivation	High school students

Multilevel evidence for the parent adolescent dyadic effect of familiarity with climate change on pro-environmental behaviors in 14 societies: Moderating effects of societal power distance and individualism	Xia & Li	2022	Environment and Behavior	Quantitative	Surveys	Brazil, Chile, Germany, Dominican Republic, Hong Kong, Croatia, Ireland, Italy, Korea, Macau, Mexico, Malta, Panama, and Portugal	15-year-olds, male and female	Meaning-action	PISA
Psychological responses, mental health, and sense of agency for the dual challenges of climate change and the COVID-19 pandemic in young people in the UK: An online survey study	Lawrance et al.	2022b	The Lancet Planet Health	Quantitative	Surveys	UK (exact locations not identified)	16–24-year-olds, male, female and non-binary	Emotion-motivation	Online data collection company, youth groups and schools
Rethinking quality science education for climate action: Transdisciplinary education for transformative learning and engagement	Kubisch et al.	2022	Frontiers in Education	Quantitative	Questionnaire	Austria and Germany (various locations not identified)	13–16-year-olds, male, female and not-defined genders	Knowledge-action	Secondary school students
Supporting youth emotionally when communicating about climate change: A self-determination theory approach	Spitzer et al.	2024	International Journal of Behavioral Development	Quantitative	Surveys	USA (exact locations not identified)	Age not specified, male and female	Meaning-emotion	Character Lab Research Network

The effects of climate change awareness on mental health: Comparison of climate anxiety and hopelessness levels in Turkish youth	Ediz & Yanik	2023	International Journal of Social Psychiatry	Quantitative	Questionnaires	Turkey (exact locations not identified- 84% urban)	15-24 year olds, male and female	Meaning-emotion	Social media and schools
The perceived impact of climate change on mental health and suicidality in Kenyan high school students	Ndete et al.	2024	BMC Psychiatry	Quantitative	Questionnaire	Kenya (3 counties, urban and rural)	13-20 year olds, male and female	Meaning-emotion	High school students
Using an Integrated Social Cognition Model to Explain Green Purchasing Behavior among Adolescents	Pakpour et al.	2021	International Journal of Environmental Research and Public Health	Quantitative	Surveys	Qazvin, Iran (urban)	14 & 19 year olds, male and female	Motivation-action	High school students
What affects adolescents' willingness to maintain climate change action participation : An extended theory of planned behavior to explore the evidence from China	Du et al.	2023	Journal of Cleaner Production	Quantitative	Questionnaire	China (various locations not identified)	13-16 year olds, male and female	Meaning-action	High school students

What triggers young Millennials to purchase ecofriendly products?: the interrelationships among knowledge, perceived consumer effectiveness, and environmental concern	Heo & Muralidharan	2019	Journal of Marketing Communications	Quantitative	Surveys	USA (Southern USA, exact location not identified)	18-24 year olds, male and female	Knowledge-Emotion	University students
Young consumers' green purchase behaviour in an emerging market	Nguyen et al.	2018	Journal of Strategic Marketing	Quantitative	Surveys	Vietnam (exact location not identified)	18-24 year old, male and female	Meaning-motivation	University students
Young People's Coping Strategies Concerning Climate Change: Relations to Perceived Communication With Parents and Friends and Proenvironmental Behavior	Ojala & Bengtsson	2018	Environement and Behaviour	Quantitative	Questionnaire	Sweden (exact locations not identified)	Age not specified, male and female	Meaning-action	High school students

3.2.5 Analysis

NVivo was the tool chosen for the completion of the analysis. All 37 articles were imported into NVivo, and this began the initial phases of RTA. Thematic analysis is a family of methods with which one finds themes throughout a dataset, allowing for a robust and accessible means of analysis (Byrne, 2022). Braun and Clarke (2019, p. 594) suggested that RTA allows for “the researcher’s reflective and thoughtful engagement with their data and their reflexive and thoughtful engagement with the analytic process”. The researcher followed Braun and Clarke’s (2022) six stages of analysis:

1. Familiarisation with the data
2. Generating initial codes
3. Searching for themes
4. Reviewing potential themes
5. Defining and naming themes
6. Producing the report

During the initial familiarisation stage, coding work began concurrently. Due to the direct relationships being explored among meaning, emotion, motivation and action, the initial topic summaries and themes were quickly identified, incorporating the first three steps of RTA. To ensure any reflexive thinking was captured, the notes function on NVivo was used to gather the researcher’s reactions, responses and insights as they read the articles in detail. As the codes and topic summaries became apparent, the researcher re-read the articles to ensure they analysed the data as thoroughly and as accurately as possible. Once the researcher was satisfied with this process, they began defining and naming the themes. The final step of Braun and Clarke’s (2022) six steps of analysis, reporting, is detailed in the results chapter.

3.3 RESEARCHER’S POSITIONALITY

This scoping review used RTA to assist with the analysis, and thus it is important to recognise my positionality as the researcher, and any implications this may have on the analysis process and findings (Joy et al., 2023). Reflexivity is a process whereby the researcher actively reflects on how they may influence the data and research outcomes (Probst, 2015). RTA is a flexible method of analysis that acknowledges that one researcher’s interpretation of the patterns in the data will be different to other researchers analysing the same data (Byrne, 2022). Thus, in this section, I will reflect on my journey into research, and how this positionality may have impacted knowledge generation.

My academic journey began when I undertook an honours programme in psychology. This was a research degree, and I spent three years unpacking and understanding human behaviour. On reflection, this trained me with a positivist paradigm. The goal was to always be objective and as removed from the participants as possible to find that 'one truth'. My own experience of mental health as a teenager shaped who I became, with kindness as my biggest value, informing my axiological view. Thus, after completion of the qualification, I began a career in supporting roles, such as youth work, teaching and support work. Working closely with people has helped me to understand that everyone has different views of the 'one truth', and there are invisible structures within society that push people to see things in a certain way, informing my ontological view. While I trained in a positivist paradigm, my experience in the world has led me towards an interpretivist lens.

It is within this interpretivist lens that this research was conducted. This paradigm asserts that there are different realities based on social constructions, such as that of language and shared meaning (Gichuru, 2017). The interpretivist paradigm requires a reflexive approach (Duffy et al., 2021), encouraging a researcher to explore their own subjective view and bias towards the research. As a practitioner supporting disadvantaged youths, I acknowledge my emotional connection to young people's wellbeing and mental health, which has impacted how I generated knowledge from this dataset. It is also important to note that, due to my background in using the positivist paradigm, I was aware of 'positivism creep', defined by Braun and Clarke (2022, p. 7) as "unknowing importation of values of quantitative positivist-empiricist reach into qualitative research." I maintained this awareness by keeping a research journal throughout this project, enabling me to reflect on any previously held biases and assumptions.

3.4 CHAPTER SUMMARY

This chapter has included the research methodology and an understanding of how the researcher constructed their research design using PRISMA-ScR as a guiding tool alongside the JBI guidelines. This allowed a comprehensive scoping review to be undertaken. As detailed throughout this chapter, careful consideration was given to the various stages of conducting the search strategy and analysis, which supported the researcher in producing academically rigorous findings that can add value to the current knowledge base of this emerging field of climate change and emotions. This chapter has also shed light on the researcher's positionality, and how this has influenced the process of data extraction and analysis, particularly as it pertains to RTA. The next chapter discusses the results obtained from the scoping review process.

4 RESULTS

4.1 INTRODUCTION

The purpose of this scoping review was to explore how climate meaning is developed, understand climate emotions and what may influence them, and finally to explore relationships among the concepts of meaning, emotions, motivation and action relating to climate change. By understanding these relationships, tools, policies and strategies can be created to support young people with climate change action while also supporting their mental health. As outlined in the literature review in Chapter 2, previous research was largely focused on adult populations, and often did not consider the emerging knowledge base on climate change emotions and how this might impact a young person's motivation towards CCA and mitigation behaviours. This rationale thus led to the employment of a scoping review methodology, as detailed in the previous chapter.

This chapter shares the results from the analysis, and the key topic summaries and codes identified through RTA. During this analysis, attention was particularly paid to the connections among the concepts of meaning, emotion, motivation and action. Through the review, themes were also identified, including the role of emotions, gender differences, connection to nature and connection to others. Section 4.2 outlines a summary of data and demographics; section 4.3 details the identified topic summaries, codes and themes; and, finally, section 4.4 concludes the chapter with a summary.

4.2 SUMMARY OF DATA AND DEMOGRAPHICS

Across the 37 articles, much of the research was conducted in western countries as shown in Figure 4.1, with the most cited countries being USA, Canada, Germany, Australia, Italy and the UK, which together made up 17 of the articles. However, there were a range of other countries such as Croatia, Iran and Kenya which added to the diversity of results. When reflecting on the views held in this scoping review, it could be argued that due to a wide range of countries, and thus cultures, the research findings captured are varied.

The ages of the participants were varied within each study, with 22 of the articles focusing on ages between 13 and 18 years old, the lower to middle range of this review's defined age range of 13-24 years old. It is suggested that this was due to the accessibility of students within school environments. Studies also varied in gender, socio-economic background, religion and education.

Figure 4.1
Geographic Location of Young People in the Scoping Review



Note. In this word cloud, the larger the country name, the more times it was the location of research in the selected studies. This indicates that much of the research was carried out in western countries.

4.3 TOPIC SUMMARIES, CODES AND THEMES

Through the exploration of the concepts of this scoping review (meaning, emotion, motivation and action), four topic summaries were identified. These topic summaries “capture the various ideas or meanings expressed around a core topic” (Joy et al., 2023, p. 2), relating to the relationships among the four concepts. Within these topic summaries, codes were identified such as “meaning to emotion”, “action to meaning”, etc. Table 4.1, below, depicts the topic summaries and codes. As evidenced in this table, some relationships were more commonly cited than others. In particular, meaning (through climate literacy and risk perception) had the most reported connections. Motivation, however, was far less evident in this study, particularly when considering its relationship to meaning and emotion.

Table 4.1*Topic Summaries and Codes from the Scoping Review Analysis*

Topic Summary	Meaning			Emotion			Motivation			Action		
Code	• Meaning to emotion	• Meaning to motivation	• Meaning to action	• Emotion to meaning	• Emotion to motivation	• Emotion to action	• Motivation to meaning	• Motivation to emotion	• Motivation to action	• Action to meaning	• Action to emotion	• Action to motivation
No. articles identified	23	18	25	9	9	13	1	1	13	4	9	9

Note. This table illustrates the topic summaries and codes that were identified through the researcher's analysis, and how many articles each code appeared in.

Through the analysis, themes were also identified through a process of RTA, and these included the role of emotions, gender differences, connection to nature and connection to others. These themes can be seen in Table 4.2. This table particularly highlights the role of emotions as a theme, as it appears in 15 of the analysed articles. Connection to others was also a strong theme being referred to in 13 of the articles. Connection to nature and gender differences were noted in eight and nine of the articles, respectively. The remainder of section 4.3 expands on the codes and themes.

Table 4.2*Themes from the Scoping Review Analysis*

Theme	Role of emotions	Gender differences	Connection to nature	Connection to others
No. articles identified	15	9	8	13

Note. This table represents the themes identified through RTA.

4.3.1 The Relationships Among Climate Change Meaning, Emotion, Motivation and Action

As identified in the literature review in Chapter 2, young people can experience meaning to emotion, emotion to motivation and motivation to action, as illustrated in Figure 1.4. Fourteen articles identified three or more of these concepts that connected in this linear fashion (Bordallo, 2023; Dong et al., 2022; Gunasiri et al., 2022; Heo & Muralidharan, 2017; Kutwayo et al., 2022; Mebane et al., 2023; Pickering et al., 2022; Zeeshan et al., 2021). For example, one article explored

experiences of climate change (meaning) which prompted feelings of inspiration and empowerment (emotion), which in turn led to being motivated to take more action (Yatirajula et al., 2023).

However, the results of this review demonstrate a much more complex picture than that which was illustrated in Figure 1.4. Each concept has a relationship with the others rather than it being a simple linear process. The following four sections expand on these relationships in more detail and their significance for this scoping review.

4.3.1.1 *Meaning connected to emotion, motivation and behaviour*

The following three sections outline the relationships found among meaning and the other concepts of emotion, motivation and action. Meaning was developed in all three domains of the home environment, formal education and media. In particular, meaning was often related to formal education (noted in 14 of the articles), signifying the important role education can have in supporting mental health and motivating people to engage in climate action. It is noteworthy that affective education and active learning appeared important for engagement in climate action, as described below.

4.3.1.1.1 *Meaning connected to emotion*

Six articles suggested that the more knowledge people have, the higher levels of anxiety, hopelessness, distress and concern they experience (Ediz & Yanik, 2023; Heo & Muralidharan, 2017; Kutuywayo et al., 2022; Li et al., 2022; Mebane et al., 2023; Prencipe et al., 2023). One article suggested this increase in knowledge identifies to young people the lack of power and control they have over CCA and mitigation, resulting in these negative emotions (Gunasiri et al., 2022).

However, three articles suggested that an increase in climate literacy resulted in positive emotions. These emotions included hope, reduced eco-anxiety, pride and enjoyment (Gunasiri et al., 2022; Li et al., 2022; Spitzer et al., 2023). Increased climate literacy resulted in these positive emotions because it informed young people on how to take action, increasing their efficacy and their connections to others and nature by providing a purpose (Larocque, 2023).

Rather than climate literacy resulting in either positive or negative emotional outcomes, some results also indicated that positive and negative emotions can increase concurrently, further emphasising the complexity of emotions relating to climate change (Kim & Kim, 2020; Larocque, 2023). This idea was expressed by one young person in the following quote:

I do feel more optimistic, but also more nervous about how fragile the earth is.
(Doyle, 2020, p. 2766)

The findings of this present research identified that climate literacy, in terms of knowledge, values and skills, can be developed in the three domains of home, education and media, resulting in both positive and negative emotions. Social media was also found to have a similar impact, with the potential to elicit both positive and negative emotions (Gunasiri et al., 2022); however, this was the sole article that explored social media and the relationship of meaning to emotion, and thus further exploration to understand the significance of social media in this context is required.

Three articles specifically explored values relating to family and religious environments and the positive and negative impacts on youth's emotions (Li et al., 2022; Ojala & Bengtsson, 2019; Prencipe et al., 2023). These articles specifically demonstrate the power of values and how they can influence emotions towards CCA and mitigation, as outlined in the literature review

Education was explicitly discussed in six articles when referring to meaning and emotion (Kim & Kim, 2020; Pickering et al., 2022). Education can elicit positive and negative emotions relating to climate change (Calvert & Hume, 2023; Larocque, 2023; Li et al., 2022), thus emphasising the need for affective education, that is, education that "that is concerned with the feelings, values, beliefs, attitudes and emotional well-being of learners" (Romi & Katz, 2003, p. 35). For example, the research by Spitzer et al. (2023) identified that when climate change communication in an educational context matches a young person's needs for competence, autonomy, and relatedness, then they experienced less anxiety. They also found that if the needs were not aligned within the educational communication, students reported higher levels of joy and engagement. They suggested that this was because it encouraged the students to engage with their learning more deeply due to this misalignment, and thus the young people reported positive emotions such as pride and enjoyment. This further identified the complexity and importance of a well-informed affective educational programme.

Physical proximity was also noted in this sub-theme of meaning to emotion. Physical proximity directly impacted young people's emotional response to climate change, with a reciprocal relationship between risk perception and emotions, particular after experiencing a climate change-related event (Bordallo, 2023; Kutylwoy et al., 2022; Prencipe et al., 2023). Being in physical proximity to nature, without necessarily experiencing a climate change-related event, also appeared to have a positive effect on many of the participants' mental health (Larocque, 2023), which is a theme further discussed in this chapter in section 4.3.5. This proximity may take many forms, such as visiting places of nature such as parks, growing vegetables or living in rural environments.

4.3.1.1.2 Meaning connected to motivation

Evidence was found for the sub-theme of meaning influencing motivation. This motivation was derived from all three domains of meaning as discussed in the literature review (home, education and media). Sources of motivation included trust in government (Dong et al., 2022), higher risk perception (Dong et al., 2022), culture (Zeeshan et al., 2021), supportive teachers (Tolppanen et al., 2023), support from family (Xia & Li, 2022), societal norms (Pickering et al., 2021) and proximity to climate change hazards (Bordallo, 2023; Du et al., 2023; Lehnert et al., 2019)

Increased climate literacy was connected to a greater willingness to take action (Bordallo, 2023; Park & Kim, 2020; Pickering et al., 2021; Tolppanen et al., 2023; Xia & Li, 2022; Zeeshan et al., 2021). Ojala and Bengtsson (2019) suggested this is because if people are not aware of the impacts and consequences then they will not be motivated to find solutions. This idea was shared by a young person who commented that:

I think having a certain knowledge of nature, a love of nature, it gives you the desire to protect it. (Larocque, 2023, p. 143)

The perceived efficacy of climate action was also related to an increase in motivation (Aksel Stenberdt & Makransky, 2023; Dong et al., 2022; Lehnert et al., 2019; Li et al., 2022). However, one article suggested that many young people do not understand the efficacy of certain actions and thus quality education could improve motivation to engage in climate action (Heo & Muralidharan, 2017). Other results found that increased belief in efficacy did not necessarily improve the willingness to act, particularly if the action is inconvenient to the young person (Lehnert et al., 2019).

4.3.1.1.3 Meaning connected to action

The relationship of meaning to action was also identified in this scoping review, again relating to the three domains of home, education and media (Du et al., 2023; Evans et al., 2018; Xia & Li, 2022). Attitudes and norms were found to increase willingness to engage in certain behaviours (Pakpour et al., 2021; Pickering et al., 2021). Two articles found that having a strong community helps to build community resilience so young people can better tackle climate change and engage in action (Larocque, 2023; Yatirajula et al., 2023).

Performative allyship was discussed in one article suggesting that some young people will share content on social media about actions and awareness, but not directly engage in physical action (Pickering et al., 2022). This article also discussed a culture among young people where it is seen as “cool” to be socially conscious by engaging in pro-environmental behaviours, which may explain performative allyship. This culture of being “cool” was explained by one young person:

A couple of years ago, maybe like 2012 or 2013, if you go into a thrift store, it is because, it was for people that could not afford fast fashion, but like now ... people go to thrift stores as a hobby ... it is a big thing. There is a verb for it. (Pickering et al., 2022, p. 2133)

Lack of knowledge and ignorance was suggested to be the biggest barrier to CCA and mitigation actions (Barros & Pinheiro, 2020; Bissinger & Bogner, 2017; Li et al., 2022; Ojala & Bengtsson, 2019). This was demonstrated in the study by Kutwayo et al. (2022) who observed that 21.9% of participants did not think climate change was a concerning issue and thus did not require action. However, those with more knowledge had a sense of urgency to act. The idea that increased climate literacy leads to more action has been supported by other studies included in this review (Abrham et al., 2023; Arnot et al., 2023; Heo & Muralidharan, 2017; Nguyen et al., 2017; Tolppanen et al., 2023; Zeeshan et al., 2021). However, another study found that 52.2% of young people had knowledge of climate change but 93.1% of these young people did not engage in climate actions (Ediz & Yanik, 2023).

The way in which climate literacy is developed is important for action. Active learning, a learning strategy that involves participation, activity and engagement (Doolittle et al., 2023), was found to be valuable. This strategy for learning improves awareness, values and beliefs, and later pro-environmental behaviours, with education providing a “reminder” of actions that young people can engage in (Abrham et al., 2023; Bissinger & Bogner, 2017; Lehnert et al., 2019). While one study found that self-efficacy did not result in a change in pro-environmental behaviours (Heo & Muralidharan, 2017), most did find that understanding the efficacy of certain actions increased those actions and this understanding is important for engaging youth in behaviours that are most beneficial for CCA and mitigation (Dong et al., 2022; Pakpour et al., 2021; Pickering et al., 2021). One young person explained:

I think it's a big thing knowing that what you do can make a difference. (Gunasiri et al., 2022, p. 6)

In regard to inaction, one article found that denial is a way to avoid engaging in actions for what is seen as a problem that is too large, or what is described in the literature review as a ‘wicked problem’ (Barros & Pinheiro, 2020). This idea supports the findings about scepticism and its role in disabling action. Pickering et al. (2021) described climate scepticism as arising from a conflict between values and desires. They used the example of wanting to get a car but valuing protecting the environment. Climate scepticism, denial or cognitive dissonance can be then used as a tool to motivate inaction or anti-environmental action, such as driving a car that produces greenhouse gas emissions (Pickering et al., 2021).

4.3.1.2 *Emotion connected to meaning, motivation and action*

The following three sections outline the relationships found among emotion and the other concepts of meaning, motivation and action. As identified, emotion and its impact on motivation towards climate action is an emerging area of research relating to climate change. These sections outline some clear findings that highlight the role of emotions when engaging youth in climate change action, specifically the role of activating emotions. The role of emotions for climate action was a theme identified in this study, and it is further outlined in section 4.3.2.

4.3.1.2.1 *Emotion connected to meaning*

Nine articles identified the sub-theme of emotion connected to meaning, and just one article being inconsistent by suggesting that emotions did not influence attitudes towards behaviours (Pham et al., 2018). When able to manage emotions through what is known as ‘cognitive reappraisal’, the process of using cognition and linguistics to reframe a situation to improve emotional regulation, students have an improved understanding of risk perception (Dong et al., 2022). This was because young people were better able to engage with difficult and challenging information when they were able to process their emotions. This concept of managing emotions to engage in difficult information was also supported by Mebane et al. (2023), Gunasiri et al. (2022), Spitzer et al. (2023) and Ojala and Bengtsson (2019). This was highlighted in the following comment, highlighting that negative emotions can hinder a young person’s willingness to engage in climate change education:

People might try not to know because it is too scary. (Doyle, 2020, p. 2760)

4.3.1.2.2 *Emotion connected to motivation*

Emotion connected to motivation was shown in nine articles. Some positive emotions that were connected to motivation towards action included hope and excitement (Arnot et al., 2023; Li et al., 2022; Mebane et al., 2023). One article found that if young people could foster positive feelings, it helped to counteract the feelings of overwhelm and worry, which resulted in higher efficacy towards pro-environmental behaviours (Gunasiri et al., 2022). Furthermore, cognitive reappraisal was an effective tool to encourage willingness to engage in environmental action (Dong et al., 2022).

Negative emotions regarding climate change were also associated with motivation towards action, and these emotions included disbelief, concern, desperation, anxiety, anger, fear and sadness (Mebane et al., 2023). Mebane (2023) suggested that these negative emotions are the strongest predictor of intention to act, rather than the positive emotions. They also found that an emotion that decreased motivation was indifference (Mebane et al., 2023). Lawrance et al. (2022b) and Pickering et al. (2022) also found that young people can sit with emotions such as overwhelm

but still feel motivated. For example, it was noted that youth who had higher levels of distress reported higher levels of agency. This suggests that to refer to emotions as either positive or negative may be reductionist, as a stereotypical “negative” emotion, such as overwhelm, may lead to a positive response, such as climate actions.

4.3.1.2.3 Emotion connected to action

The relationship between emotion and action was also identified in this review. Understanding emotional triggers can influence young people’s behaviours, with certain emotions supporting young people to engage in actions or hindering them in doing so (Barros & Pinheiro, 2020; Bissinger & Bogner, 2017; Du et al., 2023; Ediz & Yanik, 2023; Larocque, 2023; Pickering et al., 2022; Yatirajula et al., 2023). Results suggested that both positive and negative emotions can lead to action, with activating emotions (emotions that predict behavioural intent to manage a threat (Stanley et al., 2021)) including hope, guilt, anxiety, anger, expectation and upset (Ediz & Yanik, 2023; Gunasiri et al., 2022; Kim & Kim, 2020; Lawrance et al., 2022b; MacKay et al., 2020; Pickering et al., 2022). It is not just how young people feel, but how they manage these emotions that influences their behaviour, re-enforcing the need for affective education (Ojala & Bengtsson, 2019).

One article identified a cultural shift where people are becoming angry, which is leading to activism. One young person compared this to other global movements:

People are actually starting to get more angry and they are starting to see it more as being a flex to be woke. People are genuinely starting to step up and be like ‘yo, something is wrong’ and trying to educate people. People are not taking any crap anymore, sort of because it is the BLM [movement] and the [COVID-19 pandemic] coming so soon together. (Pickering et al., 2022, p. 2133)

4.3.1.3 Motivation connected to meaning, emotion and behaviour

The following three sections outline the relationships found among motivation and the other concepts of meaning, emotion and action. Motivation demonstrated the fewest connections in this study; however, the selected studies did provide some insight into motivation and its result in actualised behaviours.

4.3.1.3.1 Motivation connected to meaning

Only one article spoke to the analytical code of motivation to meaning, and suggested that egotistical motives influence certain purchasing attitudes. However, this is very specific to purchasing behaviours and relates to a small population. While it is a weaker link, it suggests there is a need for more exploration to understand the role of this sub-theme.

4.3.1.3.2 Motivation connected to emotion

Just one article identified this code. It was suggested that a sense of agency resulted in improved mental health (Gunasiri et al., 2022). By having this sense of agency, feelings of hope increased and improved optimism was observed.

4.3.1.3.3 Motivation connected to action

Regarding the connection of motivation to action, one article discussed the idea that young people have the motivation to engage in pro-environmental behaviours but do not have the capacity or resources to do so; examples of the lack of capacity included transport limitations, financial limitations, lack of family support, additional time needed to make pro-environmental decisions, and lack of information to help inform decisions (Arnot et al., 2023; Larocque, 2023; Pham et al., 2018). In another article, one young person shared:

Youth have the power and drive to reduce disaster risks and fight climate change. We are passionate about the power our generation inherently possesses, but we need adult support to meaningfully contribute. (Pickering et al., 2022, p. 2131)

This suggests that while young people have the motivation, action is not always possible without this support from significant adults to allow access to required resources, which could be family, their community, educators or important societal figures such as politicians and scientists. Pickering et al. (2022) referred to this as the civic empowerment gap, a space where young people want to engage but do not have access to the resources to do so. This was also suggested by Lawrance et al. (2022b), who proposed that young people want to engage in climate action but do not have the tools to do so.

Specific motivations that increased actions included actions that reduce domestic costs but only if the actions are not inconvenient, 'easy' actions such as taking public transport and eating less meat, and indirect actions such as learning about climate change (Dong et al., 2022; Lehnert et al., 2019). Another motivating factor was simply having reminders of mitigation and CCA strategies which can lead to actions being carried out (Abrham et al., 2023). Physical proximity to climate-related disasters was also an indicator of motivation and engagement in actions (Zeeshan et al., 2021). Relational aspects also increased young people's motivation and, thus, action, such as working in groups, solidarity and place-based connections (Larocque, 2023). This is further detailed in section 4.3.5.

It is interesting to note that one article found that a willingness to engage in action does not necessarily correlate to the actions being carried out (Lehnert et al., 2019); however, other studies contradict this (Bordallo, 2023; Pakpour et al., 2021).

4.3.1.4 Action connected to meaning, emotion and motivation

The following three sections outline the relationships found among action and the other concepts of meaning, emotion and motivation, as noted in the literature review. These sections suggest that action can decrease climate anxiety, as well as suggesting action improves climate literacy and motivation for climate action.

4.3.1.4.1 Action connected to meaning

The connection of action to meaning was mentioned throughout the articles selected for this scoping review. This meaning could develop through actions such as debating, engaging in education, or engaging in protests (Arnot et al., 2023; Li et al., 2022; MacKay et al., 2020). Arnot et al. (2023) suggested that such actions develop meaning by increasing awareness, promoting critical thinking, building community and helping to establish a culture of unity (Arnot et al., 2023). It is also suggested that engagement in action promotes the acquisition of skills such as leadership, social skills and learning about disaster preparedness (Arnot et al., 2023).

4.3.1.4.2 Action connected to emotion

Action to emotion was another identified analytical code. Most commonly, the research found that engagement in pro-environmental behaviours resulted in positive emotions. Emotions resulting from climate action included optimism, “feeling good”, hope, calmness, feeling in control, fearlessness, determination, unity, inspiration, empowerment and efficacy (Arnot et al., 2023; Gunasiri et al., 2022; Kelsey, 2020; MacKay et al., 2020). One article suggested positive emotion was related to a sense of purpose, and this helped build resilience (Yatirajula et al., 2023); action was referred to as a mental health intervention and psychological protection (Gunasiri et al., 2022; Lawrance et al., 2022b). Involvement in climate action can also increase social capital, which in turn improves psychological wellbeing (Yatirajula et al., 2023).

Specific actions that help with psychological coping and experiencing positive emotions included contact with nature, debating, being informed, engaging in public discussions with peers, changing one’s lifestyle, working with others, managing social media inputs and influencing policy (Gunasiri et al., 2022; Kim & Kim, 2020; Li et al., 2022). As noted in section 4.3.1.1.1, education was found to have the potential for positive emotional outcomes for young people, and this finding was also supported by this code. It was found that being involved in “taking action activities”, as referred to by Kim and Kim (2020), or active learning, such as tasks in school clubs or attending protests, resulted in more positive emotions such as hope and expectation. This suggests play, creativity and enjoyment supported students’ deeper learning about themselves and their emotions, and allowed them to address negative emotions (Kim & Kim, 2020; Larocque, 2023).

Despite results showing that action leads to positive emotional responses, three articles identified otherwise. One article suggested that anxiety is higher amongst those engaged in climate action (Ediz & Yanik, 2023). Another article identified that by, being involved in activism, a sense of moral responsibility was aroused, adding psychological pressure on these young people (Larocque, 2023). A third article found that being unable to engage in pro-environmental behaviours due to lack of resources (i.e., financial and/or transport limitations) resulted in some negative emotions such as guilt, hopelessness and shame (Gunasiri et al., 2022).

4.3.1.4.3 Action connected to motivation

The relationship of action to motivation was identified in this review. Three articles indicated that engaging in action further promoted motivation (MacKay et al., 2020; Mebane et al., 2023; Nguyen et al., 2017). Actions that inspired motivation included creating educational materials to increase awareness among others (Kim & Kim, 2020) and action-orientated education or active learning (Aksel Stenberdt & Makransky, 2023; Kim & Kim, 2020; Larocque, 2023). One article suggested that by taking part in climate actions, young people had an increased sense of agency and of feeling capable, relating to the previous study by Spitzer et al. (2023) which discussed the importance of needs (Gunasiri et al., 2022).

However, one study found that engaging in activism, such as protests, did not motivate other actions (Lehnert et al., 2019), particularly when young people did not see their activism making a difference, leaving them feeling demotivated (Arnot et al., 2023). Being able to “see the difference” was reflected in another study that noted how achieving a fundraising goal motivated the young people to engage in more actions (Pickering et al., 2022).

4.3.1.5 Conclusion on the relationships among meaning, emotion, motivation and action

As demonstrated in the previous sections, relationships were demonstrated along all four concepts of climate change meaning, emotion, motivation and action, painting a complex picture of how these concepts interact to motivate engagement in climate action. The most cited codes were within the relationships with meaning, while the least cited codes were among those related to motivation. In exploring these relationships, four themes arose: the role of emotion in climate action, gender differences, connection to nature, and connection to others. These themes could be identified within all four concepts of meaning, emotion, motivation and action, further adding to the complexities of this topic. These four themes are outlined in the following four sections.

4.3.2 Theme 1: The Role of Emotion in Climate Action

This section discusses the role of emotion when motivating young people to engage with climate change actions. As already identified in this results chapter, emotion has relationships with

climate change meaning, motivation and action, and the present study further demonstrates why this is an important and growing body of literature.

The findings presented thus far in this chapter have demonstrated how emotions are very wide-ranging. Some of the emotions referenced in this study are hopelessness, hope, feeling disheartened, powerlessness, shame, feeling intimidated, overwhelm, a sense of defeat, embarrassment and melancholy (Ediz & Yanik, 2023; Gunasiri et al., 2022; Heo & Muralidharan, 2017; Kutwayo et al., 2022; Li et al., 2022; Mebane et al., 2023; Prencipe et al., 2023). This demonstrates the complexity one is dealing with when understanding the range of emotions that a young person may experience, and how these emotions may impact motivation towards climate action.

Eight of the articles explicitly proposed that emotions are an important consideration for youth to engage in climate change action, and that further research is needed to fully understand the complex role of emotions in the process of engaging young people in climate action (Barros & Pinheiro, 2020; Bissinger & Bogner, 2017; Dong et al., 2022; Kim & Kim, 2020; Kubisch et al., 2022; Lawrance et al., 2022b; Pakpour et al., 2021; Yatirajula et al., 2023). The importance of emotions was referred to in one article which suggested it is a driver for decision-making and thus a vital factor for young people when deciding whether to engage with pro-environmental behaviours (Mebane et al., 2023).

Some emotions were shown to have reciprocal relationships with the other concepts, such as hope and action, further supporting the importance of emotions when encouraging pro-environmental behaviours (Gunasiri et al., 2022). The importance of emotions was further stressed in one study by reporting that climate change concern was a stronger predictor of behaviour than climate change knowledge – again highlighting the important role that emotions can play in encouraging and supporting young people to engage with climate actions (Heo & Muralidharan, 2017).

While 13 articles in this review specifically explored emotions relating to climate change, others did not. Of those that did not intend to explore emotions, two articles suggested that emotions may be the missing link that connects meaning to action (Evans et al., 2018; Pickering et al., 2021). For example, Evans et al. (2018) suggested that there may be a psychological link among early experiences and climate change action taken as an adult, such as a sense of connectedness to the planet.

The research also emphasised that emotions are particularly important for educators and policy makers to create affective education strategies that ensure good mental health and to encourage pro-environmental behaviours through policy and incentives (Kim & Kim, 2020; Mebane et al., 2023; Yatirajula et al., 2023). This can be done by creating affective education, as mentioned in sections 4.3.1.1, 4.3.1.1.1 and 4.3.1.2.3.

4.3.3 Theme 2: Gender Differences

This section discusses the next theme that evolved from the analysis which is that of gender differences. As is outlined below, nine studies found a difference within their participant groups. It is important to recognise that there is much more to gender than a binary definition of male and female; however, as these studies were all designed under this pretence, the participants are referred to here in these binary terms.

Gender differences were noted in various ways relating to meaning. Climate knowledge was found to be different among male and females, as evidenced by Larocque (2023). An example of this is that females were more aware of climate change and therefore more engaged in pro-environmental behaviours (Prencipe et al., 2023; Zeeshan et al., 2021). Another study found that males have higher risk perception than females and therefore a better understanding of efficacy (Dong et al., 2022). Another article suggested that males report higher belief in the efficacy of direct actions such as car use and recycling; however, no significant difference was found between overall attitudes and beliefs about mitigation actions (Lehnert et al., 2019).

Gender differences were also reported relating to emotions. Females reported stronger emotions and higher levels of distress and fear (Ndeti et al., 2024; Prencipe et al., 2023; Spitzer et al., 2023), with another study suggesting that higher concern in females did not always reflect in increased involvement in action towards CCA and mitigation (Zeeshan et al., 2021). Male and female participants also coped in different ways, with males more emotion-focused and females more problem-focused (Ojala & Bengtsson, 2019). However, another study found that females used more emotional words and meaning to convey climate change risk, whereas males were more likely to focus on practical aspects such as financial concerns, suggesting the different motivations for action (Doyle, 2020; Lehnert et al., 2019). Another study found that males were more likely to be engaged in cognitive reappraisal (reframing situations to be more positive) (Dong et al., 2022).

Gender differences were also noted in actions. Three articles reported females being more willing than males to engage in action (Dong et al., 2022; Lehnert et al., 2019; Zeeshan et al., 2021). One article found more females were involved in participatory activities relating to action, and males were more likely to be engaged in advocacy and protests (Zeeshan et al., 2021). In another study,

out of nine possible actions, males were seen to be less engaged in only one action, eating less meat, compared with females, suggesting females and males engage in similar ways (Pickering et al., 2021).

It is clear from these various findings that there are some inconsistencies in the results and while it is apparent there are gender differences, much more exploration needs to be conducted to fully understand how they may differ, and in what ways policy makers, educators and other significant adults can support young people to engage with climate action while considering possible gender-specific approaches.

4.3.4 Theme 3: Connection to Nature Supports Climate Action and Improved Mental Health

One theme that was common throughout the literature was that of a connection to nature, this being explicitly noted in eight of the articles. Within meaning, young people that reported being more connected to nature expressed feelings of responsibility and better understanding of the consequences of climate change (Barros & Pinheiro, 2020). Using nature as a teaching environment increased the emotional bonds with nature (Bissinger & Bogner, 2017; Du et al., 2023). Creating compassion and concern for nature can also increase action (Bissinger & Bogner, 2017; Larocque, 2023). Improving climate literacy and developing a sense of care and respect for nature was demonstrated by one young person in the article by MacKay et al. (2020, p. 7):

Before, I didn't really care about the land, I guess, and that kind of sounds harsh but I didn't care. I didn't really know what was happening. I felt like learning about climate change — it really changed how important [the land] is to people and to respect the land.

Relating to emotions, two studies found that young people reported that being in nature is healing and supports them to manage their eco-anxiety and overall wellbeing (Gunasiri et al., 2022; Larocque, 2023). To expand further on this, one article found that children who spend time in nature as younger children reported engaging in more action once they were older (Evans et al., 2018). This would suggest spending time in nature is good for developing concern and growing bonds with nature, improving mental health and encouraging action. This was highlighted in the following quote by Larocque (2023, p. 143):

interactions with nature can provide a sense of wellbeing and foster a profound sense of connection that reaches inward (body, mind, spirit) and outward (community, Land, people).

4.3.5 Theme 4: Connections with Others Supports Climate Action and Improved Mental Health

This relational aspect was identified in 13 of the articles. Young people find inspiration and motivation when engaging with peers and other adults, and particularly enjoy using their own influence to inspire and motivate others (Arnot et al., 2023; Larocque, 2023; Pickering et al., 2022; Tolppanen et al., 2023). This receiving and sharing of motivation resulted in more action being taken by young people (Pickering et al., 2022). Arnot et al. (2023) suggested that the motivation came from encouraging shared goals and unity.

Descriptive norms, what a person thinks others are doing, motivates behaviour and this may explain why connection with others is so powerful (Pickering et al., 2021). One young person shared:

I was motivated by the idea that so many people were coming together for one cause, united in their mission to raise awareness among the public about this issue and take a stance against the government's damaging policies. (Arnot et al., 2023, p. 5)

Education and connections with others were mentioned in various studies. When young people worked alongside their peers, they engaged better in their learning, felt better emotionally and were more involved in climate actions (Gunasiri et al., 2022; Li et al., 2022). One example of the power of influence in education was demonstrated in the study by Mebane et al. (2023). In this study, students engaged in sustainability projects in school. This had a positive effect on other students within the school community who became more interested in engaging in climate action. Another article identified how witnessing other people's positive impacts on CCA and DRR also encouraged feelings of hope and optimism (Gunasiri et al., 2022).

Young people shared that educating others through protests is important, and that protests have a positive emotional impact, resulting in empowerment and feelings of hope (Arnot et al., 2023). However, another account of protests were that the protests "annoyed" others and caused anti-CC rhetoric, making others disengage from action (Arnot et al., 2023). The same study found that some young people have been discouraged from engaging in protests due to their peers not being interested (Arnot et al., 2023). These findings highlight that while there is the possibility of peers having a positive influence, they can also have a negative influence on others.

Having an opportunity to teach others and raise awareness inspires young people to share information on platforms such as social media (Gunasiri et al., 2022; Pickering et al., 2022). In turn, this raising of awareness and sharing of information inspires other young people to engage with climate change action, with one young person saying "they're creating that ripple effect" (MacKay et

al., 2020, p. 12). Another young person emphasised how this could work to encourage disaster preparedness:

This is super unrealistic, but if Kim Kardashian was like ‘oh just made my disaster preparedness kit using like Supreme’s disaster bag’ then everyone would be like ‘oh my god I need this.’ (Pickering et al., 2022, p. 2114)

Family influence also appeared in the literature. Young people’s actions were predicted by parents’ or significant adults’ familiarity with climate change, particularly in those relationships where there is a low power distance, with this relationship being reciprocal between adults and young people (Ojala & Bengtsson, 2019; Park & Kim, 2020; Xia & Li, 2022). However, other research suggested that the impact of ‘significant others’ did not necessarily change the behaviours of young people, particularly in relation to consumer behaviour (Nguyen et al., 2017). Community and intergenerational relationships have also been raised as being important for helping young people manage their emotions (MacKay et al., 2020).

All these various findings further allude to the power of the influence that young people can have on each other, both positively and negatively, and the influence that people in their family and community can have. When there is a positive influence, connection to others can enhance learning, improve mental health and encourage motivation and actions.

4.4 CHAPTER SUMMARY

This chapter has summarised the findings that resulted from the scoping review described in Chapter 3. These results have indicated that the relationships among the concepts of climate change meaning, emotion, motivation and behaviour are complex relationships that can be both positively and negatively influenced by several factors such as gender, peers, family, religion and access to nature.

The analysis also highlighted some common findings throughout the research that impact the relationships among the four concepts. The first theme identified was the role of emotion. This was highlighted as a key concept throughout the literature, with eight articles referring to this as an important concept that encouraged motivation towards pro-environmental behaviours. The second theme was gender differences, which described how gender may influence how one experiences climate change meaning, emotion and motivation towards actions. Findings on this were inconsistent, leaving scope for further research to better understand the role of gender when engaging youth in climate change action. The third and fourth themes that emerged were connection to nature and connection to others, with all the relevant articles demonstrating the

power that connection can have when influencing young people to engage with climate change actions, as well as improving mental health. The next chapter discusses these findings in relation to the initial research question, as well as considering the contribution this scoping review makes to this emerging body of literature.

5 DISCUSSION

5.1 INTRODUCTION

The introduction chapter of this thesis highlighted the urgency required to manage anthropogenic climate change. As the upcoming leaders, young people must be supported to engage and implement effective CCA and mitigation strategies. However, young people are experiencing mental health challenges related to climate change, such as anxiety, which can hinder their motivation towards climate action (Kurth & Pihkala, 2022). To address this concern, this study had three objectives. The first objective was to explore the ways in which climate change meaning is developed. The second objective was to understand the range of climate change emotions experienced, and the factors that might influence them. The final objective of this study was to investigate the relationships among climate change meanings, emotion, and motivation towards climate actions. By conducting a scoping review, the researcher was able to map the current knowledge base relating to these objectives and identify inconsistencies and gaps in the literature.

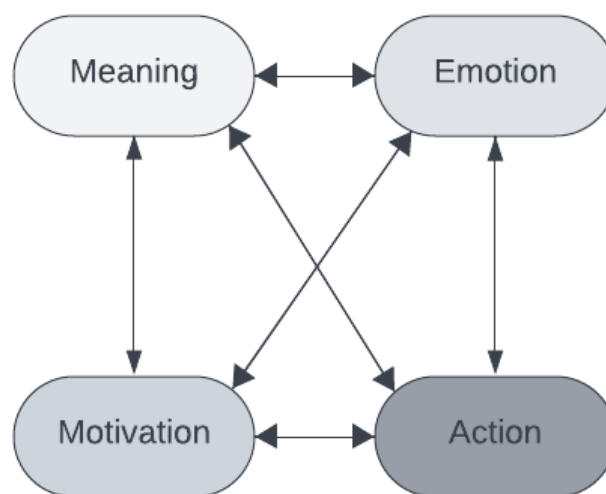
The previous chapter detailed the findings of this study. These findings identified a complex and multi-directional relationship among the concepts of climate change meaning, emotion, motivation and action in young people. The findings also highlighted the role of emotion in engaging young people in climate action, and indicated that engaging in affective education and active learning (defined in sections 4.3.1.1.1 and 4.3.1.1.3, respectively) can support climate actions. The chapter then discussed additional themes identified through the analysis, adding further layers of complexity to understanding engaging young people in climate actions. These additional themes included gender differences, connection to nature and connection to others.

This chapter discusses these findings within the broader context, as provided in the literature review in Chapter 2. First, in section 5.2, the overall relationships among the concepts of meaning, emotion, motivation and action are discussed, proving a model of how these concepts are influenced by other factors. Next, section 5.3 discusses emotion as a risk factor, and how this must be considered to support CCA and mitigation efforts. Summarising the practical findings, section 5.4 provides a guide for implementing the findings of this research. This chapter concludes in section 5.5 which reflects on the objectives of this study, study limitations, and recommendations for future research, and provides a chapter summary.

5.2 A COMPLEX WEB OF CLIMATE CHANGE MEANING, EMOTION, MOTIVATION AND ACTION

Through the literature review in Chapter 2, the concepts of meaning, emotion, motivation and action were discussed, based on Lazarus's theory of emotions. These concepts were identified as being integral to understanding how young people are motivated to engage in climate action. This study supported the role of each of these concepts. All 37 articles analysed in this study demonstrated a connection among at least two of the concepts of climate change meaning, emotion, motivation and action for young people. Thirty-five of the 37 articles identified that these relationships were multi-directional, as shown in Figure 5.1, below. This is unlike the initial suggestion made by the author in the literature review which suggested this was a linear process (see Figure 1.4) which the author now considers reductionist. This study's findings describe a complex web of relationships among the four concepts, illustrating a dynamic picture for young people's engagement in CCA and mitigation.

Figure 5.1
A Model of Multi-directional Relationships Among Climate Change Meaning, Emotion, Motivation and Action



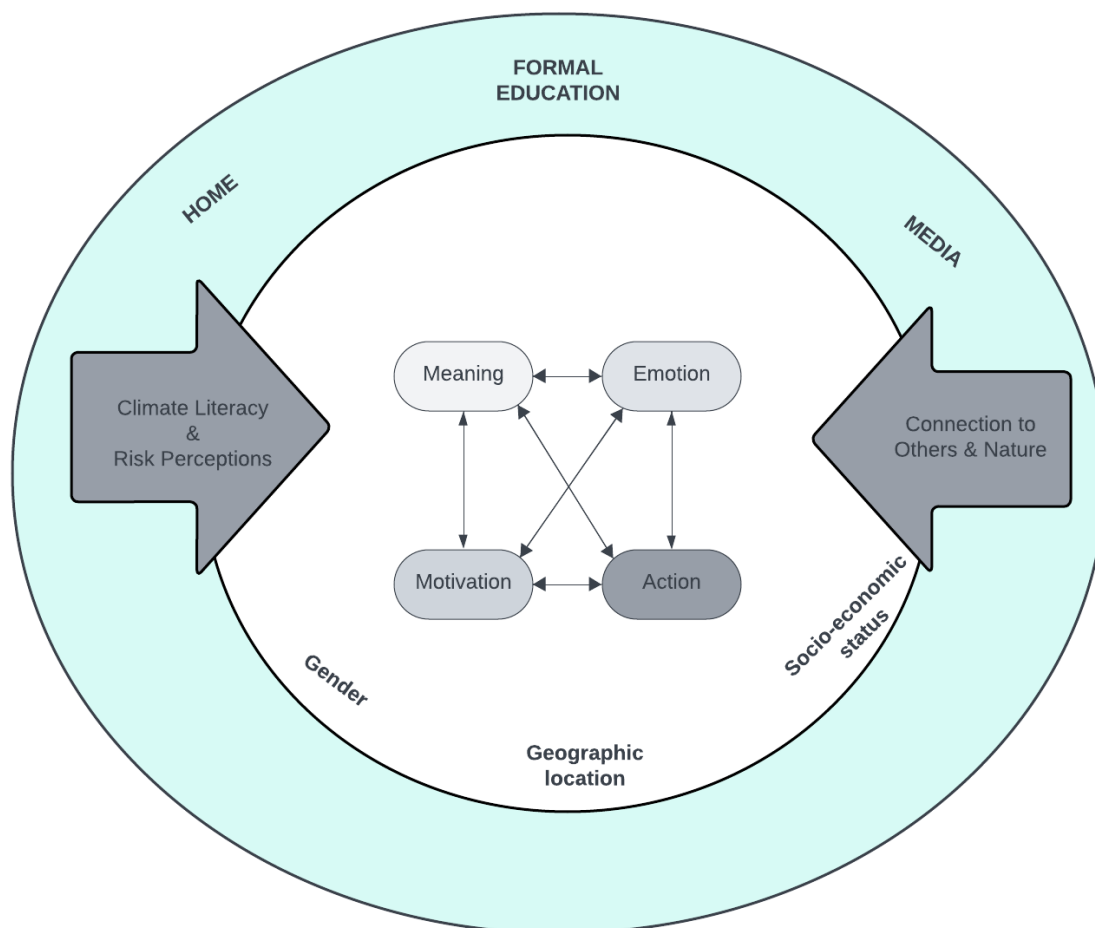
Note. This image depicts the multi-directional relationships among the concepts of meaning, emotion, motivation and action. This idea is developed from the initial suggestion in Figure 1.4, which suggested a simple linear pathway through these concepts.

As well as these multi-directional relationships, this study's findings also suggest additional factors that can influence motivation towards climate action that go beyond the four concepts of meaning, emotion, motivation and action. This is illustrated in Figure 5.2, below. This figure encompasses the importance of home, formal education and media, the environments in which a young person develops climate literacy and risk perceptions, as outlined in Chapter 2 and reflected

in the findings of this study. Other factors, namely gender, socio-economic status and geographic location, have also been included in this figure to demonstrate how they may also shape how a young person engages with climate change emotion and action.

Figure 5.2

A Complex Model of Multi-directional Relationship Among Climate Change Meaning, Emotion, Motivation and Action



Note. This figure illustrates the complex nature of climate change meaning, emotion, motivation and action. Influences from home, formal education and the media can impact these concepts, alongside demographic contexts such as socio-economic status, gender and geographic location.

One area of differentiation from Chapter 2 concerns values. Chapter 2 suggested that young people in western countries may be influenced by values such as engaging in a linear economy and individualism, both encouraging the use the natural environment without consideration for planetary consequences. Such actions include using single-use plastics and deforestation (Kelman et al., 2015). However, this did not align with some of the findings of this study, which suggested that young people, regardless of their geographic location, do not disregard the consequences of their actions and the impact on climate change. This was demonstrated in the interviews completed by Larocque (2023). These Canadian youth activists were able to express a deep concern for the

consequences of their actions, and were able to influence change to raise awareness of the negative consequences certain actions have for climate change. These young people also advocated for community-based practices, rather than supporting a more westernised concept of individuality. Relating to ideas of a linear economy, young people supported a circular economy with one of the most frequently cited actions taken by young people being recycling (65-78% depending on gender) (Lehnert et al., 2019).

This perhaps represents a shift in social consciousness, from a disregard for planetary health to a deeper concern for nature. This could be a positive step forward for CCA and DRR in the future. This cultural shift was referred to by Pickering et al. (2022), noting how “thrifting” has become such a popular part of youth culture that a new verb has been created. They also acknowledged how influential figures such as celebrities have power to inspire the youth population to engage in climate actions. This cultural shift is a necessity if humans are to effectively adapt to climate change and mitigate climate-related hazards. However, it has been argued that any current cultural shift is not significant enough to make changes to anthropogenic climate change. Instead, further work should be done through means such as formal education to build towards this necessary cultural shift (Rappleye et al., 2024).

Another interesting finding is the theme of gender differences, which had not been identified in the initial literature review. Gender differences were explicitly discussed in nine of the articles, demonstrating that this may impact a young person’s meaning, emotion, motivation and action towards CCA and mitigation. This study found that females are more emotive when considering climate change and are more open to sharing their worries (Doyle, 2020; Spitzer et al., 2023; Zeeshan et al., 2021). One article suggested that females are more comfortable sharing emotions due to societal norms and values, adding a further complexity to how the concepts of meaning, emotion, motivation and action may be developed and influenced when considering gender (Ndetei et al., 2024).

This study highlighted many different theories on gender differences. One theoretical explanation for gender differences was that nature is seen as feminine and therefore it is easier for females to connect with and act on this concern (Dong et al., 2022). Another article reasoned that these differences may arise because, in countries where poverty is higher among females, they are often looking after the home and feeling more impacted by climate change (Zeeshan et al., 2021). Due to this physical proximity to climate-related hazards, they better understand the risks to their domestic environments and are therefore more likely to get involved in direct actions (Zeeshan et al., 2021). This study also suggested that some females do not have the resources to be directly

involved in CCA and mitigation behaviours, so their concerns do not always translate to action. This capacity to be involved in CCA and mitigation actions was highlighted in a 2016 report which recognised gender disparities regarding available opportunities to be in climate leadership roles (Sellers, 2016). While it is not specific to youth, the report demonstrated a wider systemic issue on women's capacity to be involved in decision-making regarding CCA and mitigation.

Despite some theories on the differences in gender, one study suggested it is neither knowledge or perception underlying the differences in actions taken by males and females, and suggested the need for further research in this area (Pickering et al., 2021). It is apparent from this review alone that these gender differences in young people are not well understood. It will be important for future research to explore how factors such as socio-economic status, geographic location and gender affect young people's meaning, emotion, motivation and action towards CCA and mitigation, to ensure support is tailored effectively. This knowledge could be incorporated into learning environments, cultural roles, available opportunities (e.g., volunteering, school clubs) and much more, to ensure that strategies and policies align with a young person's individual context.

The final two themes related to 'connection' were highlighted numerous times throughout this study. Both connection to nature and connection to others were emphasised, with both factors having the potential to create a positive relationship with meaning, emotion, motivation and actions. The impacts of connection to nature on psychological wellbeing is becoming another area of growing interest. This can be seen in the recent interest in therapies such as forest therapy, in which a person spends time in nature to heal a range of physical and psychological health concerns (Rajoo et al., 2020). Relating to connection with others, working with others, influencing others and learning from others were all supportive factors for young people. The influence of peers on young people is well understood in the field of psychology (Giletta et al., 2021), and this knowledge can be applied to engaging young people in climate actions. By combining these concepts of connection to nature and connection to others, creative interventions for supporting youth with their engagement in CCA and mitigation, while maintaining good mental health, can be developed.

In summary, this study has revealed that the concepts of meaning, emotion, motivation and action are complex, and the relationships are still being understood. This study also suggests that the relationships among meaning, emotion, motivation and action can differ depending on various factors relating to the context of individual young people, such as gender, socio-economic environment and geographic location. As identified in the literature review, these factors are complicated and need to be understood to ensure young people are supported to engage in CCA and mitigation. Further adding to this complexity are ideas of connection to nature and connection to

others which can serve as tools to support young people to engage with climate action and maintain their mental health, as will be discussed further in section 5.4.

5.3 EMOTION AS A RISK FACTOR

Emotions relating to climate change are multifaceted and varied, as detailed in the climate emotions wheel (see Figure 2.3). These climate emotions can offer unique insights into decision-making and risk perception, and therefore it is vital to understand their role in young people's engagement in CCA and mitigation behaviours (Kelsey, 2020; Kurth & Pihkala, 2022). This study has emphasised the role of emotion, which cannot be underestimated, with Heo and Muralidharan (2017) suggesting that climate change concern was a stronger predictor of behaviour than climate change knowledge. Therefore, if effective tools, policies and strategies are to be created to engage young people in climate action while maintaining their mental health, a consideration of emotions must be incorporated into them.

It is therefore suggested that emotion can be considered a risk factor for climate-related hazards. If emotions are well understood and managed, it is expected that young people would be more engaged in climate action, as outlined in the results chapter. Climate emotions also pose a risk factor for young people's mental health, which is a growing concern, as highlighted in the introduction chapter. By being emotionally responsive to emotions relating to climate change, young people can be emotionally safe and therefore improve their mental health.

To consider emotion as a risk factor for engaging in climate actions, it is thus important to understand how emotions can influence climate action. In the literature discussed in Chapter 2, as well as this study's findings, activating emotions support engagement in climate actions (see the definition of 'activating emotions' in section 4.3.1.2.3). Both "negative" and "positive" emotions can be activating emotions, such as Kurth and Pihkala's (2022) concept of practical anxiety and Kelsey's (2020) concept of hope. This study found diverse activating emotions, such hope, anxiety, guilt, expectation, anger and concern (Ediz & Yanik, 2023; Gunasiri et al., 2022; Kim & Kim, 2020; Lawrance et al., 2022b; Mebane et al., 2023). Much more research is needed in this area to further identify activating emotions and how to utilise them to engage young people in climate action.

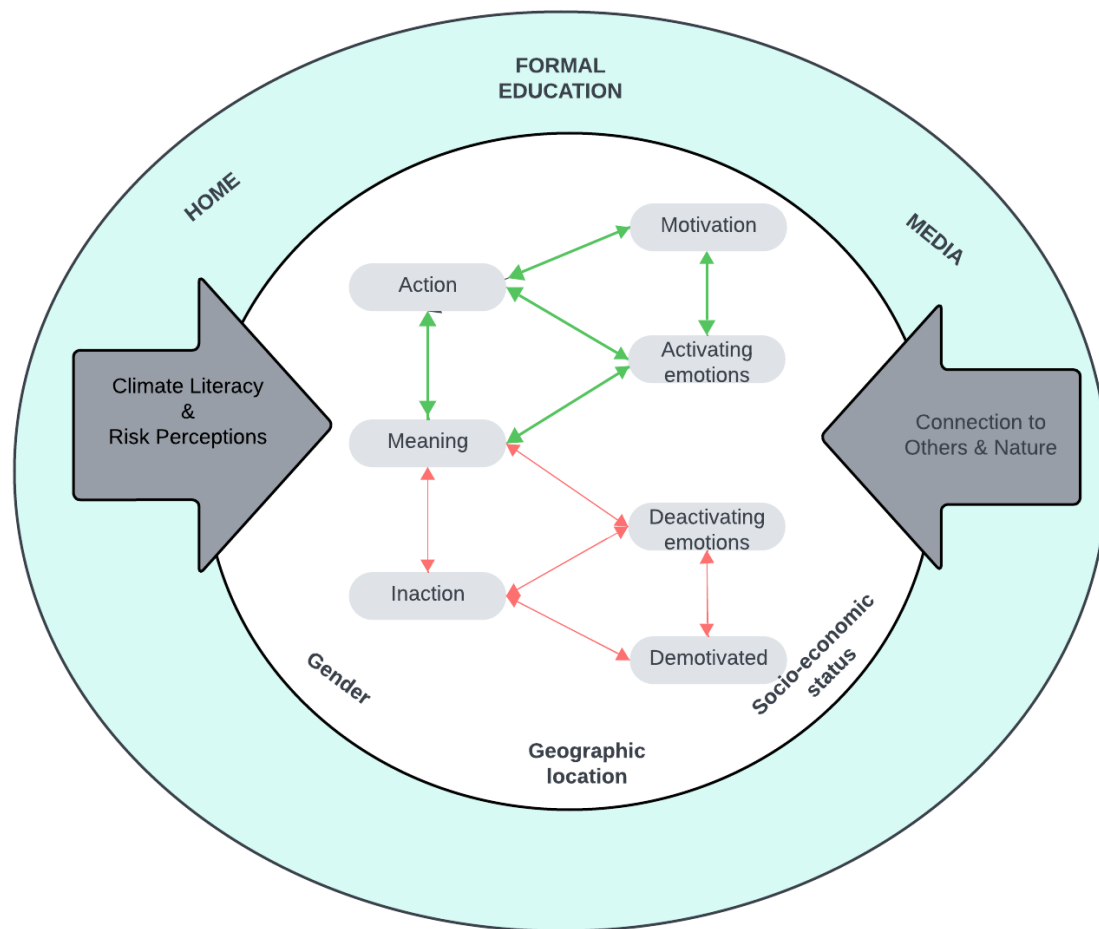
The results of this study further supported the literature review by identifying emotions that are de-activating. These de-activating emotions include feelings of anxiety, hopelessness, powerlessness and indifference (Gunasiri et al., 2022; Mebane et al., 2023; Yatirajula et al., 2023). These emotions often arose from exposure to negative or hopeless stories in the media and through education. This reflects the theories shared in the literature review, such as those of doomism, tragic

hope and dark optimism, relating to a delicate equation and balance of emotions which enable action. When considering the motivation model of EPPM (refer to section 2.5 for further information), activating and de-activating emotions can be added to this model, adding a deeper level to the understanding of how motivation is created.

In understanding that different emotions can either evoke climate action or not do so, an emotional response can be viewed as a key turning point in a young person's motivation to engage in action. As supported by the findings in this study, once a young person begins on a pathway of activating emotions, a positive cycle begins. On this pathway, a young person is motivated and engaged in action. Action can create a deeper understanding of climate change, further developing activating emotions and therefore more action, and thus a positive feedback loop can be created. However, if a young person experiences deactivating emotions, a negative feedback loop can occur, resulting in a young person being disengaged from climate action, less interested in developing climate literacy and so on. This idea is depicted in Figure 5.3 below.

Figure 5.3

An Emotionally Driven and Complex Model of Multi-directional Relationships Among Climate Change Meaning, Emotion, Motivation and Action



Note. This figure details potential pathways that a young person may follow in positive and negative feedback loops, with activating and deactivating emotions influencing this pathway.

A young person could move between positive and negative feedback loops. For example, if a young person initially feels hopeful and engages in action, but they do not see their action “making a difference”, as described by Arnot et al. (2023), they may experience de-activating emotions. This could result in a lack of motivation for further action (inaction). In this example, the young person has gone from the positive cycle to the negative cycle. This pivot point at the emotional cornerstone of the pathway is thus fundamental in ensuring young people are supported and encouraged to engage in pro-environmental behaviours, while maintaining their mental health.

To conclude, it is evident that an understanding of emotion as a risk factor is a gap in the current literature. Figure 5.3 is a first step towards mapping how climate emotions may impact climate action, contributing to the field of DRM. However, it is important to note that one cannot reduce youth engagement in climate change action simply to emotions motivated by irrational behaviour. Young people globally have proven to be knowledgeable about climate science and driven towards action to manage disaster risk. Nonetheless, given they are the future leaders of this

planet, they may experience climate emotions more intensely while they learn how they can contribute to managing anthropogenic climate change in the future. For this reason, emotions are a vital risk factor to be considered within DRM research.

5.4 A PRACTICAL GUIDE: MOBILISING CLIMATE ACTION AND MAINTAINING MENTAL HEALTH

Throughout this thesis, the relationship among the four concepts of meaning, emotion, motivation and behaviour were explored. By understanding this relationship, effective tools, policies and strategies can be developed to support young people to engage in climate action while maintaining their mental health. This section discusses the implications of this study's findings, along with the literature outlined in Chapter 2, in creating a practical guide to motivate action among young people, while maintaining their mental health.

This thesis has identified four practical elements that are successful in both engaging young people in climate action and improving their mental health. These four areas are as follows:

- Affective education
- Active learning
- Connection to nature
- Connection to others

Firstly, affective education was identified. This is defined as education that “that is concerned with the feelings, values, beliefs, attitudes and emotional well-being of learners” (Romi & Katz, 2003, p. 35). Affective education was shown to help young people to develop positive emotional relationships with climate change (Bissinger & Bogner, 2017; Kim & Kim, 2020; Zeeshan et al., 2021). This supports the findings of Lee et al. (2020) as outlined in Chapter 2. Affective education is vital for a deeper understanding of climate change, which in turn improves climate literacy and therefore creates motivation towards climate action (Spitzer et al., 2023). Supporting Kurth and Pihkala (2022), this study highlights that negative emotions do not necessarily result in the outcomes of inaction (Larocque, 2023), and therefore teachers can embrace and utilise the range of activating emotions by supporting their students in an emotionally responsive way (Larocque, 2023). This builds on prior research mentioned in the literature review such as that of Kevorkian (2019) who offers insights into managing experiences of grief and using this to motivate lifestyle and policy change.

The second element that has practical implications is that of active learning. This concept refers to a learning strategy that involves participation, activity and engagement (Doolittle et al., 2023). It is a strategy that is widely shown to support students' learning and encourage deeper learning (Doolittle et al., 2023). By using active learning through formal education, students improve climate literacy, improve their mental health and increase their motivation towards climate action (Bissinger & Bogner, 2017; Mebane et al., 2023). An example of this was from Park and Kim (2020), who identified that young people engaged in climate change club activities increased their awareness of climate change, improved their climate literacy, built a sense of community and were encouraged to engage in ongoing climate action. By improving climate literacy, a sense of self-efficacy is developed along with their acceptance of the information they are being taught. If the acceptance of the information occurs, young people are more likely to make environmentally friendly decisions (Kurth & Pihkala, 2022).

The next two practical element to consider are that of connection, both to nature and to others. Both of these connections provide spaces for young people to improve their mental health, develop climate literacy and be motivated to participate in pro-environmental behaviours (Gunasiri et al., 2022; MacKay et al., 2020; Pickering et al., 2022). Firstly, considering connection to nature, the benefits of engaging with nature for holistic wellbeing is well documented. Programmes of ecotherapy, being exposed to the natural environment, are increasingly used to treat a range of ailments, including mental health conditions (Scholl & Gulwadi, 2020).

The fourth practical element of connection to others is well noted in this study and the literature in Chapter 2. The research on peer influence is well understood and this can be applied to mobilising young people to engage in climate action. A sense of community is also well documented as improving mental health (Stewart & Townley, 2020) and this has been reflected in this study's findings. This finding also reflects research by Marczak et al. (2023) who found that collective action elicited positive emotions and supported people to engage in climate action.

These four elements of affective education, active learning, connection to nature and connection to others create the building blocks needed to support young people in this space of DRM. Combined, these elements mean young people should be provided with opportunities to engage with others while being in nature, and while incorporating active learning and affective education. It would be predicted that, in doing so, their mental health would improve and they would experience activating emotions, encouraging them to engage in CCA and mitigation.

These four practical elements do not need to be limited to formal educational settings, however. They can be incorporated into other environments, as shown in Figure 5.4. For example,

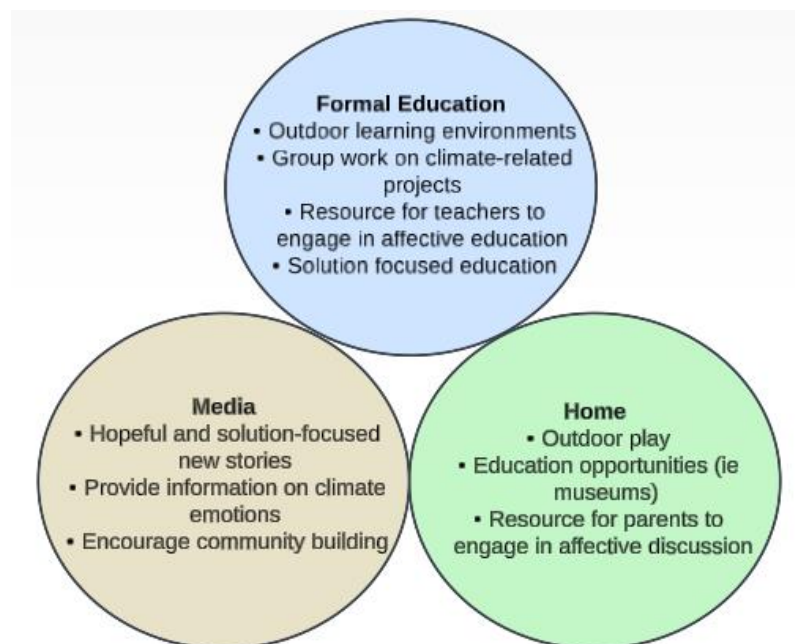
home environments could encourage children to play outdoors and learn about their local eco-systems. Parents could be provided with resources to help them respond to their children's emotional needs regarding climate change. Social media could teach young people about climate change emotions and encourage young people to work together to develop their connection to their local natural environments. This can further be extended to local community projects to assist with DRR efforts.

Figure 5.4

Examples of Practical Elements that can Support Climate Action in the Home, Formal Education and Media

Note. This image shows examples of how affective education, active learning, connection to nature and connection to others could be used in various environments to create a solid foundation from which young people can find the motivation to engage in climate action while maintaining their mental health.

If all aspects of home, formal education and media included some of these practical elements, it would be predicted that young people would have improved climate literacy, improved mental health, and an increase in motivation towards action. Examples of such work are developing. For example, the Climate Mental Health Network has a page of resources for parents which includes



information on how to talk to children in an emotionally sensitive manner in response to the climate crisis (Climate Mental Health Network, n.d.). Another way these practical elements are being seen is in providing positive news stories. This is shown by organisations such as Blue Climate Initiative, which has an online social media presence spreading solution-focused and positive news of successful CCA and mitigation actions relating to the oceans (Blue Climate Initiative, n.d.). These are

some small steps that could have a profound impact on young people's mental health and their motivation towards climate action.

In summary, this section has detailed some practical elements that were identified in this study as creating a positive influence on climate change meaning, emotion, motivation and action. This guide includes affective education, active learning, connection to nature and connection to others. If these elements are incorporated in the home, formal education and media environments, young people can be supported to engage in climate change action while maintaining their mental health. This guide is a springboard for future research to understand what influences will support youth in their endeavour to manage climate change.

5.5 CONCLUSION

5.5.1 Reflection on Research Objectives and Findings

To conclude this thesis, it is important to reflect on the initial objectives of this scoping review. The first objective was to explore the ways in which climate change meaning is developed by young people. This study defined 'meaning' based on Lazarus theory of emotions, and incorporated the definitions of climate literacy (knowledge, skills and values) and risk perception. This was identified in various ways, as outlined in the results chapter. Formal education was often highlighted, although this is likely due to young people involved in the research being accessed through high schools. Despite this, it remains that formal education demonstrated many possible ways to encourage climate literacy and risk perception, namely through affective education and active learning, as detailed already in this discussion chapter. Connection to nature and connection to others were also often attributed to development of climate literacy and risk perceptions. These four elements were further discussed in section 5.4, with the suggestion they can be utilised in a practical sense to encourage motivation towards action, as well as to improve mental health.

The second objective of this study was to understand the range of climate change emotions experienced by young people, and what factors might influence them. Various emotions were identified throughout this study, including hopelessness, hope, anxiety, concern, disheartened, powerless, shame, intimidated, overwhelm, sense of defeat, embarrassment and melancholy (Ediz & Yanik, 2023; Gunasiri et al., 2022; Heo & Muralidharan, 2017; Kutwayo et al., 2022; Li et al., 2022; Mebane et al., 2023; Prencipe et al., 2023). The large variety of emotions echoed that of the emotions wheel in the literature review (see Figure 2.3), further emphasising this intricate area of psychology. Importantly, the role of activating emotions was identified, highlighting the vital role of emotions in motivating climate actions. As noted, some activating

emotions, such as hope and anxiety, can support young people to engage in CCA and mitigation behaviours but emotions also have the potential to hinder engagement. Therefore, there must be a delicate balance to ensure that the emotions become activating and not deactivating. This field of psychology is another complex factor of motivation and engagement in climate action.

The final objective was to investigate the relationships among climate change meaning, emotions relating to climate change, motivation towards CCA and mitigation, and climate actions for young people. These relationships have been identified among each of the concepts. Each concept offers nuanced factors that create a complex picture of how young people are motivated to engage in climate change action, as depicted in Figure 5.2. The findings of this study demonstrate this complexity, with some inconsistencies, as outlined in the previous chapter. While the individual concepts are well understood, these relationships among the concepts need to be investigated in more detail, particularly with a focus on young people.

The overarching question of this thesis is 'How do anthropogenic climate change meanings and emotions influence youths' motivation towards climate action?' Considering the above reflections on the research objectives, the answer is now much more apparent. The influences of climate change meaning and emotion stem from home, formal education and media. These influences can result in activating emotions, such as hope, anxiety and anger, which in turn motivate climate action. De-activating emotions can also arise which discourages climate action. To support activating emotions, tools such as affective education and active learning can be utilised, alongside connecting with nature and others. Throughout this discussion, it is apparent that these tools are effective in mobilising young people to engage in climate action while maintaining their mental health.

In summary, through the research question and objectives, this thesis has contributed to the field of DRM by providing a map of the current knowledge base. This map provides a path on which young people can engage in CCA and mitigation to manage anthropogenic climate change. There are some practical steps demonstrating how meaning and emotion influence motivation towards climate action, as outlined in section 5.4. Furthermore, emotion has been demonstrated to be fundamental in understanding how to engage and motivate young people towards climate action. With future research expanding on these findings, effective tools, policies and strategies can be created to support young people in this journey towards CCA and mitigation.

5.5.2 Study Limitations

Due to the nature of a thesis, some methodological considerations were compromised due to the time and resources of the researcher. For example, when conducting RTA, multiple coders can

be beneficial in checking interpretations and question assumptions in the meaning derived from the data (Byrne, 2022). While this research was completed solo, the researcher used other available resources such as regular supervision, maintaining a reflective journal, and completing reflection on each analysed article. By utilising these resources, support was provided for decision-making and previously held biases were reflected upon which allowed the researcher to increase the academic rigour of this study

Another limitation of this study related to the age range of the young people chosen for inclusion. Due to time constraints, it was important for the researcher to choose a specific age range to ensure a reasonable number of articles were selected for analysis. This meant some articles were excluded if they did not fit the age criteria exactly and clearly. Many articles did not clearly state an age range (e.g., they referred to participants as first-year university students). Such articles were removed from the final analysis. It is acknowledged that young people outside of the chosen age range would be able to effectively contribute to this discourse. An expanded or more lenient age range could be explored in future research.

To further ensure that a reasonable number of articles was selected for analysis, search limitations were put in place. One such limitation was to only include peer-reviewed articles in the analysis. While this allowed for academically robust findings to be analysed, it also meant other sources were dismissed, such as grey literature, which may have provided valuable information that would complement the findings of this study. Another search limitation included only analysing articles written in English. Again, this may have overlooked some articles that could have provided valuable insights into this topic.

A final consideration is in relation to the words included in the search strategy. As outlined in the literature review, climate change meaning is discussed in terms of climate literacy, for which there are a wide range of definitions (Kolenatý et al., 2022). To better capture the scope of this topic, the search strategy could have been expanded to include the term “climate literacy” as well as related concepts within the various definitions, such as “competencies” and “skills”.

5.5.3 Recommendations for Future Research

As a scoping review, this research was intended to map the emerging knowledge and gaps within this knowledge base. As outlined already in this chapter, there is much more to be discovered about the relationships among the four concepts of meaning, emotion, motivation and action. As noted, emotion is largely missing or not well understood in the field of DRM and thus it is recommended that future research explores how emotion influences climate change meaning and motivation towards CCA and mitigation actions. This was recommended by many of the authors

included in this study (Barros & Pinheiro, 2020; Evans et al., 2018; Kim & Kim, 2020; Pickering et al., 2021)

A further recommendation for future research would be to encourage research to be qualitative in nature. This is due to the complexity of the concepts, particularly meaning and emotion, which are multifaceted and increasingly nuanced. A complex topic such as that of emotions can be easily over-simplified using quantitative methods, whereas qualitative data may better express the nuances, resulting in more accurate and valid findings. Only four of the 37 articles analysed in this study used qualitative research methods alone, and another eight articles using mixed methods, as shown in Table 3.3. Therefore, there may be a lack of depth to the young people's responses in the research, while deeper, more complete responses could provide significant insights into their mental health and behavioural choices.

CC psychology in DRM is an emerging field of science, with the complexity of this science compounded by regular changes in societal responses. The responses from young people on their meaning, emotion, motivation and behaviours towards climate change will continue to change and evolve. Therefore, research must consistently provide up-to-date findings, ensuring that the current mental health of young people is being understood and supported, and their needs for motivation are met.

It is also interesting to note that only six of the analysed articles were situated within disaster-related journals, suggesting much more work needs to be done to bring this knowledge base into the forefront of DRM. The field of DRM requires a multi-disciplinary approach, and this is evident in the wide range of journals that the scoping review was based upon. climate change emotions are not prevalent in the work of DRM researchers, and this must change if there is to be improvements in young people's engagement in CCA and mitigation behaviours.

5.6 CHAPTER SUMMARY

Anthropogenic climate change and the related disasters pose a real and urgent threat to the human population (IPCC, 2022b). Young people are at the forefront of this, and it is vital to have their engagement in DRM to ensure the health and safety of the planet and its ecosystems, including human life. The research reported in this thesis aimed to explore this issue by asking how climate meaning and emotion may influence motivation towards climate action. As noted through Chapters 4 and 5, this issue has been successfully explored, with some important findings being highlighted in relation to emotion as a risk factor, affective education, active learning, connection to nature and connection to others.

As an outcome of a scoping review, it is important to highlight gaps and inconsistencies in the current research (Arksey & O'Malley, 2005). This has also been achieved. It has been identified that emotions play a vital role in engaging young people in climate action, yet this role is not well understood. This discussion has also provided a starting point for a practical guide for young people's engagement with climate change action while maintaining their mental health. This guide could provide useful insights for young people to manage their own mental health and motivation towards climate action, as well as other significant adults such as caregivers, teachers, scientists and politicians. This study also highlighted that the relationships between meaning, emotion, motivation and behaviour are still not well understood and there is still more research to be done in this space of DRM. With an expanded knowledge base, tools, policies and strategies can be put in place to best support young people and the planet in the future:

prepare young people with the strength they will need to face the impending threats of their future... (Hurley et al., 2022, p. 190)

REFERENCES

- Abraham, Y., Zeng, S., Tenney, R., Davidson, C., Yao, E., Kloth, C., Dalton, S., & Arjomandi, M. (2023). Effect of a single one-hour teaching session about environmental pollutants and climate change on the understanding and behavioral choices of adolescents: The BREATHE pilot randomized controlled trial. *PLoS One*, 18(11), e0291199. <https://doi.org/10.1371/journal.pone.0291199>
- Agoben, T. T. (2017). Unearthing the reasons behind human behaviour in society: A reappraisal of the theories in sociological behaviourism. *SSRN*. <https://doi.org/https://dx.doi.org/10.2139/ssrn.3142068>
- Aksel Stenberdt, V., & Makransky, G. (2023). Mastery experiences in immersive virtual reality promote pro-environmental waste-sorting behavior. *Computers & Education*, 198. <https://doi.org/10.1016/j.compedu.2023.104760>
- Al Mamun, M. A., Bronner, S. J., Piracha, A., & Haswell, M. (2024). Guest editorial: Circular economy and climate change: Valuing indigeneity and sustainability. *International Journal of Climate Change Strategies and Management*, 16(3), 273-275. <https://doi.org/10.1108/IJCCSM-09-2024-221>
- Albrecht, G., Sartore, G. M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., Stain, H., Tonna, A., & Pollard, G. (2007). Solastalgia: The distress caused by environmental change. *Australasian Psychiatry*, 15 Suppl 1, S95-98. <https://doi.org/10.1080/10398560701701288>
- Albrecht, G. A. (2019). *Earth emotions: New words for a new world*. Cornell University Press.
- Arcaia, M., & Gribkoff, E. (2022, March 14). Climate Justice. *Climate Portal*. <https://climate.mit.edu/explainers/climate-justice>
- Ares, E., & Bolton, P. (2020). *The rise of climate change activism?* House of Commons Library. <https://commonslibrary.parliament.uk/the-rise-of-climate-change-activism/>
- Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19-32. <https://doi.org/10.1080/1364557032000119616>
- Arnot, G., Thomas, S., Pitt, H., & Warner, E. (2023). "It shows we are serious": Young people in Australia discuss climate justice protests as a mechanism for climate change advocacy and action. *Australian and New Zealand Journal of Public Health*, 47(3), 100048. <https://doi.org/10.1016/j.anzjph.2023.100048>
- Aromataris, E., Lockwood, C., Porritt, K., Pilla, B., & Jordan, Z (Eds.). (2024). *JBIM Manual for Evidence Synthesis*. Joanna Briggs Institute. <https://doi.org/https://doi.org/10.46658/JBIMES-24-01>.

- Asgarizadeh, Z., Gifford, R., & Colborne, L. (2023). Predicting climate change anxiety. *Journal of Environmental Psychology*, 90, 102087. <https://doi.org/10.1016/j.jenvp.2023.102087>
- Atkinson, Q. D., & Jacquet, J. (2022). Challenging the idea that humans are not designed to solve climate change. *Perspectives on Psychological Science*, 17(3), 619-630. <https://doi.org/10.1177/17456916211018454>
- Barros, H., & Pinheiro, J. (2020). Climate change perception by adolescents: reflections on sustainable lifestyle, local impacts and optimism bias (Percepción del cambio climático en adolescentes. Reflexiones sobre los estilos de vida sostenibles, el impacto local y el sesgo optimista). *PsyEcology*, 11(2), 260-283. <https://doi.org/10.1080/21711976.2020.1728654>
- Bartlett, S. (2008). Climate change and urban children: Impacts and implications for adaptation in low- and middle-income countries. *Environment and Urbanization*, 20(2), 501-519. <https://doi.org/10.1177/0956247808096125>
- Bendell, J. (2021). Psychological insights on discussing societal disruption and collapse. *Ata: Journal of Psychotherapy Aotearoa New Zealand*, 25(1), 35-53. <https://doi.org/10.9791/ajpanz.2021.05>
- Benevolenza, M. A., & DeRigne, L. (2019). The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature. *Journal of Human Behavior in the Social Environment*, 29(2), 266-281. <https://doi.org/10.1080/10911359.2018.1527739>
- Bissinger, K., & Bogner, F. X. (2017). Environmental literacy in practice: education on tropical rainforests and climate change. *Environment, Development and Sustainability*, 20(5), 2079-2094. <https://doi.org/10.1007/s10668-017-9978-9>
- Blue Climate Initiative. (n.d.). [Homepage]. https://www.instagram.com/blue_climate_initiative/
- Bolsen, T., & Shapiro, M. A. (2018). The US news media, polarization on climate change, and pathways to effective communication. *Environmental Communication*, 12(2), 149-163. <https://doi.org/10.1080/17524032.2017.1397039>
- Bordallo, M. (2023). Indirect effect of climate change experience on household energy conservation behavior of college students through risk perception and intention. *Asia-Pacific Social Science Review*, 23(1). <https://doi.org/10.59588/2350-8329.1484>
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative research in sport, exercise and health*, 11(4), 589-597. <https://doi.org/10.1080/2159676X.2019.1628806>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. Sage.
- Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). *Answers to frequently asked questions about thematic analysis*. <https://cdn.auckland.ac.nz/assets/psych/about/our->

[research/documents/Answers%20to%20frequently%20asked%20questions%20about%20thematic%20analysis%20April%202019.pdf](https://www.researchgate.net/publication/351111111/research/documents/Answers%20to%20frequently%20asked%20questions%20about%20thematic%20analysis%20April%202019.pdf)

Brosch, T. (2021). Affect and emotions as drivers of climate change perception and action: A review. *Current Opinion in Behavioral Sciences*, 42, 15-21.

<https://doi.org/10.1016/j.cobeha.2021.02.001>

Browne, A. (2023). *Explainer: What is climate anxiety?* Earth.org. <https://earth.org/what-is-climate-anxiety>

Byrne, D. (2022). A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality & Quantity*, 56(3), 1391-1412. <https://doi.org/10.1007/s11135-021-01182-y>

Calvert, J., & Hume, M. (2023). Improving student learning outcomes using narrative virtual reality as pre-training. *Virtual Reality*, 27(3), 2633-2648. <https://doi.org/10.1007/s10055-023-00830-y>

Chestnoy, S., & Gershinkova, D. (2017). USA Withdrawal from Paris Agreement—What Next? *International Organisations Research Journal*, 12(4), 215-225.

<https://doi.org/DOI:10.17323/1996-7845-2017-04-215>

Clarke, B., Otto, F., Stuart-Smith, R., & Harrington, L. (2022). Extreme weather impacts of climate change: an attribution perspective. *Environmental Research: Climate*, 1(1), 012001.

<https://doi.org/10.1088/2752-5295/ac6e7d>

Clayton, S., Manning, C., Krygsman, K., & Speiser, M. (2017). *Mental health and our changing climate: Impacts, implications, and guidance*. American Psychological Association & ecoAmerica. <http://ecoamerica.org/wp-content/uploads/2017/03/ea-apa-psych-report-web.pdf>

Climate Mental Health Network. (n.d.). *Parents & Caregivers Resources*.

<https://www.climatementalhealth.net/parents>

Climate Psychology Alliance. (2020). *The handbook of climate psychology*.

<https://www.climatepsychologyalliance.org/images/files/handbookofclimatepsychology.pdf>

Corner, A., Roberts, O., Chiari, S., Völler, S., Mayrhuber, E., Mandl, S., & Monson, K. (2015). How do young people engage with climate change? The role of knowledge, values, message framing, and trusted communicators. *Wiley Interdisciplinary Reviews: Climate Change*, 6.

<https://doi.org/10.1002/wcc.353>

Dong, X., Geng, L., & Rodríguez Casallas, J. D. (2022). How is cognitive reappraisal related to adolescents' willingness to act on mitigating climate change? The mediating role of climate change risk perception and believed usefulness of actions. *Environmental Education Research*, 29(12), 1758-1779. <https://doi.org/10.1080/13504622.2022.2120188>

- Doolittle, P., Wojdak, K., & Walters, A. (2023). Defining active learning: A restricted systemic review. *Teaching and Learning Inquiry*, 11. <https://doi.org/10.20343/teachlearningqu.11.25>
- Doyle, J. (2020). Creative communication approaches to youth climate engagement: Using speculative fiction and participatory play to facilitate young people's multidimensional engagement with climate change. *International Journal of Communication*, 14. <https://ijoc.org/index.php/ijoc/article/view/14003/3093>
- Du, M., Chai, C. S., Di, W., & Wang, X. (2023). What affects adolescents' willingness to maintain climate change action participation: An extended theory of planned behavior to explore the evidence from China. *Journal of Cleaner Production*, 422, 138589. <https://doi.org/10.1016/j.jclepro.2023.138589>
- Duffy, L. N., Fernandez, M., & Sène-Harper, A. (2021). Digging deeper: Engaging in reflexivity in interpretivist-constructivist and critical leisure research. *Leisure Sciences*, 43(3-4), 448-466. <https://doi.org/10.1080/01490400.2020.1830903>
- Dunlap, R. E., & Brulle, R. J. (2020). Sources and amplifiers of climate change denial. In D. C. Holmes & L. M. Richardson (Eds.), *Research handbook on communicating climate change* (pp. 49-61). <https://www.elgaronline.com/edcollbook/edcoll/9781789900392/9781789900392.xml>
- Ediz, C., & Yanik, D. (2023). The effects of climate change awareness on mental health: Comparison of climate anxiety and hopelessness levels in Turkish youth. *International Journal of Social Psychiatry*, 69(8), 2157-2166. <https://doi.org/10.1177/00207640231206060>
- Edwards, C., Ospina, D., Pereira, L., Steinert, N. J., Wunderling, N., Zickfeld, K., Hebden, S., Achakulwisut, P., Muttitt, G., & Semieniuk, G. (2023). *Ten new insights in climate science 2023/2024*. Future Earth, Earth League and World Climate Research Programme.
- Ekins, P., Domenech Aparisi, T., Drummond, P., Bleischwitz, R., Hughes, N., & Lotti, L. (2020). *The circular economy: What, why, how and where*. University College, London. <https://discovery.ucl.ac.uk/id/eprint/10093965>
- El-Sheikh, S. (2021). *New health Data shows unabated climate change will cause 3.4 million deaths per year by century end*. United Nations. <https://www.v-20.org/new-health-data-shows-unabated-climate-change-will-cause-3.4-million-deaths-per-year-by-century-end>
- Englander, J. (2020, September 8). New update to my most popular graphic. <https://johnenglander.net/400000-year-graphic-shows-sea-level-temperature-and-co2/>
- Ettinger, J., Walton, P., Painter, J., & DiBlasi, T. (2021). Climate of hope or doom and gloom? Testing the climate change hope vs. fear communications debate through online videos. *Climatic Change*, 164(1), 19. <https://doi.org/10.1007/s10584-021-02975-8>

- Evans, G. W., Otto, S., & Kaiser, F. G. (2018). Childhood origins of young adult environmental behavior. *Psychological Science*, 29(5), 679-687.
<https://doi.org/10.1177/0956797617741894>
- Eyring, V., Gillett, N. P., Achuta Rao, K. M., Barimalala, R., Barreiro Parrillo, M., Bellouin, N., Cassou, C., Durack, P. J., Kosaka, Y., McGregor, S., Min, S., Morgenstern, O., & Sun, Y. (2021). Human influence on the climate system. In V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, & B. Zhou (Eds.), *Climate change 2021: The physical science basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 423-552). Cambridge university Press. <https://www.ipcc.ch/report/ar6/wg1/>
- Ford, R., Williams, K., Smith, E., & Bishop, I. (2012). Beauty, belief, and trust: toward a model of psychological processes in public acceptance of forest management. *Environment and Behavior*, 46, 476-506. <https://doi.org/10.1177/0013916512456023>
- Fridays for Futures. (n.d.). *List of countries*. <https://fridaysforfuture.org/what-we-do/strike-statistics/list-of-countries/>
- Friends of the Earth. (2020, January 21). *Over two-thirds of young people experience eco-anxiety as Friends of the Earth launch campaign to turn anxiety into action*
<https://friendsoftheearth.uk/climate/over-twothirds-young-people-experience-ecoanxiety-friends-earth-launch-campaign-turn>
- Friends of the Earth. (n.d.). *Our History*. Retrieved 01 July 2025 from
<https://friendsoftheearth.uk/who-we-are/our-history>
- Ghosh, R. C. (2024). *Climate-induced migration from the Pacific to New Zealand: A qualitative analysis* [Doctoral thesis, University of Otago]. <http://hdl.handle.net/10523/16508>
- Gichuru, M. J. (2017). The interpretive research paradigm: A critical review of its research methodologies. *International Journal of Innovative Research and Advanced Studies (IJIRAS)*, 4(2), 1-5. https://www.ijiras.com/2017/Vol_4-Issue_2/paper_1.pdf
- Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66, 290-302.
<https://doi.org/10.1037/a0023566>
- Gilletta, M., Choukas-Bradley, S., Maes, M., Linthicum, K. P., Card, N. A., & Prinstein, M. J. (2021). A meta-analysis of longitudinal peer influence effects in childhood and adolescence. *Psychological Bulletin*, 147(7), 719-747. <https://doi.org/10.1037/bul0000329>

- Graham, S., Barnett, J., Fincher, R., Hurlimann, A., & Mortreux, C. (2014). Local values for fairer adaptation to sea-level rise: A typology of residents and their lived values in Lakes Entrance, Australia. *Global Environmental Change*, 29, 41-52.
<https://doi.org/10.1016/j.gloenvcha.2014.07.013>
- Gubler, M., Brügger, A., & Eyer, M. (2019). Adolescents' Perceptions of the Psychological Distance to Climate Change, Its Relevance for Building Concern About It, and the Potential for Education. In W. Leal Filho & S. L. Hemstock (Eds.), *Climate change and the role of education* (pp. 129-147). Springer. https://doi.org/10.1007/978-3-030-32898-6_8
- Gunasiri, H., Wang, Y., Watkins, E. M., Capetola, T., Henderson-Wilson, C., & Patrick, R. (2022). Hope, coping and eco-anxiety: Young people's mental health in a climate-impacted Australia. *International Journal of Environmental Research and Public Health*, 19(9).
<https://doi.org/10.3390/ijerph19095528>
- Hasan-Aslih, S., Pliskin, R., van Zomeren, M., Halperin, E., & Saguy, T. (2019). A darker side of hope: Harmony-focused hope decreases collective action intentions among the disadvantaged. *Personality and Social Psychology Bulletin*, 45(2), 209-223.
<https://doi.org/10.1177/0146167218783190>
- Hausfather, Z. (2020). Analysis: When might the world exceed 1.5C and 2C of global warming? *Carbon Brief*, <https://www.carbonbrief.org/analysis-when-might-the-world-exceed-1-5c-and-2c-of-global-warming/>. <https://www.carbonbrief.org/analysis-when-might-the-world-exceed-1-5c-and-2c-of-global-warming/>
- Haynes, K., & Tanner, T. M. (2015). Empowering young people and strengthening resilience: youth-centred participatory video as a tool for climate change adaptation and disaster risk reduction. *Children's Geographies*, 13(3), 357-371.
<https://doi.org/10.1080/14733285.2013.848599>
- Health Navigator New Zealand. (2023). *Climate change anxiety | Anipā o te huringa āhuarangi*.
<https://healthify.nz/health-a-z/c/climate-change-anxiety/>
- Heo, J., & Muralidharan, S. (2017). What triggers young Millennials to purchase eco-friendly products?: The interrelationships among knowledge, perceived consumer effectiveness, and environmental concern. *Journal of Marketing Communications*, 25(4), 421-437.
<https://doi.org/10.1080/13527266.2017.1303623>
- Herring, D., & Lindsey, R. (2020, October 29). *Global warming frequently asked questions*. National Oceanic and Atmospheric Administration Climate. <https://www.climate.gov/news-features/understanding-climate/global-warming-frequently-asked-questions#show4>

- Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R. E., Mayall, E. E., Wray, B., Mellor, C., & van Susteren, L. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *The Lancet Planetary Health*, 5(12), e863-e873. [https://doi.org/10.1016/S2542-5196\(21\)00278-3](https://doi.org/10.1016/S2542-5196(21)00278-3)
- Hurley, E. A., Dalglish, S. L., & Sacks, E. (2022). Supporting young people with climate anxiety: Mitigation, adaptation, and resilience. *The Lancet Planetary Health*, 6(3), e190. [https://doi.org/10.1016/S2542-5196\(22\)00015-8](https://doi.org/10.1016/S2542-5196(22)00015-8)
- Intergovernmental Panel on Climate Change. (2022a). Annex I: Glossary. In C. Intergovernmental Panel on Climate (Ed.), *Global Warming of 1.5°C: IPCC Special Report on Impacts of Global Warming of 1.5°C above Pre-industrial Levels in Context of Strengthening Response to Climate Change, Sustainable Development, and Efforts to Eradicate Poverty* (pp. 541-562). Cambridge University Press. <https://doi.org/10.1017/9781009157940.008>
- Intergovernmental Panel on Climate Change. (2022b, April 4). *The evidence is clear: The time for action is now. We can halve emissions by 2030*. <https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/>
- Intergovernmental Panel on Climate Change. (2023, March 10). *AR6 Synthesis Report* <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>
- Jetten, J., Fielding, K. S., Crimston, C. R., Mols, F., & Haslam, S. A. (2021). Responding to climate change disaster: The case of the 2019/2020 bushfires in Australia. *European Psychologist*, 26(3), 161-171. <https://doi.org/10.1027/1016-9040/a000432>
- Joy, E., Braun, V., & Clarke, V. (2023). Doing reflexive thematic analysis: A reflexive account. In F. Meyer & K. Meissel (Eds.), *Research methods for education and the social disciplines in Aotearoa New Zealand*. NZCER Press. <https://uwe-repository.worktribe.com/output/10434562>
- Kahan, D. M. (2012). Cultural Cognition as a Conception of the Cultural Theory of Risk. In S. Roeser, R. Hillerbrand, P. Sandin, & M. Peterson (Eds.), *Handbook of Risk Theory: Epistemology, Decision Theory, Ethics, and Social Implications of Risk* (pp. 725-759). Springer Netherlands. https://doi.org/10.1007/978-94-007-1433-5_28
- Kamenetz, A., & Pihkala, P. (2023). *Climate Emotions Wheel*. Climate Mental Health Network. <https://www.climatementalhealth.net/wheel>
- Kelman, I., Gaillard, J. C., & Mercer, J. (2015). Climate change's role in disaster risk reduction's future: Beyond vulnerability and resilience. *International Journal of Disaster Risk Science*, 6(1), 21-27. <https://doi.org/10.1007/s13753-015-0038-5>

- Kelsey, E. (2016). Propagating collective hope in the midst of environmental doom and gloom. *Canadian Journal of Environmental Education*, 21, 23-40.
<https://cjee.lakeheadu.ca/article/view/1415/856>
- Kelsey, E. (2020). *Hope matters: Why changing the way we think is critical to solving the environmental crisis*. Greystone Books.
- Kevorkian, K. A. (2019). Environmental grief. In *Non-death loss and grief* (pp. 216-226). Routledge.
- Kim, J.-H., & Kim, C.-J. (2020). Analysis of emotions of high school students participating in a school SSI club project related to climate change. *Asia-Pacific Science Education*, 6(1), 70-96.
<https://doi.org/10.1163/23641177-bja00003>
- Kolenatý, M., Kroufek, R., & Cincera, J. (2022). What triggers climate action: The impact of a climate change education program on students' climate literacy and their willingness to act. *Sustainability*, 14, 10365. <https://doi.org/10.3390/su141610365>
- Kubisch, S., Krimm, H., Liebhaber, N., Oberauer, K., Deisenrieder, V., Parth, S., Frick, M., Stötter, J., & Keller, L. (2022). Rethinking quality science education for climate action: Transdisciplinary education for transformative learning and engagement. *Frontiers in Education*, 7.
<https://doi.org/10.3389/educ.2022.838135>
- Kurth, C., & Pihkala, P. (2022). Eco-anxiety: What it is and why it matters. *Frontiers in Psychology*, 13, 981814. <https://doi.org/10.3389/fpsyg.2022.981814>
- Kutywayo, A., Chersich, M., Naidoo, N. P., Scorgie, F., Bottoman, L., & Mullick, S. (2022). Climate change knowledge, concerns and experiences in secondary school learners in South Africa. *Jamba*, 14(1), 1162. <https://doi.org/10.4102/jamba.v14i1.1162>
- Larocque, E. (2023). Co-envisioning the social-ecological transition through youth eco-activists' narratives: Toward a relational approach to ecological justice. *Journal of Community Practice*, 31(2), 127-151. <https://doi.org/10.1080/10705422.2023.2208577>
- Lawrance, E. L., Jennings, N., Kioupi, V., Thompson, R., Diffey, J., & Vercammen, A. (2022a). Hope in Action as a Pedagogical Response to Climate Crisis and Youth Anxiety. In A. Farrell, C. Skyhar, & M. Lam (Eds.), *Teaching in the Anthropocene: Education in the Face of Environmental Crisis* (pp. 108-115). Canadian Scholars.
- Lawrance, E. L., Jennings, N., Kioupi, V., Thompson, R., Diffey, J., & Vercammen, A. (2022b). Psychological responses, mental health, and sense of agency for the dual challenges of climate change and the COVID-19 pandemic in young people in the UK: An online survey study. *The Lancet Planet Health*, 6(9), e726-e738. [https://doi.org/10.1016/S2542-5196\(22\)00172-3](https://doi.org/10.1016/S2542-5196(22)00172-3)

- Lawson, D., Stevenson, K., Carrier, S., Strnad, R., & Seekamp, E. (2018). Intergenerational learning: Are children key in spurring climate action? *Global Environmental Change*, 53, 204-208.
<https://doi.org/10.1016/j.gloenvcha.2018.10.002>
- Lazarus, R. S. (1991). Cognition and motivation in emotion. *American Psychologist*, 46(4), 352-367.
<https://doi.org/10.1037/0003-066X.46.4.352>
- Lee, A. R., Hon, L., & Won, J. (2018). Psychological proximity as a predictor of participation in a social media issue campaign. *Computers in Human Behavior*, 85, 245-254.
<https://doi.org/10.1016/j.chb.2018.04.006>
- Lee, K., Gjersoe, N., O'Neill, S., & Barnett, J. (2020). Youth perceptions of climate change: A narrative synthesis. *Wiley Interdisciplinary Reviews: Climate Change*, 11(3), e641.
<https://doi.org/https://doi.org/10.1002/wcc.641>
- Lehnert, M., Fiedor, D., Frajer, J., Hercik, J., & Jurek, M. (2019). Czech students and mitigation of global warming: Beliefs and willingness to take action. *Environmental Education Research*, 26(6), 864-889. <https://doi.org/10.1080/13504622.2019.1694140>
- Lertzman, R. (2015). *Environmental melancholia: Psychoanalytic dimensions of engagement*. Routledge. <https://doi.org/10.4324/9781315851853>
- Li, C. J., Schulz, J. H., & Thuston, S. (2022). After the forum I realized there is more I can do: Communicating climate change to youth using public deliberation. *Applied Environmental Education & Communication*, 21(3), 254-272.
<https://doi.org/10.1080/1533015x.2022.2062068>
- Libarkin, J. C., Gold, A. U., Harris, S. E., McNeal, K. S., & Bowles, R. P. (2018). A new, valid measure of climate change understanding: Associations with risk perception. *Climatic Change*, 150(3), 403-416. <https://doi.org/10.1007/s10584-018-2279-y>
- Lomborg, B. (2021, November 3). We're safer from climate disasters than ever before. *The Wall Street Journal*. <https://www.wsj.com/articles/climate-activists-disasters-fire-storms-deaths-change-cop26-glasgow-global-warming-11635973538>
- Lujala, P., Lein, H., & Rød, J. K. (2015). Climate change, natural hazards, and risk perception: the role of proximity and personal experience. *Local Environment*, 20(4), 489-509.
<https://doi.org/10.1080/13549839.2014.887666>
- Luthen, S., Ryan, E., & Wakefield, J. (2021). *Born into the climate crisis: Why we must act now to secure children's rights*. S. t. C. International.
https://resourcecentre.savethechildren.net/document/born-climate-crisis-why-we-must-act-now-secure-childrens-rights/?_ga=2.243556737.524791541.1707627055-2110943122.1707627055&_gl=1*1vnk3qi*_ga*MjExMDk0MzEyMi4xNzA3NjI3MDU1*_ga_6

[46SWQJ0VB*MTcwNzYyNzA1Ni4xLjEuMTcwNzYyNzA2Mi41NC4wLjA.*_ga GRKVSTV36C*MTcwNzYyNzA1Ni4xLjEuMTcwNzYyNzA2Mi41NC4wLjA.](#)

- Ma, T., Moore, J., & Cleary, A. (2022). Climate change impacts on the mental health and wellbeing of young people: A scoping review of risk and protective factors. *Social science & medicine*, 301, 114888. <https://doi.org/10.1016/j.socscimed.2022.114888>
- MacKay, M., Parlee, B., & Karsgaard, C. (2020). Youth engagement in climate change action: Case study on indigenous youth at COP24. *Sustainability*, 12(16), 6299. <https://doi.org/10.3390/su12166299>
- Mak, S., & Thomas, A. (2022). An introduction to scoping reviews. *Journal of Graduate Medical Education*, 14(5), 561-564. <https://doi.org/10.4300/jgme-d-22-00620.1>
- Mañez, M., Carmona, M., Haro, D., & Hanger, S. (2016). Risk perception. In J. Aerts & J. Mysiak (Eds.), *Novel multi-sector partnerships in disaster risk management. Results of the ENHANCE project* (pp. 51-67). EU FP7 Project ENHANCE. <https://pure.iiasa.ac.at/id/eprint/13903/1/Chapter3-ENHANCE.pdf>
- Mann, M. E. (2021). *The new climate war: The fight to take back our planet*. PublicAffairs.
- Marczak, M., Winkowska, M., Chaton-Østlie, K., Morote Rios, R., & Klöckner, C. A. (2023). “When I say I'm depressed, it's like anger.” An exploration of the emotional landscape of climate change concern in Norway and its psychological, social and political implications. *Emotion, Space and Society*, 46, 100939. <https://doi.org/https://doi.org/10.1016/j.emospa.2023.100939>
- Markowitz, E. M., & Shariff, A. F. (2012). Climate change and moral judgement. *Nature Climate Change*, 2(4), 243-247. <https://doi.org/10.1038/nclimate1378>
- McBride, S. E., Hammond, M. D., Sibley, C. G., & Milfont, T. L. (2021). Longitudinal relations between climate change concern and psychological wellbeing. *Journal of Environmental Psychology*, 78, 101713. <https://doi.org/10.1016/j.jenvp.2021.101713>
- Mebane, M. E., Benedetti, M., Barni, D., & Francescato, D. (2023). Promoting climate change awareness with high school students for a sustainable community. *Sustainability*, 15(14). <https://doi.org/10.3390/su151411260>
- Ministry for the Environment. (2024). *Measuring forest carbon*. Retrieved September 29, 2024 from <https://environment.govt.nz/facts-and-science/climate-change/measuring-greenhouse-gas-emissions/measuring-forest-carbon/>
- Moola, S., Munn, Z., Sears, K., Sfetcu, R., Currie, M., Lisy, K., Tufanaru, C., Qureshi, R., Mattis, P., & Mu, P. (2015). Conducting systematic reviews of association (etiology): The Joanna Briggs

- Institute's approach. *International Journal of Evidence-Based Healthcare* 13(3), 163-169.
<https://doi.org/10.1097/xeb.0000000000000064>
- Morrison, M., Duncan, R., & Parton, K. (2015). Religion does matter for climate change attitudes and behavior. *PloS one*, 10(8). <https://doi.org/10.1371/journal.pone.0134868>
- National Aeronautics and Space Administration. (n.d.). *What is the greenhouse effect?*
<https://climate.nasa.gov/fag/19/what-is-the-greenhouse-effect/>
- National Park Service. (2020, October 16). What is climate change? In (pp.
<https://home.nps.gov/goga/learn/nature/climate-change-causes.htm>).
- Ndeti, D. M., Wasserman, D., Mutiso, V., Shanley, J. R., Musyimi, C., Nyamai, P., Munyua, T., Swahn, M. H., Weisz, J. R., Osborn, T. L., Bhui, K., Johnson, N. E., Pihkala, P., Memiah, P., Gilbert, S., Javed, A., & Sourander, A. (2024). The perceived impact of climate change on mental health and suicidality in Kenyan high school students. *BMC Psychiatry*, 24(1), 117.
<https://doi.org/10.1186/s12888-024-05568-8>
- New Zealand Association for Environmental Education. (n.d.). *Te tai unuora | Climate wellbeing guide*. <https://www.nzaee.org.nz/resources/climate-change-wellbeing-guide>
- Newman, R., & Noy, I. (2023). The global costs of extreme weather that are attributable to climate change. *Nature Communications*, 14(1), 6103. <https://doi.org/10.1038/s41467-023-41888-1>
- Nguyen, T. N., Lobo, A., & Nguyen, B. K. (2017). Young consumers' green purchase behaviour in an emerging market. *Journal of Strategic Marketing*, 26(7), 583-600.
<https://doi.org/10.1080/0965254x.2017.1318946>
- Ojala, M. (2015). Hope in the face of climate change: Associations with environmental engagement and student perceptions of teachers' emotion communication style and future orientation. *The Journal of Environmental Education*, 46(3), 133-148.
<https://doi.org/10.1080/00958964.2015.1021662>
- Ojala, M., & Bengtsson, H. (2019). Young people's coping strategies concerning climate change: Relations to perceived communication with parents and friends and proenvironmental behavior. *Environment and Behavior*, 51(8), 907-935.
<https://doi.org/10.1177/0013916518763894>
- Ojala, M., Cunsolo, A., Ogunbode, C. A., & Middleton, J. (2021). Anxiety, worry, and grief in a time of environmental and climate crisis: A narrative review. *Annual review of environment and resources*, 46, 35-58. <https://doi.org/10.1146/annurev-environ-012220-022716>
- Omar, S., & Van Belle, J.-P. (2024). Disaster misinformation management: Strategies for mitigating the effects of fake news on emergency response. In Á. Rocha, C. Ferrás, J. Hochstetter Diez,

- & M. Diéguez Rebolledo (Eds.), *Information Technology and Systems: ICITS 2024* (Vol. 1, pp. 308-318). Springer.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S.,...Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Pakpour, A. H., Lin, C.-K., Safdari, M., Lin, C.-Y., Chen, S.-H., & Hamilton, K. (2021). Using an integrated social cognition model to explain green purchasing behavior among adolescents. *International Journal of Environmental Research and Public Health*, 18(23), 12663. <https://doi.org/10.3390/ijerph182312663>
- Park, W.-Y., & Kim, C.-J. (2020). The impact of project activities on the cultivation of ecological citizenship in a high school climate change club. *Asia-Pacific Science Education*, 6(1), 41-69. <https://doi.org/10.1163/23641177-bja00005>
- Peters, G. J. Y., Ruiter, R. A., & Kok, G. (2014). Threatening communication: A qualitative study of fear appeal effectiveness beliefs among intervention developers, policymakers, politicians, scientists, and advertising professionals. *International Journal of Psychology*, 49(2), 71-79. <https://doi.org/10.1002/ijop.12000>
- Pham, T. H., Nguyen, T. N., Phan, T. T. H., & Nguyen, N. T. (2018). Evaluating the purchase behaviour of organic food by young consumers in an emerging market economy. *Journal of Strategic Marketing*, 27(6), 540-556. <https://doi.org/10.1080/0965254x.2018.1447984>
- Pickering, C. J., Al-Baldawi, Z., McVean, L., Amany, R. A., Adan, M., Baker, L., Al-Baldawi, Z., & O' Sullivan T, S. (2022). "It's like youth are talking into a microphone that is not plugged in": Engaging youth in disaster risk reduction through photovoice. *Qualitative health research*, 32(14), 2126-2146. <https://doi.org/10.1177/10497323221136485>
- Pickering, G. J., Schoen, K., & Botta, M. (2021). Lifestyle decisions and climate mitigation: Current action and behavioural intent of youth. *Mitigation and Adaptation Strategies for Global Change*, 26(6), 25. <https://doi.org/10.1007/s11027-021-09963-4>
- Pihkala, P. (2018). Eco-anxiety, tragedy, and hope: Psychological and spiritual dimensions of climate change. *Zygon* 53(2), 545-569. <https://doi.org/10.1111/zygo.12407>
- Pihkala, P. (2019). *Climate anxiety*. Suomen Mielenterveysseura <https://researchportal.helsinki.fi/en/publications/climate-anxiety>
- Pihkala, P. (2020). Anxiety and the ecological crisis: An analysis of eco-anxiety and climate anxiety. *Sustainability*, 12(19), 7836. <https://www.mdpi.com/2071-1050/12/19/7836>

- Pihkala, P. (2022). Toward a taxonomy of climate emotions. *Frontiers in Climate*, 3, 738154. <https://doi.org/10.3389/fclim.2021.738154>
- Pihkala, P. (2025). Ecological Grief, Religious Coping, and Spiritual Crises: Exploring Eco-Spiritual Grief. *Pastoral Psychology*, 74(1), 69-96. <https://doi.org/10.1007/s11089-024-01158-3>
- Polcarová, E., & Pupíková, J. (2022). Analysis of Socially Vulnerable Communities and Factors Affecting Their Safety and Resilience in Disaster Risk Reduction. *Sustainability*, 14(18), 11380. <https://www.mdpi.com/2071-1050/14/18/11380>
- Popova, L. (2012). The Extended Parallel Process Model: Illuminating the gaps in research. *Health Education & Behavior*, 39(4), 455-473. <https://doi.org/10.1177/1090198111418108>
- Prencipe, L., Houweling, T. A. J., van Lenthe, F. J., Kajula, L., & Palermo, T. (2023). Climate distress, climate-sensitive risk factors, and mental health among Tanzanian youth: a cross-sectional study. *The Lancet Planet Health*, 7(11), e877-e887. [https://doi.org/10.1016/S2542-5196\(23\)00234-6](https://doi.org/10.1016/S2542-5196(23)00234-6)
- Pribram, K. H. (1980). Chapter 10 - THE BIOLOGY OF EMOTIONS AND OTHER FEELINGS¹¹This chapter was written in response to a request to contribute an up-to-date “biological theory of emotion” to this volume because I have attempted to formulate such a theory in the past (see Pribram, 1967, 1969, 1970, 1971; Pribram & Melges, 1969). P. T. Young (1973) has characterized these attempts as “comprehensive,” a tribute to the wealth of data on the topic that had been accumulated over the past few decades by neurobiological scientists. The flow of data has not slowed since the earlier reviews were written. The current revision of the theory is therefore extensive. In R. Plutchik & H. Kellerman (Eds.), *Theories of Emotion* (pp. 245-269). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-0-12-558701-3.50016-8>
- Probst, B. (2015). The eye regards itself: Benefits and challenges of reflexivity in qualitative social work research. *Social work research*, 39(1), 37-48. <https://doi.org/https://doi.org/10.1093/swr/svu028>
- Rajoo, K. S., Karam, D. S., & Abdullah, M. Z. (2020). The physiological and psychosocial effects of forest therapy: A systematic review. *Urban Forestry & Urban Greening*, 54, 126744. <https://doi.org/https://doi.org/10.1016/j.ufug.2020.126744>
- Rapplee, J., Komatsu, H., & Silova, I. (2024). Re-thinking pedagogies for climate change activism: Cognitive, behaviorist, technological, or cultural? In J. Wyn, H. Cahill, & H. Cuervo (Eds.), *Handbook of children and youth studies* (pp. 1145-1163). Springer Nature Singapore. https://doi.org/10.1007/978-981-99-8606-4_127

- Rawluk, A., Ford, R. M., Neolaka, F. L., & Williams, K. J. (2017). Public values for integration in natural disaster management and planning: A case study from Victoria, Australia. *Journal of Environmental Management*, 185, 11-20. <https://doi.org/10.1016/j.jenvman.2016.10.052>
- Rekacewicz, P., Bournay, E., & UNEP/GRID-Arenda. (2005). *Climate change: processes, characteristics and threats*. Grida. <https://www.grida.no/resources/6889>
- Romi, S., & Katz, Y. J. (2003). Affective education: The nature and characteristics of teachers' and students' attitudes toward school in Israel. *Educational Practice and Theory*, 25(1), 35-47. <https://doi.org/10.7459/ept/25.1.04>
- Sangervo, J., Jylhä, K. M., & Pihkala, P. (2022). Climate anxiety: Conceptual considerations, and connections with climate hope and action. *Global Environmental Change*, 76, 102569. <https://doi.org/https://doi.org/10.1016/j.gloenvcha.2022.102569>
- Sanson, A. V., Van Hoorn, J., & Burke, S. E. L. (2019). Responding to the impacts of the climate crisis on children and youth. *Child Development Perspectives*, 13(4), 201-207. <https://doi.org/10.1111/cdep.12342>
- Schaller, M., Kenrick, D. T., Neel, R., & Neuberg, S. L. (2017). Evolution and human motivation: A fundamental motives framework. *Social and Personality Psychology Compass*, 11(6), e12319. <https://doi.org/https://doi.org/10.1111/spc3.12319>
- Scholl, K. G., & Gulwadi, G. B. (2020). Connecting ecotherapy and well-being. In W. Leal Filho, T. Wall, A. M. Azul, L. Brandli, & P. G. Özuyar (Eds.), *Good Health and Well-Being* (pp. 99-109). Springer International. https://doi.org/10.1007/978-3-319-95681-7_74
- Scott, M. (2021, February 18). *Whats the coldest the Earth's ever been?* National Oceanic and Atmospheric Administration. <https://www.climate.gov/news-features/climate-qa/whats-coldest-earths-ever-been>
- Sellers, S. (2016). *Gender and climate change: A closer look at existing evidence*. Global Gender and Climate Alliance. <https://wedo.org/wp-content/uploads/2016/11/GGCA-RP-FINAL.pdf>
- Sharp, E. L., Fagan, J., Kah, M., McEntee, M., & Salmond, J. (2021). Hopeful approaches to teaching and learning environmental "wicked problems". *Journal of Geography in Higher Education*, 45(4), 621-639. <https://doi.org/10.1080/03098265.2021.1900081>
- Shepherd, J. M. (2011). Carbon, climate change, and controversy. *Animal Frontiers*, 1(1), 5-13. <https://doi.org/10.2527/af.2011-0001>
- Šimić, G., Tkalčić, M., Vukić, V., Mulc, D., Španić, E., Šagud, M., Olucha-Bordonau, F. E., Vukšić, M., & P, R. H. (2021). Understanding emotions: Origins and roles of the amygdala. *Biomolecules*, 11(6). <https://doi.org/10.3390/biom11060823>

- Sivakumar, A., Jayasingh, S., & Shaik, S. (2023). Social media influence on students knowledge sharing and learning: An empirical study. *Education Sciences*, 13(7), 745. <https://www.mdpi.com/2227-7102/13/7/745>
- Speaks, J. (2010). Theories of meaning. *Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/entries/meaning/?utm_source=www.curiouspeoples.com&utm_medium=referral&utm_campaign=the-liar-paradox
- Spitzer, J., Grapsas, S., Poorthuis, A. M. G., & Thomaes, S. (2023). Supporting youth emotionally when communicating about climate change: A self-determination theory approach. *International Journal of Behavioral Development*, 48(2), 113-124. <https://doi.org/10.1177/01650254231190919>
- Stanley, S. K., Hogg, T. L., Leviston, Z., & Walker, I. (2021). From anger to action: Differential impacts of eco-anxiety, eco-depression, and eco-anger on climate action and wellbeing. *The Journal of Climate Change and Health*, 1, 100003. <https://doi.org/10.1016/j.joclim.2021.100003>
- Stewart, K., & Townley, G. (2020). How far have we come? An integrative review of the current literature on sense of community and well-being. *American Journal of Community Psychology*, 66(1-2), 166-189. <https://doi.org/10.1002/ajcp.12456>
- Sultana, F. (2014). Gendering Climate Change: Geographical Insights. *The Professional Geographer*, 66(3), 372-381. <https://doi.org/10.1080/00330124.2013.821730>
- Sun, L., Deng, Y., & Qi, W. (2018). Two impact pathways from religious belief to public disaster response: Findings from a literature review. *International journal of disaster risk reduction*, 27, 588-595. <https://doi.org/10.1016/j.ijdrr.2017.10.004>
- Talwar, S. (2021). Culturally mediated perceptions of climate change risks in New Zealand. *Climatic Change*, 164(1), 12. <https://doi.org/10.1007/s10584-021-02966-9>
- Taylor, M., & Murray, J. (2020, February 20). 'Overwhelming and terrifying': the rise of climate anxiety. *The Guardian*. <https://www.theguardian.com/environment/2020/feb/10/overwhelming-and-terrifying-impact-of-climate-crisis-on-mental-health>
- Tian, H., & Liu, X. (2022). Pro-environmental behavior research: Theoretical progress and future directions. *International Journal of Environmental Research and Public Health*, 19(11). <https://doi.org/10.3390/ijerph19116721>
- Tolppanen, S., Kang, J., & Tirri, K. (2023). Climate competencies of Finnish gifted and average-ability high school students. *Education Sciences*, 13(8). <https://doi.org/10.3390/educsci13080840>

- Treen, K. M. d. I., Williams, H. T., & O'Neill, S. J. (2020). Online misinformation about climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 11(5), e665.
<https://doi.org/10.1002/wcc.665>
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D., Horsley, T., & Weeks, L. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of internal medicine*, 169(7), 467-473.
<https://doi.org/10.7326/M18-0850>
- Tsjeng, Z. (2019, February 27). *The climate change paper so depressing it's sending people to therapy*. Vice UK. <https://www.vice.com/en/article/vbwpdb/the-climate-change-paper-so-depressing-its-sending-people-to-therapy>
- United Nations. (n.d.-a). *Education is key to addressing climate change*.
<https://www.un.org/en/climatechange/climate-solutions/education-key-addressing-climate-change>
- United Nations. (n.d.-b). *What is climate change?* <https://www.un.org/en/climatechange/what-is-climate-change>
- United Nations. (n.d.-c). *Youth*. United Nations. <https://www.un.org/en/global-issues/youth>
- van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology*, 41, 112-124.
<https://doi.org/10.1016/j.jenvp.2014.11.012>
- Voices of Youth. (n.d.). *Take action on climate change*. Retrieved February 12, 2024 from
<https://www.voicesofyouth.org/climate-action>
- Wade-Benzoni, K. A., Hernandez, M., Medvec, V., & Messick, D. (2008). In fairness to future generations: The role of egocentrism, uncertainty, power, and stewardship in judgments of intergenerational allocations. *Journal of Experimental Social Psychology*, 44(2), 233-245.
<https://doi.org/10.1016/j.jesp.2007.04.004>
- Weber, E. U. (2006). Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet). *Climatic Change*, 77(1), 103-120.
<https://doi.org/10.1007/s10584-006-9060-3>
- Woodbury, Z. (2019). Climate Trauma: Toward a New Taxonomy of Trauma. *Ecopsychology*, 11(1), 1-8. <https://doi.org/10.1089/eco.2018.0021>
- World Health Organization. (2018). *COP24 special report: Health and climate change*.
<https://www.who.int/publications/i/item/9789241514972>
- World Health Organization. (2022). *Mental health and climate change: Policy brief*.
<https://www.who.int/publications/i/item/9789240045125>

- Xia, W., & Li, L. M. W. (2022). Multilevel evidence for the parent-adolescent dyadic effect of familiarity with climate change on pro-environmental behaviors in 14 societies: Moderating effects of societal power distance and individualism. *Environment and Behavior*, 54(7-8), 1097-1132. <https://doi.org/10.1177/00139165221129550>
- Yatirajula, S. K., Prashad, L., Daniel, M., & Maulik, P. K. (2023). A cross-sectional survey of climate and COVID-19 crises in young people in Indian slums: Context, psychological responses, and agency. *The Lancet Regional Health Southeast Asia*, 13, 100191. <https://doi.org/10.1016/j.lansea.2023.100191>
- Young, R. A., Marshall, S. K., Valach, L., Domene, J. F., Graham, M. D., & Zaidman-Zait, A. (2011). Emotion and the transition to adulthood. In R. A. Young, S. K. Marshall, L. Valach, J. F. Domene, M. D. Graham, & A. Zaidman-Zait (Eds.), *Transition to adulthood: Action, projects, and counseling* (pp. 65-85). Springer. https://doi.org/10.1007/978-1-4419-6238-6_6
- Zarocostas, J. (2020). How to fight an infodemic. *The Lancet*, 395(10225), 676. [https://doi.org/10.1016/S0140-6736\(20\)30461-X](https://doi.org/10.1016/S0140-6736(20)30461-X)
- Zeeshan, M., Sha, L., Tomlinson, K. W., & Azeez, P. A. (2021). Factors shaping students' perception of climate change in the western Himalayas, Jammu & Kashmir, India. *Current Research in Environmental Sustainability*, 3. <https://doi.org/10.1016/j.crsust.2021.100035>
- Zkilibar. (2023). Natural and anthropogenic drivers of climate change. In *Climate change science*. Indiana University. <https://iu.pressbooks.pub/zkilibar/chapter/natural-and-anthropogenic-drivers-of-climate-change/>

