"Climate Catastrophe":

The Role of Fear Appeals in Climate Change Communication

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Thesis

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Abstract

Climate change is a highly pressing global issue. Addressing climate change requires co-operation on many levels, including at the individual and collective level. Appealing to fear is a common strategy employed by climate change communicators to motivate mitigation behaviours. Recently, a growing body of research has emerged where specific fear appeal frameworks, such as the Extended Parallel Process Model (EPPM) are applied to climate change communication. The EPPM postulates that fear appeals must be countered with adequate recommendations for taking protective action, termed "efficacy" messaging. According to the EPPM, providing efficacy recommendations prevents people from disengaging with fear appeals.

Thus far, few studies have applied the EPPM as framework for motivating collective mitigation actions, such as taking part in protests and signing petitions. This study aims to address this research gap. Specifically, this study investigates the hypothesis that a low to moderately frightening message about the impacts of climate change combined with an efficacy message may be most effective for motivating individual mitigation actions (e.g. household energy saving). Conversely, a high fear message about the impacts of climate change combined with an efficacy message may be most effective for motivating collective mitigation actions (e.g. participating in climate protests). This hypothesis was tested using a 2 x 2 experimental design that included a message intervention administered via an online survey.

Contrary to these hypotheses, there was no overall effect for the 'high' *vs.* 'low' fear message intervention on either individual or collective action intentions. Providing a specific efficacy message (*vs.* not) *did not* significantly increase individual action intentions but *did* significantly increase collective action intentions. Analyses also demonstrated that perceptions of severity (i.e. perceived seriousness of climate change) were more strongly associated with collective action intentions compared with individual action intentions. Overall, the study findings supported the EPPM as a framework for motivating both individual and collective action intentions to mitigate climate change.

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Ngā mihi,

Signature removed for confidentiality purposes.

Azura Patterson

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List of Abbreviations

CCPI – Climate Change Performance Index

CMEP – Commonwealth Marine Economies Program

CO_2 – Carbon dioxide

EPPM – Extended Parallel Process Model

EV – Electric Vehicle

FPW – Finite Pool of Worry

GHG – Greenhouse gas

IPCC – Intergovernmental Panel on Climate Change

NASA - National Aeronautics and Space Administration (USA)

NDC – Nationally Determined Contribution (under 2015 Paris Agreement)

NH_4 – Methane

NIWA – National Insititute of Water and Atmospheric Research (NZ)

N_2O – Nitrous oxide

OECD - The Organisation for Economic Co-operation and Development

PMT – Protection Motivation Theory

POMP – Percentage of Maximum Possible

ppm – parts per million (atmospheric carbon dioxide concentration)

PRM – Parallel Response Model

UNFCCC - United Nations Framework Convention on Climate Change

ZCA - Climate Change Response (Zero Carbon) Amendment Act (NZ)

Chapter 1: Introduction

"Be worried. Be very worried."

~ *TIME Magazine* Cover, Global Warming Special Report, April 3rd, 2006 ~

1.1 Preamble

Anthropogenic climate change is one of the most pressing issues humanity currently faces. United Nations Secretary, Ban Ki-moon, has described it as the "challenge of our generation" (The Guardian, 2007). Climate change refers to changes in the mean and/or variability of climate properties (e.g. temperature and rainfall) that persist over an extended period (IPPC, 2018a). More specifically, *anthropogenic* climate change refers to changes in climate that have resulted from human activity (IPCC, 2018a). There is overwhelming scientific consensus that increases in greenhouse gas (GHG) emissions since the Industrial Revolution (c. 1760) have caused a rapid spike in average global temperature within the last half century (Cook et al., 2016; IPCC, 2014). GHGs, such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) are so-called because they block heat from escaping the Earth's atmosphere much like the glass of a greenhouse. Anthropogenic climate change caused by the heat trapping effect of GHGs is distinct from the concept of climate change more generally. It has become common practice, however, in everyday language and academic texts to refer to anthropogenic climate change as simply "climate change." In this thesis, the term "climate change" is used to refer to anthropogenic climate change, unless stated otherwise.

Climate change was first brought to public attention in 1988 by NASA climate scientist, James Hansen, in a testimony before the United States Senate (Jäger & O'Riordan, 1996). In the same year, the Intergovernmental Panel on Climate Change (IPCC) was established. This intergovernmental body is responsible for assessing and summarising all published scientific literature related to climate change (Jäger & O'Riordan, 1996). Reports produced by the IPCC are considered the international authority on the subject. According to the IPCC's Fifth

Assessment report published in 2014, average global temperatures are predicted to increase by 3.7-4.8 degrees Celsius relative to pre-industrial levels by the year 2100 unless drastic policy measures are implemented to reduce GHG emissions (IPCC, 2014). Yet, despite this advice, global GHG emissions are continuing to rise at an ever increasing rate (Bushell et al., 2017; CO2.Earth, 2021; Ritchie & Roser, 2020).

Potential impacts of the projected increase in average global temperature are complex, wide-ranging and uncertain. Likely consequences include rising sea levels, coastal erosion and increased frequency of extreme weather events, such as electrical storms and hurricanes (IPCC, 2014, 2018b). Many parts of the world will experience increased frequency and severity of droughts and forest fires (IPCC, 2014, 2018b). These weather events will have wide-spread, devastating impacts for all life on Earth. Global food systems will likely be disrupted and the biodiversity loss that is already occurring will be accelerated (Climate Central Inc., 2013; IPCC, 2018b). Mass displacement of populations as a result of climate change and increases in warfare due to resource scarcity are also likely to occur (Baldwin et al., 2014; Barnett & Adger, 2007). As illustrated in the IPCC's latest 2018 report, the extremity of consequences are heavily dependent on the trajectory of GHG emissions in the coming decades (IPCC, 2018b). Efforts to reduce GHG emissions are therefore critically important and truly the "challenge of our generation" (The Guardian, 2007).

1.2 The "Science-Action" Gap

Successfully addressing climate change is a crucial but highly complex challenge. Despite increasing public awareness about climate change since the 1980s, GHG emissions have continued to rise unabated. In the year of Hansen's testimony in 1988, atmospheric carbon dioxide concentrations had already risen to 350 parts per million (ppm) compared with 280 ppm at the start of the Industrial Revolution (1750) (Ritchie & Roser, 2020). In the three decades that followed Hansen's testimony, CO_2 concentrations have reached 420 ppm as of May 2021 (CO2.Earth, 2021). Thus far, international treaties to reduce global emissions have been largely unsuccessful (Schiermeier, 2012). The most recent of these, the 2015 Paris Agreement, aims to "limit global warming to well below 2 degrees, preferably to 1.5 degrees Celsius, compared to pre-industrial levels" (UNFCCC, 2015). Each of the 196 parties to the Paris Agreement is required to declare their individual contribution toward mitigating climate change, called a

Nationally Determined Contribution (NDC). Despite the Paris Agreement goal of limiting warming to 1.5 degrees Celsius, studies have demonstrated that current NDCs are actually in line with a temperature rise of around 2.7-3.7 ^{O}C (Levin & Fransen, 2015). A significant gap, therefore, exists between Paris Agreement goals and present NDCs. Additionally, current policy measures in most countries are inadequate even to meet present NDCs (Bushell et al., 2017). Ultimately, there is a large disparity between scientific advice on climate change and present efforts to reduce emissions. This discrepancy has been coined the "science-action gap" by several scholars (Bushell et al., 2017; Moser & Dilling, 2013).

1.3 The Collective Action Challenge

One of the challenges that makes the "science-action gap" difficult to address, is that climate change represents a collective action problem. A "collective action problem" describes a type of social dilemma in which a collective would benefit from working together to achieve a particular outcome, but fails to do so due to the prioritisation of individual interests (Brechin, 2016). Collective action problems have been the subject of philosophical study for many centuries. In 1968, Hardin published a foundational work in common resource management titled *The Tragedy of the Commons*. Hardin theorised that commonly held resources, such as land, oceans and air, will inevitably be subject to exploitation unless measures are imposed to control these resources (Hardin, 1968). Meanwhile, Olson (1975) was among the first to propose that individuals within a group will be incentivized to "free ride" on the efforts of others when working towards a collective goal. In other words, the greatest cost-benefit outcome for an individual occurs when they make no effort towards a collective benefit, whilst all others in the group put in maximal effort. This allows an individual to reap the greatest benefit for the lowest cost. The more individuals that opt to "free ride", however, the harder it is to achieve a collective outcome. Olson argues that as group size increases, so does the incentive to "free ride" (Olson, 1975). Hence, as group size increases, the likelihood of successfully achieving a collective outcome decreases.

Climate change can be considered a large-scale 'commons' dilemma. Although Hardin's 'tragedy of the commons' theory pre-dates public awareness of climate change, scholars have argued that the global atmosphere is a common resource and therefore prone to exploitation if sufficient measures are not taken to control this (Aitken et al., 2011; Jagers et al., 2020). In other words,

producing GHG emissions can be seen as exploiting a common resource via the degradation of air quality and the liveability of the planet. Esty and Moffa (2012) have also described climate change as the "quintessential global-scale collective action problem" (pg. 777). Indeed, the consequences of climate change are highly likely to affect the entire global population meaning that emissions reductions benefit the planet collectively. Meanwhile, addressing the problem requires cooperation and buy-in on a world-wide scale. Although mitigation benefits humanity collectively, it is costly for individual households, companies and governments to take action, thereby incentivising people to "free ride" (Esty & Moffa, 2012).

Collective action problems have been extensively studied on the small scale (Jagers et al., 2020). Laboratory experiments as well as field studies of local-scale issues have revealed a number of key facilitators for successful collective action (Jagers et al., 2020). Studies have demonstrated, for example, that levels of cooperation are greater when free-riders are adequately punished for their defection (Gächter & Herrmann, 2009). Cooperation is also more likely in situations where contributions are publicly disclosed and thus people's reputations are at stake (Gächter & Fehr, 1999; Laury et al., 1995). Furthermore, levels of cooperation increase when people have adequate ability to communicate with each other (Sally, 1995). Foundational work by Ostrom concerning real-life collective action problem scenarios at the local scale suggests that trust, reciprocity and reputation are all key elements of successful collective action (Ostrom, 1990, 1998; Ostrom & Walker, 2005). These findings have been demonstrated, for example, across a number of field studies in local fishing and farming communities (Jagers et al., 2020).

The sheer number of actors involved in large-scale collective action problem like climate change make it challenging to apply evidence of successful cooperation strategies from smaller-scale scenarios (Jagers et al., 2020). Punishing defectors, for instance, becomes very difficult to manage and requires the establishment of third party monitoring entities (Jagers et al., 2020). Anonymity and lack of accountability also pose major problems with collective action on a global-scale (Jagers et al., 2020). Firstly, it is not feasible for billions of people to adequately communicate with one another about the issue. Secondly, with a globally-sized group of actors, individual contributions become exceptionally small and difficult to single out (Jagers et al., 2020). Overall, trust, reciprocity and reputation are very difficult to establish when those involved in a collective action problem are spatially distant, largely anonymous to one another and group numbers exceptionally high (Jagers et al., 2020; Ostrom, 2010).

1.4 Multi-Scale Approach to Global Collective Action Problems

Because climate change is a global problem, there is a certain prevailing wisdom that solutions to the problem must also be global (Ostrom, 2010). A great deal of time and attention, therefore, has been given to international negotiations and agreements, such as defining NDCs under the Paris Agreement (Esty & Moffa, 2012; Ostrom, 2010). Climate change is often conceptualised as a collective action problem on an international level, with each country as a singular actor within the collective dilemma. International treaties and negotiations on climate change are, of course, important and necessary attempts to establish global-level third party monitoring entities and hold nations publicly accountable for their contributions (Jagers et al., 2020). As Ostrom (2010) has argued, however, finding solutions to *actually* reduce emissions as soon as possible is a more urgent problem than negotiating the discrepancies in national targets to theoretically reduce emissions.

Ostrom (2010) argues that the decades-long failure to reach solutions to climate change on an international level reinforces the importance of a multi-scale approach to solving the problem. She describes a multi-scale approach as one that "encourages experimental efforts [to reduce emissions] at multiple levels" (Ostrom, 2010, p13). In other words, addressing climate change will require cooperation and action not just at the international but also individual, household, business, community and national level (Ostrom, 2010). Household and business-level decisions, for instance, about transport use and energy consumption have relative small impacts, yet cumulatively they have a large impact (Ostrom, 2010). Successful implementation of government policies to reduce emissions also rely on willing cooperation from citizens and public support for these policies (Baatz, 2014; Ostrom, 2010). With a problem as large and complex as climate change, there is no one "optimal" solution (Ostrom, 2010). Rather, there need to be efforts made to reduce emissions at all levels of society (Ostrom, 2010). As per Ostrom's multi-scale collective action theory, it is important that climate change is addressed at many levels. The present study draws on this idea by exploring how best to motivate both individual household actions (e.g. energy saving) and collective community actions (e.g. protests) to mitigate climate change.

1.5 Climate Change Engagement

As discussed above, solving climate change is not merely about successful international negotiations; it also requires that as many people as possible, at multiple levels of society, are sufficiently "engaged" with the issue. "Engagement" in relation to climate change has been defined by Lorenzoni et al. (2007) as encompassing a range of inter-related factors from concern, attitudes and intentions to actual behaviours. By their definition, "engagement with climate change" is a "*state* of connection with the issue" (Lorenzoni et al., 2007). In other words, simply knowing about climate change is not enough for people to be truly "engaged." Rather, "meaningful engagement" is a process wherby people actively care about the issue and are motivated to take action (Lorenzoni et al., 2007).

1.6 Climate Change Communication

One critical aspect of successfully engaging the public with climate change is developing effective ways of communicating the problem (Bushell et al., 2017; Moser, 2016; Moser & Dilling, 2013). Accordingly, a growing, interdisciplinary field of research in climate change communication has emerged in recent decades (Moser, 2010; Moser & Dilling, 2013). Especially in the early years of climate change messages being presented to the public, the "information-deficit" model was the prevailing communication strategy (Bushell et al., 2017; Moser & Dilling, 2013). This model of communication assumes that providing the public with clear and understandable scientific explanations of climate change and its consequences would be sufficient to raise awareness and motivate behaviour change (Moser, 2010; Suldovsky, 2017). The information-deficit approach essentially treats the public as "empty vessels" waiting to be filled with factual information that will rationally prompt them to react (Whitmarsh et al., 2011).

The information-deficit model has been largely unsuccessful in motivating public action on climate change (Bushell et al., 2017; Moser & Dilling, 2007, 2013). This may be in part because it ignores the role that emotions play in human decision making. The assumption that people always follow a process of rational deliberation, weighing up a list of costs and benefits and calculating all possible outcomes, is psychologically implausible (Zeelenberg et al., 2008). "Bounded rationality" theory posits that the human brain has an autonomous preference to not

spend too long on any given decision (Kahneman, 2003). Hence, our ability to rationalise decisions is limited by our cognitive capacities (Zeelenberg et al., 2008). Emotions are thought to aid human decision making by prioritizing goals and assigning value to certain aspects of the options being deliberated (Hanoch, 2002; Zeelenberg et al., 2008). In this way, emotions may act as a kind of cognitive 'short cut' in aid of bounded rationality (Hanoch, 2002; Zeelenberg et al., 2008).

Since emotions play an important role in human decision making, emotional appeals are often utilised as a persuasive communication strategy (Hornik et al., 2017; Moser & Dilling, 1990). As Moser & Dilling (2007) have observed, this is true also of climate change communication. Theoretically, appealing to emotions such as fear and guilt, has greater potential than factual information alone to motivate action on climate change (Moser & Dilling, 1990, 2007). This is because appealing to emotions, rather than to logical and factual argument, may aid people's decision making by encouraging them to assign value to the arguments being presented (Hanoch, 2002; Zeelenberg et al., 2008). In other words, emotional appeals may assist people in 'short cutting' lengthy, rational deliberation over factual information about the topic and direct their attention towards taking action.

1.7 Use of Fear in Climate Change Communication

As Reser and Bradley (2017) have observed, the ongoing threat of climate change is an "inherently frightening" message to communicate. The consequences of climate change, such as extreme weather events, starvation and flooding are, by their very nature, difficult to talk about in a way that is non-frightening to people (Reser & Bradley, 2017). Perhaps for this reason, emotional appeals to fear are an especially common persuasive device in climate change communication (Moser & Dilling, 2013; O'Neill & Nicholson-Cole, 2009). Images of stranded polar bears on ice caps, flooded cities, and catastrophic forest fires have become iconic representations of climate change (Moser & Dilling, 2013; O'Neill & Nicholson-Cole, 2009). The use of alarmist wording and narratives are also frequently employed in an attempt to persaude people to take action (Bushell et al., 2017; Moser & Dilling, 2013; O'Neill & Nicholson-Cole, 2009). The 2008 climate organisation, One Hundred Months, for example, was established around the messaging that we "ha[d] only 100 months to avoid disaster" (Bushell et al., 2017). Similar discussions of "climate chaos" have been employed by other NGOs (e.g. UK-based

StopClimateChaos) (O'Neill & Nicholson-Cole, 2009). A plethora of books published on the topic of climate change have also utilised titles evoking "catastrophe," "crisis," and "emergency" (Moser & Dilling, 2013). Sensationalizing the frightening aspects of climate change is also common in media press coverage (Boykoff, 2007; Chetty et al., 2015; Kenix, 2008). The quintessential example of this is perhaps *Time Magazine*'s famous 2006 cover depicting a polar bear stranded on a melting ice-sheet beside the headline quoted at the opening of this chapter: "Be worried. Be very worried" (TIME Magazine, 2019). A study conducted by Hulme (2008) found that 9 out of 10 UK newspapers who reported on the IPPC Working Group I report introduced adjectives such as "catastrophic," "terrifying," "devastating" or "shocking" despite none of these words being present in the original IPCC report.

Literature suggests that using shock, exaggeration and sensationalism is a successful strategy for attracting attention (Deacon et al., 1999; Emsley, 2001; O'Neill & Nicholson-Cole, 2009). This may explain why provocative language and appeals to catastrophe and disaster are so prevalent in climate change reporting (O'Neill & Nicholson-Cole, 2009; Reser & Bradley, 2017). As discussed above, emotional appeals, at least in theory, also ought to be more effective than isolated factual information for motivating action on climate change. Yet, contrary to this assumption, a frequently cited study conducted by O'Neill & Nicholson-Cole (2009) concluded that appealing to fear may actually disengage people from climate change messaging. The study involved a qualitative focus group where participants were asked to describe how they felt about various images related to climate change (e.g., smoke stacks, melting ice caps, solar panels, wind turbines etc.) (O'Neill & Nicholson-Cole, 2009). The study authors concluded that participants tended to associate "frightening" images, such as those of floods and starving children, with feelings of powerlessness (O'Neill & Nicholson-Cole, 2009). Contrary to the popular assumption that generating more fear will logically motivate greater intention to act on climate change, O'Neill and Nicholson-Cole (2009) found that fear tended to endow the study participants with feelings of helplessness and a sense of being overwhelmed and "[did] not motivate a sense of personal engagement with the issue" (pg. 375). Based on their findings, O'Neill and Nicholson Cole (2009) concluded that stand-alone appeals to fear may be counterproductive for motivating action on climate change. In summarising the study, the authors suggest that in order to prevent fear appeals from rendering people powerless and overwhelmed, they should be combined with practical recommendations about specific, feasible actions people can take to reduce climate change (O'Neill & Nicholson-Cole, 2009). This suggestion was based on evidence from numerous "fear appeal" studies conducted within the field of health promotion.

1.8 Fear Appeal Frameworks

Within the field of health promotion psychology, researchers have developed a number of theoretical frameworks for explaining how fear appeals can be used most effectively to motivate behaviour change (Ruiter et al., 2001). 'Fear appeals' in the health promotion field tend to be more narrowly defined as "a persuasive communication attempting to arouse fear in order to promote precautionary motivation and self-protective action" (Ruiter et al., 2001, p. 614). In other words, appeals to fear are typically coupled with recommendations to take specific protective action. Fear appeal frameworks, such as Protection Motivation Theory (PMT) and the Extended Parallel Process Model (EPPM) will be discussed in greater detail in Chapter 2. Both of these theories inform the present study and provide a framework for explaining why fear appeals need to be coupled with feasible recommendations for protective action.

Frameworks like PMT and the EPPM were originally developed for explaining responses to health campaigns that targeted protective actions, such as quitting smoking and condom use (Rogers, 1975; Witte 1994). These frameworks propose that appealing to fear alone may be either insufficient to motivate behaviour change (Maddux & Rogers, 1983; Rogers, 1975), or may activate cognitive pathways that lead people to dismiss, disengage or reject the information at hand (Witte, 1994, 1998). In contrast, combining fear appeals with specific recommendations for protective action is more likely to activate cognitive pathways that lead people to change their behaviour (Maddux & Rogers, 1983; Maloney et al., 2011; Ruiter et al., 2001). Restated, the general principle underlying fear appeal frameworks is that fear will only motivate people to take action when they feel sufficiently empowered by specific advice on how to alleviate the threat at hand (Maddux & Rogers, 1983; Maloney et al., 2011; Ruiter et al., 2001). Fear appeal frameworks define this sense of empowerment as "perception of efficacy" (Maloney et al., 2011; Ruiter et al., 2001).

While fear appeal frameworks, such as the EPPM, were originally developed to inform health promotion campaigns, researchers have increasingly applied them to a variety of other topics, including food safety (Schafer et al., 1993) and environmental hazards (M. C. Weber et al., 2018). Since O'Neill and Nicholson-Cole's 2009 study, a growing body of research has begun to emerge

where these fear appeal theories are applied to climate change. A number of studies have already demonstrated that fear appeal frameworks, such as the EPPM, may be useful for motivating people to take action on climate change (Chen, 2016; Meijnders et al., 2001; Sarrina Li & Huang, 2020; Xue et al., 2016).

1.9 Individual Versus Collective Actions

Unlike most health-related protective behaviours (e.g., quitting smoking), which operate primarily at the individual level, taking action to mitigate climate change requires successful co-operation on multiple scales, as discussed earlier (Esty & Moffa, 2012; Ostrom, 2010). Thus, it is important to consider whether fear appeals frameworks should be applied differently for individual compared with collective actions. In relation to climate change, perceptions of efficacy (i.e. feeling sufficiently empowered to solve the problem), relies heavily on the actions of others. For this reason the inherent effectiveness (i.e. efficacy) of *individual* actions to mitigate climate change, such as using energy efficient lightbulbs, is likely to be perceived as low (Bushell et al., 2017). Thus, emphasising the extreme nature of climate change and eliciting high levels of fear may be counterproductive to motivate individual-level behaviours because people may perceive the discrepancy between the problem and recommended solutions as being too large (Bushell et al., 2017). As will be explained in more detail in the following chapter, this discrepancy may lead people to engage in defensive cognitive pathways and reject the behavioural recommendations provided (Maloney et al., 2011; Witte, 1994).

Collective-level actions to mitigate climate change, such as participating in protests or community projects, may be perceived as more effective ways of mitigating climate change. Firstly, because they are aimed at achieving higher-level changes (e.g., policy changes that mitigate climate change on a larger scale). Secondly, because there is typically a higher degree of accountability, trust and reciprocity associated with collective action. In other words, collective actions (e.g., being part of an organisation, attending a protest or signing a petition) provide people with a more tangible sense that others are also taking action. Meanwhile, it is harder to observe whether others are taking individual actions (e.g., whether people have installed energy-efficient lighting).

There is already some experimental evidence suggesting that a *high* fear appeal, *vs.* no/a low fear appeal, may be more effective for motivating *collective* level actions on climate change when combined with messaging emphasising the efficacy of these actions (Sarrina Li & Huang, 2020). As will be discussed in detail in Chapter 2; it may be because the perceived inherent efficacy of these actions is relatively high. Consequently, people's sense that these actions can successfully solve climate change may be sufficient to direct high levels of fear regarding climate change towards taking action (Maloney et al., 2011; Witte, 1994). Juxtaposedly, appeals to fear may be less relevant for motivating people to take *individual* actions to mitigate climate change, such as adopting household energy savings practices (Meijnders et al., 2001; Sarrina Li & Huang, 2020). A *low* fear appeal combined with messaging emphasising the efficacy of these individual actions may be most effective for increasing people's intentions to adopt these behaviours (Meijnders et al., 2001). This may be because eliciting high levels of fear regarding the scale and extremity of climate change leads people to perceive individual level actions as insufficient to solve the problem (Bushell et al., 2017). This, in turn, may cause people to reject recommendations to adopt these individual behaviours (Maloney et al., 2011; Witte, 1994).

1.10 Research Gap and Study Overview

To the best of my knowledge, no experimental studies have thus far been conducted to explicitly investigate whether a 'high-fear'/'high efficacy' message could affect collective actions intentions, and whether a 'low fear'/'high efficacy' message could affect individual action intentions. The present study aims to address this research gap. This study takes a quantitative approach and explores this research gap via the method of an online survey. The survey gathered information on a number of relevant variables, including demographics, environmental concern and political affiliation. A 2 x 2 experimental intervention was then administered via the survey. Participants were presented, firstly, with either a 'high-fear' or 'low-fear' message about climate change. Secondly, participants received recommendations to participate in either individual or collective actions to mitigate climate change. Individual actions included things such as switching to a renewable energy supplier and reducing car use. Meanwhile, collective actions included things like attending climate change protests and volunteering for climate organisations. Following the message intervention, a number of outcome measures were obtained. These included perceived fear levels, efficacy perceptions and intentions to participate in both individual and collective

actions to reduce climate change. Statistical analysis was conducted to answer the research questions posed in this study. These research questions are outlined in Table 1.1 below.

Table 1.1 Research Questions

Research Questions
Research Question 1. Does providing a 'high fear' message about climate change increase people's level of fear and perceptions of EPPM variables in relation to climate change compared to providing a 'low fear' message?
Research Question 2. What effect does providing recommendations to participate in individual *vs.* collective actions to mitigate climate change have on perceptions of efficacy?
Research Question 3. How do different messages about climate change affect people's intentions to engage in individual actions to reduce climate change? Specifically, a 'high fear' *vs.* 'low fear' message AND individual action recommendations provided *vs.* not provided.
Research Question 4. How do different messages about climate change affect people's intentions to engage in collective actions to reduce climate change? Specifically, a 'high fear' *vs.* 'low fear' message AND collective action recommendations provided *vs.* not provided.
Research Question 5. Are the EPPM variables significant positive predictors of intentions to participate in individual and collective actions to reduce climate change?

1.11 Place of Research: Aotearoa/New Zealand

The present study was conducted in Aotearoa/New Zealand: a small Pacific nation with a population of 4.8 million (Worldometer, 2021b). Though New Zealand's overall contribution to global emissions may be small (0.17 % in 2014), the country still has a significant part to play in emissions reductions (Ministry for the Environment, 2019; World Resources Institute, 2015). According to the 2021 Climate Change Performance Index (CCPI), New Zealand ranks 25th out of 58 countries plus the European Union in overall performance on climate change policy and contributions (Burck et al., 2021). New Zealand ranks 5th among other OECD countries with regards to per capita emissions, putting it ahead of nations like the UK, France and Japan

(OECD, 2021). This ranking is attributable to the country's uniquely high agricultural and transport sector emissions, accounting for 48.1 % and 17.9 % of New Zealand's total emissions respectively in 2017 (Ministry for the Environment, 2019).

New Zealand is a signatory nation to the Paris Agreement with an NDC to reduce its GHG emissions by 30 per cent below 2005 levels by the year 2030 (Ministry for the Environment, 2009). In line with aims under the Paris Agreement, the New Zealand government passed the Climate Change Response (Zero Carbon) Amendment Act (Zero Carbon Act (ZCA)) in November 2019 (Bailey et al., 2021). The ZCA encompasses a legal commitment for New Zealand to achieve net zero carbon emissions by the year 2050 (Bailey et al., 2021). Given the discrepancy between New Zealand's poor mitigation performance and its aims to achieve net zero emissions by 2050, a better understanding of how to motivate behaviour change amongst the New Zealand public is imperative. To the best of my knowledge, there are no experimental studies that have tested whether fear appeal frameworks are useful for motivating climate change mitigation behaviours in the context of Aotearoa. The present study aims to address this research gap.

1.12 Thesis Preview

This thesis is divided into five chapters. Table 1.2 below provides a brief summary and preview of the contents of each of these chapters.

Table 1.2 Thesis Preview

Chapter	Summary
1. Introduction	Chapter 1 has provided a general introduction to climate change and highlighted the importance of addressing the issue. Context was provided on collective action theory and climate change communication. The theoretical frameworks that informed the present study were introduced. An outline of the research gap addressed by the present study was given, followed by an overview of the study aims and research questions.

2. Theoretical frameworks: fear appeal theory	Chapter 2 provides an in depth discussion of the fear appeal theoretical frameworks that inform the present study. Context is provided on how previous research has applied these frameworks to climate change. Research gaps are identified and an explanation of the study aims provided. Research Questions and corresponding hypotheses are presented at the end of the chapter.
3. Methodology	Chapter 3 establishes the epistemological position taken and describes the methodology used in this research. The layout and design of the study is explained in detail. Some preliminary data analysis is also provided.
4. Results	Chapter 4 presents the results of the this study. Details regarding the statistical procedures conducted to obtain these results is given. Results are presented in accordance with each of the research questions for this study.
5. Discussion	Chapter 5 provides an in depth discussion of the study findings and how they relate to existing research. Limitations of the present study are identified and some advice for climate change communicators is given based on the study findings. The discussion chapter ends with a summary of the main findings from this study.
References	Bibliography of all references used in this thesis presented in APA 7th Edition.
Appendix A	Participant Information Sheet.
Appendix B	Survey transcript, including the four randomly assigned messages.
Appendix C	Debreif Form and prize draw information.
Appendix B	Ethics approval.

Chapter 2: Theoretical frameworks: Protection motivation theory and the extended parallel process model

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"[For fear to incentivise] there must be some hope of being saved from the cause of agony…no one deliberates about hopeless things."

~ Aristotle, *Rhetoric*, 141, 350 BC ~

2.1 Introduction

More than two millennia ago, Ancient Greek philosopher, Aristotle, proposed that in order for fear to successfully persuade people to think and act on a problem, they must also be provided with a sense of hope that the problem can be resolved (Pfau, 2007; Witte, 1998). As expressed in the quote above, stand-alone appeals to fear, he argued, lead people to feel hopeless. In turn, this hopelessness will render people unwilling to consider an issue further. Inspiring hope, Aristotle suggests, may be the key to preventing this disengagement. Some 2300 years on, contemporary communication scholars have built on Aristotle's ideas by developing psychological frameworks that explain the need to counter fear appeals with recommendations for specific protective action (Pfau, 2007; Witte, 1998).

This chapter begins by outlining these fear appeal frameworks, including Roger's Protection Motivation Theory (PMT) and Witte's Extended Parallel Process Model (EPPM), and describing how they inform the present study. Next, this chapter will discuss existing scholarship that has applied elements of these fear appeal frameworks to climate change. Lastly, this chapter will discuss the differences between individual actions (e.g. household energy saving) and collective actions (e.g. protests) to mitigate climate change. It also discusses the evidence suggesting that a 'high fear' appeal may be most effective for increasing collective actions intentions while a 'low fear' appeal may be most effective for increasing individual action intentions. As alluded to in Chapter 1, this is based on the idea that the efficacy of recommended protective behaviours

must be sufficient to counter the degree of fear appeal. This chapter concludes by presenting a set of research questions based on the frameworks and research gap discussed.

2.2 Early Fear Appeal Frameworks: Parallel Response Model

Leventhal (1970; 1971) was among the first contemporary scholars to propose a theoretical model explaining people's response to fear appeals. His *Parallel Response Model* (PRM) proposed that people presented with a fear appeal will respond via activation of either the (1) danger control or (2) fear control pathway. The *fear control* pathway describes the process of "emotion-focused coping," where people seek to lower their fear levels via maladaptive coping mechanisms, such as denial or distrust of the message (Leventhal, 1971; Ruiter et al., 2001). Meanwhile, *danger control* describes the cognitive process that leads people to adopt adaptive coping mechanisms (i.e. adoption of behaviours to reduce the threat itself) (Leventhal, 1971). Leventhal argued that these two pathways operate independently, but that one pathway may dominate how people will respond to a fear appeal due to various other moderating factors (Leventhal, 1970, 1971). He suggested, for example, that the fear control pathway may be dominant for people with low self-esteem. Conversely, he argued that people with high self-esteem may favour the danger control pathway (Leventhal, 1971). The main critique of Leventhal's PRM is that it fails to clearly define how and why each of its constituent pathways may be triggered (Ruiter et al., 2001; Witte, 1994). His danger-control/fear-control pathway model, however, served as an important foundation for the development of later theories, such as PMT and the EPPM discussed below.

2.3 Protection Motivation Theory: Overview

Protection Motivation Theory (PMT) was founded by Rogers in 1975. Protection Motivation Theory builds on the PRM in its attempt to define the variables involved in the danger control pathway proposed by Leventhal (Ruiter et al., 2001). Protection Motivation Theory assumes that individuals will undergo a cognitive process of weighing up a series of specific variables relating to the threat itself and to the corresponding recommended protective actions provided (Ruiter et al., 2001). As Rogers puts it, protection motivation "arouses sustains and directs activity" towards certain behavioral intentions (Rogers, 1975, pg. 94). According to the revised version of

the PMT, the cognitive process of protection motivation is comprised of two main factors. These factors are: (1) threat appraisal, and (2) coping appraisal (Maddux & Rogers, 1983).

2.3.1 Threat Appraisal

As the name suggests, *threat appraisal* comprises an individual's assessment of the threat posed by a fear appeal (Floyd et al., 2000). In the threat appraisal process, individuals are assumed to weigh up two main sub-factors: (1) the *severity* of the threat, and (2) their perceived *vulnerability* to the threat (Maddux & Rogers, 1983). *Severity* of the threat refers to the extent to which people perceive the consequences of a threat to be serious or noxious. In other words, the perceived seriousness of the threat. *Vulnerability* refers to the extent to which people perceive themselves to be personally susceptible to a threat, that is, how likely people think they are to actually experience the threat.

2.3.2 Coping Appraisal

The second factor that influences how an individual will respond to a fear appeal, according to PMT, is *coping appraisal* (Maddux & Rogers, 1983). Coping appraisal encompasses an individual's assessment of their ability to cope with, or respond to, a threat (Maddux & Rogers, 1983). During the coping appraisal process, individuals are thought to weigh up two factors: (1) response efficacy, and (2) self-efficacy. *Response efficacy* refers to the extent to which people perceive a recommended action to be effective in minimizing the threat. *Self-efficacy* refers to an individual's perceived personal capability of performing the actions recommended to minimize a threat.

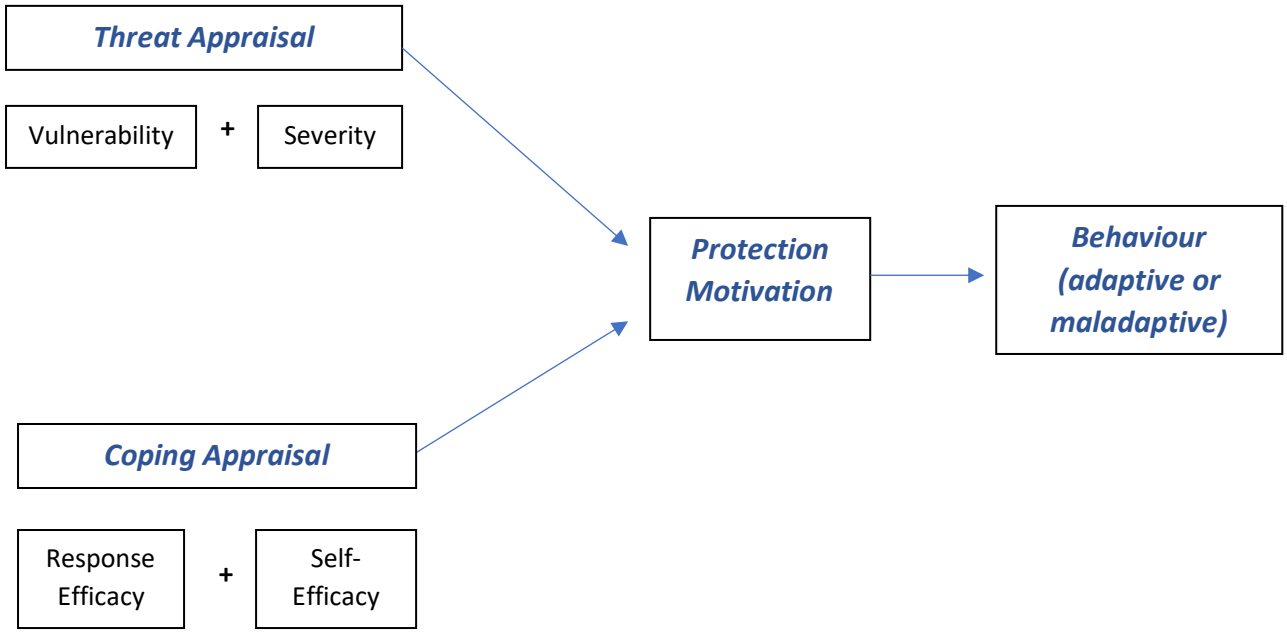


Figure 2.1. Simplified schema of Protection Motivation Theory. Adapted from Maddux and Rogers (1983).

Figure 2.1 provides a schematic summary of PMT based on the findings from Maddux and Rogers' 1983 study. The figure illustrates the way in which vulnerability, severity, response efficacy and self-efficacy are thought to moderate behaviour via the mechanism of protection motivation. The schematic, however, is a simplified representation of the way in which the four cognitive variables of PMT supposedly interact. Rogers originally hypothesized that the four PMT variables (vulnerability, severity, response efficacy and self-efficacy) would combine multiplicatively (Maddux & Rogers, 1983). In early PMT studies, Rogers and colleagues, however, found that the PMT variables combined in what they described as a "sub-additive" fashion (Maddux & Rogers, 1983, p. 476). Thus, a combination of the highest levels for each of the variables did not necessarily produce the highest intention scores, and a combination of the lowest variables did not necessarily produce the lowest intention scores (Maddux & Rogers, 1983). Rather, a high level of any two of the four variables, according to Rogers, was enough to reach a threshold level, beyond which additional information had no further effect on intentions (Maddux & Rogers, 1983).

Several meta-analyses have demonstrated support for the relationship between the four PMT variables and intentions to perform protective action (Floyd et al., 2000; Milne et al., 2000).

Studies have consistently demonstrated, however, that coping appraisal variables (response efficacy and self-efficacy) are stronger predictors of adaptive behavioural outcomes compared with threat appraisal variables (severity and vulnerability) (Bandura, 1997; Floyd et al., 2000; Milne et al., 2000). This suggests that people's perceptions of the recommended coping behaviours are more important determinants of behavioural outcomes compared with people's perceptions of the threat itself (Ruiter et al., 2001). Therefore threat perception has a more distal effect on outcomes compared with efficacy perceptions (Ruiter et al., 2001).

PMT informs the present study by identifying and describing the key variables supposedly involved in people's cognitive appraisal of fear appeals. As will be discussed in more detail in the Chapter 3, the present study comprises a 2 x 2 experimental intervention designed to systematically vary perceptions of the variables described by PMT: severity, vulnerability and efficacy. As Ruiter et al. (2001) have observed, the relatively simplistic structure of PMT makes it an appealing theoretical framework. The main problem with PMT, however, is that it fails to adequately explain why coping appraisal variables (i.e. efficacy perceptions) appear to be stronger determinants of adaptive behavioural outcomes compared with threat appraisal variables (severity and vulnerability). Whilst PMT is foundational in describing this set of variables, it also fails to adequately explain the role that fear arousal plays in the cognitive process of fear appeal response (Ruiter et al., 2001; Witte, 1994). For a clearer framework in understanding how fear levels relate to behavioural outcomes, the present study also draws upon the Extended Parallel Process Model (EPPM) discussed below.

2.4 Extended Parallel Process Model: Overview

Witte's *Extended Parallel Process Model* (EPPM) builds on both Leventhal's PRM and Rogers' PMT in an attempt to more clearly explain the role that fear arousal plays in determining how people will respnd to fear appeal messages (Maloney et al., 2011; Witte, 1994, 1998). The EPPM utilises the same four cognitive variables as PMT: (1) severity, (2) vulnerability, (3) response efficacy and (4) self-efficacy, but additionally draws on Leventhal's concept of the fear control *vs.* danger control pathways (Witte, 1994). Similarly to PMT theory, according to Witte (1994) the initial assessment of a fear appeal involves evaluation of the threat itself. If the severity of the threat and an individual's vulnerability to the threat (i.e. threat appraisal) is low then the message will be dismissed at this stage and no further cognitive processes will occur (Witte, 1994). Consequently,

if the threat is perceived to be irrelevant or trivial then the message will be disregarded resulting in no response (Witte, 1994). If, however, the threat is perceived to be sufficiently relevant and severe, an individual will begin a secondary appraisal of the recommended protective action (Witte, 1994).

Just as in PMT, this secondary appraisal involves perceptions of response efficacy and self-efficacy (Maloney et al., 2011; Witte, 1994). According to the EPPM, if perceptions of response and self-efficacy are high enough then the danger control pathway will be activated, leading to protection motivation and acceptance of the message (Maloney et al., 2011; Witte, 1994). Thus, if the recommended protective action is deemed sufficient to reduce the threat, adaptive (i.e. protective) behavioural intentions will be initiated. If, however, perceptions of response and self-efficacy are low, this will activate the fear control pathway, leading to defensive motivation and rejection of the fear appeal message (Maloney at al., 2011; Witte, 1994). Restated, if efficacy levels are low then individuals will attempt to alleviate their fear levels via defensive mechanisms, such as denial of the threat or by questioning the credibility of the message (Ruiter et al., 2001; Witte, 1994).

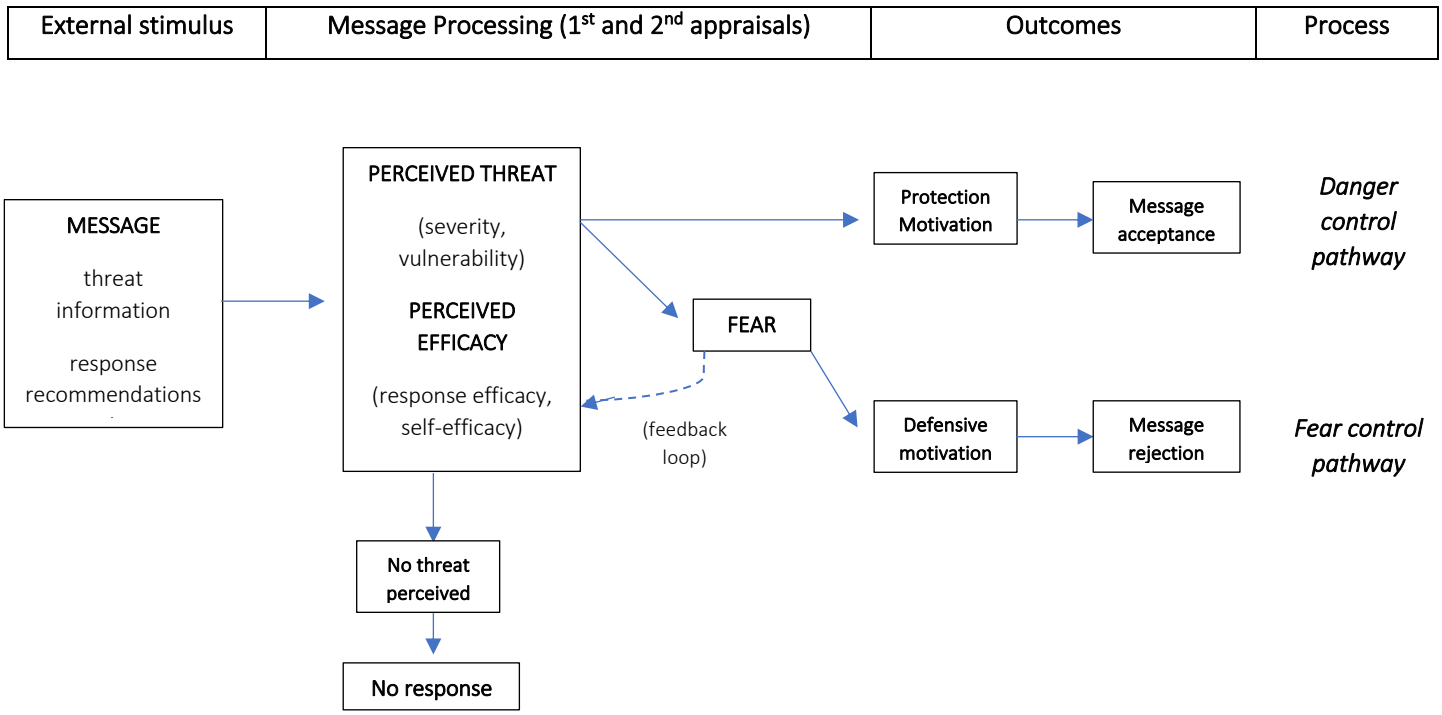


Figure 2.2. Simplified schema of the Extended Parallel Process Model. Adapted from Witte (1994).

Figure 2.2 provides a schematic summary of Witte's EPPM (Witte, 1994). It demonstrates the three main possible outcomes of exposure to a fear appeal according to EPPM theory: (1) threat perception is too low, resulting in no response; (2) threat perception is high and efficacy perception is sufficient to activate protection motivation; (3) threat perception is high but efficacy perception is insufficient, resulting in fear arousal and activation of defensive processing (Maloney et al., 2011; Witte, 1994). To summarise, the EPPM embodies the concept expressed in Aristotle's quote from the start of this chapter: fear may motivate people to take action but only when their sense of efficacy related to solving the problem is sufficiently high. The assumption that a fear appeal will only be effective in motivating adaptive action when combined with adequate efficacy messaging underlies the hypotheses of the present study.

Experimental evidence for the EPPM was first demonstrated by Witte and colleagues in a series of studies (Witte, 1994, 1998). It has since been applied extensively as an experimental framework within the field of health promotion (Davis et al., 2009; Roberto et al., 2019; Tavakoly Sany et al., 2020; Witte & Allen, 2000). The EPPM has also been used to inform studies in other areas, such as workplace safety (Basil et al., 2013) and internet security (Chen et al., 2021). As alluded to in the previous chapter, there is a growing body of research suggesting that the EPPM may also be a useful framework for motivating intentions to participate in climate change reducing behaviours (Chen, 2016; Meijnders et al., 2001; Sarrina Li & Huang, 2020; Xue et al., 2016). These studies will be discussed in detail in the following sections to provide further context for the present study.

2.5 Evidence for EPPM as a Framework for Climate Change-Related Behaviours

As discussed in detail in the previous chapter, a qualitative focus-group study conducted by O'Neill and Nicholson-Cole (2009) was among the first to suggest that arousing fear about climate change in the absence of adequate response recommendations may lead people to feel powerless and disengaged. Since then, a number of cross-sectional correlational studies have suggested that the four main PMT/EPPM variables (severity, vulnerability, response efficacy and self-efficacy) are indeed positive predictors of peoples' intentions to engage in climate change mitigation behaviours (Bockarjova & Steg, 2014; Hunter & Röös, 2016; Kim et al., 2013; Rainear & Christensen, 2017). A study conducted by Kim et al. (2013) found that, amongst both US and

Korean college students, severity and self-efficacy were significant predictors of general climate change mitigation behavioural intentions, while vulnerability and response efficacy were not. Furthermore, Rainear and Christensen (2017) found that all four variables (severity, vulnerability, response efficacy and self-efficacy) were significant predictors of general climate change-mitigation behavioural intentions in US college students. In their study, the PMT/EPPM variables collectively explained 50.6 % of the variance in intentions beyond what was accounted for by other demographic variables (such as age and gender) (Rainear & Christensen, 2017).

Similarly, all four variables were found to be positive predictors of intentions to adopt electric vehicles (EVs) in the Netherlands (Bockarjova et al., 2014). The only exception was that vulnerability was not a significant predictor of support for pro-EV policy (Bockarjova et al., 2014). Hunter and Röös (2016) also reported that all four variables in relation to climate change were significant predictors of intentions to reduce meat consumption in a Swedish population sample. In line with evidence from previous PMT meta-analyses data (Floyd et al., 2000; Milne et al., 2000), Hunter and Röös (2016) found that the coping appraisal variables (self-efficacy and response efficacy) were stronger predictors of intentions to reduce meat consumption than threat appraisal variables (severity and vulnerability). Overall, these correlational studies indicate that the four EPPM variables are useful predictors of intentions to engage in climate change-reducing behaviour. Evidence for vulnerability as a significant predictor is weakest, while evidence for the predictive significance of the other three variables is stronger. Most of these studies, however, have focused on intentions for individual/household actions such as energy saving and adopting EVs. To the best of my knowledge, there are no studies yet that have investigated whether the EPPM variables are significant positive predictors of collective action intentions (e.g. participating in protests or community projects). As will be discussed in more detail towards the end of this chapter, the present study aims to address this research gap.

In addition to the correlational studies discussed above, further research has provided more robust experimental evidence for the EPPM as a relevant framework for communicating climate change (Chen, 2016; Meijnders et al., 2001; Sarrina Li & Huang, 2020; Xue et al., 2016). A study conducted by Chen (2016) demonstrated that using messages to illicit varying levels of fear regarding climate change (low fear *vs.* moderate fear *vs.* high fear) resulted in a ∩ shaped curve pattern of intentions to engage in pro-environmental behaviour. Those who received a low-fear appeal message demonstrated significantly higher levels of intention to engage in climate change-

reducing behaviours compared with those who received a high-fear appeal (Chen, 2016). The study did not provide any recommendations for protective action (i.e. response- and self-efficacy were not targeted in the experiment) (Chen, 2016). These findings suggest that eliciting high fear levels without providing recommendations to promote efficacy lead to lower intentions to take action, likely due to defensive processing and message rejection (Maloney et al., 2011; O'Neill & Nicholson-Cole, 2009; Witte, 1994).

Findings from a Beijing study further corroborate evidence for the EPPM as a relevant framework for climate change communication (Xue et al., 2016). In the study, participants were randomised to receive either a high-threat/high-efficacy message or a high-threat/low-efficacy message (Xue et al., 2016). Hence, both messages were threatening but one message provided no recommendations for reducing the threat of climate change, while the other message did (Xue et al., 2016). As was hypothesised based on the EPPM, people who received the high efficacy message (*vs.* the low efficacy message) reported higher levels of perceived efficacy in addition to higher intentions to seek out further information (Xue et al., 2016). Participants who received the high-efficacy message also reported lower levels of fear control processing (i.e. message rejection and denial of the threat) compared with the low-efficacy group, as well as higher level of agreement with a general statement that they intended to "take action on climate change" (Xue et al., 2016). Thus, there is good evidence suggesting that it is important to combine fear appeals with efficacy messaging. It is, however, necessary to consider whether different types of actions (e.g. individual *vs.* collective) may benefit from differing degrees of fear messages (e.g. high *vs.* low fear). The present study aims to investigate this idea, which will be discussed further in subsequent sections.

2.6 Replacing Self-Efficacy with Collective Efficacy

While the studies detailed above provide support for the EPPM as a useful framework for motivating action on climate change, there is also evidence that the EPPM should be amended in the context of climate change communication by replacing self-efficacy with collective efficacy. Considering that the EPPM was developed within the context of health promotion, it makes sense that self-efficacy would be a key factor involved in motivating individual behaviour change. Smoking cessation and safe-sex practices, for example, can be described as personal health behaviours in which the threat and solutions operate at the individual level (van Zomeren et al.,

2010). As discussed in the previous chapter, climate change can be described as a large-scale, global collective action problem because the consequences of the threat will likely affect most of the world's population and solutions to the problem require collective, global action (Esty & Moffa, 2012). Evidence suggests that solving collective problems requires people to focus on available resources at the collective, rather than at the individual level (Ellemers, 1993; van Stekelenburg & Klandermans, 2013; van Zomeren et al., 2008). To support this assumption, Homburg and Stolberg (2006) demonstrated that perceptions of collective efficacy, but not self-efficacy, were positive predictors of pro-environmental behaviour.

A series of experimental studies conducted by van Zomeren et al. (2010) further demonstrate that collective efficacy is more relevant than self-efficacy in the context of climate change fear appeals. In one experiment, a 2 x 2 message design was used (low fear *vs.* high fear and a self-efficacy message *vs.* no self-efficacy message). The study found a significant main effect for the fear manipulation on intentions to reduce climate change, but found no significant main effect for the self-efficacy manipulation. This experimental result therefore contradicts the assumption that self-efficacy is a significant positive predictor of climate change-reducing behaviours (Bockarjova & Steg, 2014; Hunter & Röös, 2016; Kim et al., 2013; Rainear & Christensen, 2017). In a second study, van Zomeren et al. (2010) used another 2 x 2 design, first varying a low fear *vs.* a high fear message, followed by a collective efficacy message *vs.* no collective efficacy message. In this study, there was a significant main effect for both the fear and collective efficacy manipulations. This result suggests that appeals to collective, rather than self-efficacy, are more effective at motivating climate change mitigation behaviours.

Results from Chen's (2016) experimental study discussed earlier further corroborate this conclusion. Under a low fear appeal condition, regression analysis showed that neither self- nor collective efficacy were significant predictors of intentions to engage in climate change mitigation behaviour (Chen, 2016). Under a high fear appeal condition, however, regression analysis demonstrated that collective efficacy but *not* self-efficacy was a significant predictor for intentions to mitigate climate change (Chen, 2016). Overall, experimental evidence suggests that when using the EPPM as a framework for studying climate change fear appeals, these models are best adapted by replacing self-efficacy with collective efficacy (Chen, 2016; van Zomeren et al., 2010). As such, the messages used in the present study were designed to enhance people's perceptions of collective efficacy rather than self-efficacy.

2.7 The EPPM and Individual Versus Collective Level Actions

Climate change is a highly complex, global-scale collective action problem that requires action on many different levels, including at the individual, community and institutional level. It is therefore important to consider whether the EPPM may be effectively applied to different types of mitigation actions in different ways. The present study focuses on both individual and collective actions. For the purpose of this thesis, "individual level actions" constitute individual consumer behaviours, such as efforts to reduce home energy use, petrol/diesel car use, meat consumption and air travel. Meanwhile, this thesis draws on Van Zomeren and Iyer's (2009) definition of collective action as "any action that aims to improve the status, power or influence of an entire group" (pg. 646). In this sense, collective actions include those that aim to influence climate change mitigation policy and practices at the community and national level. This includes, for example, participating in protests, volunteering for community projects or signing petitions related to mitigating climate change.

As alluded to in the previous chapter, there is some experimental evidence to support the idea that high fear appeals may be more effective for motivating collective-level action on climate change, whilst low to moderate fear appeals may be more effective for motivating individual-level action on climate change. In an experimental study, Meijnders et al. (2001) used a 3 x 2 factorial design to test messages promoting the use of energy saving light bulbs as a protective behaviour to help reduce climate change. The experiment varied messages in terms of the level of fear about climate change (control *vs.* moderate fear *vs.* high fear). The experiment also varied response recommendations using differing argument strengths (i.e. weak argument in favour of using energy saving lightbulbs *vs.* strong argument for using the bulbs). The study results suggested that a *moderate* fear appeal coupled with a high efficacy message was the most effective for increasing intentions to purchase the energy saving lightbulb. This was contrary to the assumption that a *high* fear appeal coupled with a high efficacy message would be most effective for motivating adoption of the bulb. This finding seems to suggest that moderate fear appeals, rather than high, may be more effective when coupled with a high efficacy appeal for motivating individual, household-level mitigation behaviour.

Meanwhile, a Taiwanese study experimentally tested five different messages: (1) high-threat/high-efficacy, (2) high-threat/low efficacy, (3) low-threat/high-efficacy, (4) low-

threat/low-efficacy, and (5) control (i.e. no message) (Sarrina Li & Huang, 2020). The study measured intentions to adopt individual behaviours to mitigate climate change (e.g., reducing meat consumption, switching off lights, and turning down air conditioning). The study also measured intentions to participate in collective actions (e.g., attending public meetings to address the issue, and participating in protests to demand better public transport policies. Sarrina Li and Huang (2020) found that exposure to the high efficacy messages compared with the low efficacy messages was associated with significantly stronger intentions to adopt both individual and collective behaviours to mitigate climate change. Meanwhile, contrary to expectations based on the EPPM, exposure to the high threat messages compared with the low threat messages was *not* significantly associated with intentions to adopt individual behaviours. Exposure to the high threat message *was,* however, associated with significantly stronger intentions to participate in collective actions compared with the low threat message, as postulated by the EPPM.

The findings from Meijnders et al. (2001) and Sarrina Li and Huang (2020) suggest that a high fear appeal combined with a high efficacy appeal may be most effective for motivating collective actions to mitigate climate change. Meanwhile, a low to moderate fear appeal combined with a high efficacy appeal may be most effective for motivating individual actions to mitigate climate change. When we consider this finding more closely, this may actually align well with the framework of the EPPM. As discussed, the main concept of the EPPM is that efficacy perceptions have to be sufficient to counter threat perceptions, otherwise fear-control pathways may be triggered, leading to disengagement or rejection of the recommended actions (Maloney et al., 2011; Witte, 1994). It is possible that individual actions may be inherently perceived as having lower efficacy compared with collective actions. Hence, collective action recommendations may be perceived as sufficient to counter a high fear appeal, whereas individual action recommendations are not.

2.8 Inherent Efficacy of Individual Versus Collective Actions

Encouraging people to adopt individual actions to mitigate climate change is no doubt important. Household-level action, when taken cumulatively, has the potential to significantly reduce emissions. Nicholas and Wynes (2017) estimate, for example, that one person choosing to live car-free could save 2.4 tonnes of CO_2 equivalent per year. Considering that New Zealand has one of the highest car ownership rates in the world (4.4 million registered motor vehicles in 2019

compared with a population of only 4.7 million (Ministry of Transport NZ, 2019)), if enough New Zealanders chose to go car-free this could have a large impact on reducing New Zealand's emissions profile. Despite the potential for cumulative individual actions to achieve sizeable emission reductions, these sorts of individual behaviours may be inherently associated with fairly low perceptions of response and collective efficacy.

The efficacy of individual actions relies heavily on enough other people also adopting these behaviours. In other words, individual actions need to be taken collectively (i.e. by enough others) in order to have a large impact on reducing emissions. This degree of large-scale cooperation represents a collective action dilemma. Individual actions tend not to be publicly disclosed and it can be especially difficult to gauge to what extent others are also performing these actions (Aitken et al., 2011). As such, perceptions of collective efficacy for individual actions may also be fairly low (i.e. people may struggle to trust that enough others are also performing these actions). Furthermore, the response efficacy of individual actions in themselves (i.e. when not considered cumulatively) is arguably very low. The seeming remoteness of these household protective actions from the threat of climate change may also lead people to question their efficacy. People may, for instance, question what buying energy efficient lightbulbs or driving less has to do with reducing the risk of flooding, droughts and other extreme weather events (Bushell et al., 2017). Bushell et al. (2017) have argued that people may be disincentivized to perform individual actions because their smallness and simplicity (i.e. low perceived efficacy) is disproportionate compared with the scale and seriousness of climate change. This argument supports the underlying principle of the EPPM that efficacy perceptions need to be sufficient to counter threat perceptions. In other words, because the perceived efficacy of individual actions may be relatively low, appeals to fear should also be minimized otherwise fear control pathways may be triggered and the recommendations rejected, as per the EPPM (Maloney et al., 2011; Witte, 1994).

It is feasible that collective actions are more likely to be perceived as having higher response efficacy because collective actions are aimed at community and policy change that have inherent potential for wide-scale impact. A ban on petrol and diesel cars, for example, such as the one proposed for 2030 by the Climate Change Commission's latest report (Climate Change Commission, 2021), would have a clear and substantial impact on reducing New Zealand's transport emissions. Thus, participating in collectively petitioning the government to ban

petrol/diesel cars may appear to be a more influential action compared with simply choosing to drive less. Furthermore, collective actions, such as participating in a climate change protest, is more clearly and explicitly linked to the threat itself compared with an "everyday" action like choosing to walk somewhere instead of driving. Consequently, participation in collective actions may be perceived as more directly related to climate change and hence perceived as having greater efficacy, regardless of whether or not they actually do.

Additionally, there may be a greater sense of trust and reciprocity involved in collective actions since participants may be less anonymous to one another. When joining a protest or volunteering for an organisation, for example, people are able to directly observe that others are also taking the same action. Similarly, petitions typically promote how many others have already signed. In this sense, collective actions may be inherently associated with a higher sense of collective efficacy compared with individual actions because people have a clearer sense that action is also being taken by others. Experimental evidence suggests that messages emphasising efficacy are still important for encouraging collective actions (Sarrina Li & Huang, 2020). The inherent perceived efficacy of these actions, however, may be high enough to sufficiently counter a high fear appeal (Sarrina Li & Huang, 2020).

2.9 Study Aims and Research Questions

The assumptions regarding the perceived efficacy of collective *vs.* individual actions discussed above have yet to be experimentally tested. The present study aims to address this research gap. In the present study participants were randomly presented with: (1) a 'high fear' *vs.* 'low fear' message, and (2) specific efficacy-enhancing recommendations to engage in individual *vs.* collective action to mitigate climate change. The assumption, based on existing research, was that providing specific efficacy-enhancing recommendations would be important for increasing intentions to participate in both individual and collective actions (Sarrina Li & Huang, 2020). Therefore, participants exposed to the individual action recommendations would report significantly higher intentions to adopt these behaviours compared with those who did not (i.e. those who instead received the collective action recommendations). Similarly, those who received the collective action recommendations would report significantly higher intentions to participate in these actions compared with those who did not (i.e. those who received the individual action intentions). In this sense, the recommendation messages function as a type of

control for each other (individual action recommendations provided *vs.* not provided, and vice versa for the collective action recommendations).

Furthermore, the study aimed to test whether a 'high fear' message (compared with a 'low fear' message) would be more effective for increasing collective action intentions among those who also received efficacy-enhancing recommendations to participate in these actions. Conversely, the hypothesis was that among those who received efficacy-enhancing recommendations to participate in individual actions, exposure to a 'low fear' message (*vs.* a 'high fear' message) would significantly increase intentions to adopt these individual actions. This hypothesis was based on the framework of the EPPM and existing evidence discussed above (Meijnders et al., 2001; Sarrina Li & Huang, 2020).

An outline of the research questions and corresponding hypotheses that emerged from the literature discussed in this chapter is presented below.

Table 2.1 Research Questions and Hypotheses

Hypotheses for research questions based on theoretical framework
Research Question 1. Does providing a 'high fear' message about climate change increase people's level of fear and perceptions of severity and vulnerability in relation to climate change compared to providing a 'low fear' message? **H_1:** Providing a 'high fear' message about climate change will significantly increase fear levels and perceptions of severity and vulnerability in relation to climate change compared to providing a 'low fear' message, as postulated by the EPPM.
Research Question 2. What effect does providing efficacy recommendations to participate in individual *vs.* collective actions to mitigate climate change have on perceptions of collective efficacy and response efficacy? **H_2:** Providing efficacy-enhancing recommendations to participate in collective actions to mitigate climate change will result in higher perceptions of response and collective efficacy compared to providing efficacy-enhancing recommendations to participate in individual actions to mitigate climate change. This is based on the assumption that collective actions are inherently more likely to be perceived as having greater response and collective efficacy potential compared to individual actions (as discussed above).

Research Question 3. How do different messages about climate change affect people's intentions to engage in individual actions to reduce climate change? Specifically, a 'high fear' *vs*. 'low fear' message AND individual action recommendations provided *vs*. not provided.

H_{3a}: Providing specific efficacy-enhancing recommendations to engage in individual actions to mitigate climate change will significantly increase people's intentions to engage in these actions compared with those who were not provided these specific recommendations (i.e. those provided with a collective action efficacy message)

H_{3b}: There will be no main overall effect of the 'fear-based' message intervention on individual action intentions. This is because the effect of the fear appeal will be dependent on the efficacy intervention, as per the EPPM. As such, there will be a significant interaction effect between the two message interventions. Among those who *did* receive an efficacy-enhancing message to engage in individual actions, those who also received a 'low fear' message will demonstrate significantly higher intentions to engage in the recommended individual actions compared with those who received a 'high fear' message.

Research Question 4. How do different messages about climate change affect people's intentions to engage in collective actions to reduce climate change? Specifically, a 'high fear' *vs*. 'low fear' message AND collective action recommendations provided *vs*. not provided.

H_{4a}: Providing specific efficacy-enhancing recommendations to engage in collective actions to mitigate climate change will significantly increase people's intentions to engage in these actions compared with those who were not provided these specific recommendations.

H_{4b}: There will be no main overall effect of the 'fear-based' message intervention on collective action intentions. This is because the effect of the fear appeal will be dependent on the efficacy intervention, as per the EPPM. There will, however, be a significant interaction effect between the two message interventions. Among those who received efficacy recommendations to engage in collective actions, those who also received a 'high fear' message about climate change will demonstrate significantly higher intentions to engage in the recommended collective actions compared with those who receive a 'low fear' message about climate change.

Research Question 5. Are the EPPM variables significant positive predictors of intentions to participate in both individual and collective actions to reduce climate change?

H_{5a}: As postulated by the EPPM, fear levels and perceptions of severity, vulnerability and efficacy in relation to climate change will be significant positive predictors of intentions to engage in both individual and collective actions to reduce climate change.

H_{5b}: Efficacy perceptions will be equally significant positive predictors of intentions to engage in collective *vs.* individual actions to mitigate climate change. Meanwhile, perceptions of severity and vulnerability will be stronger predictors of intentions to participate in collective actions compared with individual actions. This is based on the assumption that a low appeal to fear may be more effective for motivating individual actions, while a high fear appeal many be more effective for motivating collective actions.

2.10 Chapter Summary

This chapter has provided an in depth discussion of the theoretical frameworks that inform the present study, including PMT and the EPPM. A review of the present literature applying these frameworks to climate change has been provided and gaps in this research identified. The aims and hypotheses of the present study have been outlined above. The following chapter will provide a description of the methodological approach taken in this research and outline the study design in more detail.

Chapter 3: Methodology

3.1 Introduction

I begin this chapter by establishing the epistemological position taken in this study and explain the choice of a quantitative approach. In subsequent sections I provide an overview of the study design, data collection methods and characteristics of the research sample. Next, I provide rationale for questions included in the survey in addition to presenting some preliminary data analysis. Finally, I give a brief outline of the key ethical considerations for this study.

3.2 Epistemological Position

As explained in the previous chapter, the research design for this thesis is based on psychological frameworks, such as the PMT and the EPPM (Maddux & Rogers, 1983; Witte, 1994). Early (19th-20th century) approaches in psychology were largely grounded in a positivist approach to conducting research (Baker, 1992; Leahey, 2017). Positivism is based on the underlying assumption that the world can be objectively measured via empirical observation (Neuman, 2011; Wheeldon & Åhlberg, 2012). Positivist research typically involves collecting and analysing quantitative data sets in order to confirm or refute a pre-conceived theory or hypothesis (Neuman, 2011). Through a positivist lens, early psychological research attempted to emulate the "hard" sciences (such as physics and chemistry) by treating experimental researchers as an objective operator capable of observing and interpreting experimental outcomes in a rational and unbiased manner (Baker, 1992).

In the last century there has been a shift within the discipline of psychology towards a more *post-positivist* approach to research (Baker, 1992). Post-positivism is a variation of positivism that acknowledges there is always a degree of uncertainty involved in the production of knowledge (Creswell, 2014). While positivism assumes objective truth, post-positivism recognises that researchers cannot be fully certain about any given observation, as data collection is inherently subject to error and unintended bias (Creswell, 2014). It is also now widely recognised that researchers themselves are subject to their own unique perceptions, and worldviews that will influence the way they collect and interpret data during an experiment (Baker, 1992).

In this thesis I take a post-positivist approach to psychological research, utilising numeric measurements and observation to draw conclusions based on hypotheses. I also recognize that experimental methods are always subject to errors and biases. Therefore, conclusions drawn from the present study may provide useful insights into climate change communication but do not represent an indisputable, objective truth. I also acknowledge that my own unique perceptions, writing style and personal background has shaped the way I understand and present information in this thesis. Ideas and concepts I was introduced to during my Envrionmental Studies degree coursework, for example, have played a large role in shaping this thesis. Furthermore, my self-identification as an environmental activist as well as past experience participating in protests and community groups related to climate change have also shaped this research. For instance, it was my activist experience that partially informed the argument that collective actions may be perceived as having higher efficacy than individual actions.

3.3 Quantitative Survey Research

Quantitative research is the method that most readily aligns with a post-positivist epistemology. Quantitative research involves the collection of numerical data that is subsequently analysed using mathematical methods (e.g. statistics) (Creswell, 1994). In experimental psychology, a quantitative approach enables researchers to test a treatment or intervention across a large number of people in order to draw conclusions about its relative effectiveness (Toomela, 2008). This research utilizes a quantitative approach to obtain breadth of understanding in how different messages about climate change (i.e. an intervention treatment) are related to behavioural intentions (i.e. an outcome variable). Surveys are a common and widely accepted method of obtaining quantitative data in psychological studies (Baker, 1992). Surveys enable the collection of data pertaining to specific variables across a large sample size. This allows researchers to perform a comparative analysis between variables for different groups of people in the sample and to draw conclusions about particular phenomena of interest (de Vaus, 2014).

3.4 Research Design

Data for this thesis research was collected using an online survey via the Qualtrics platform. At the start of the survey, participants were informed that the survey would take 10-15 minutes to complete. The full extent of the study design was not revealed to participants at this stage to

ensure that responses would be spontaneous. Following an information section about the survey, respondents were asked whether or not they consented to participate. Those who did not consent were automatically redirected to the end of the survey.

Figure 3.1 Overview of survey layout

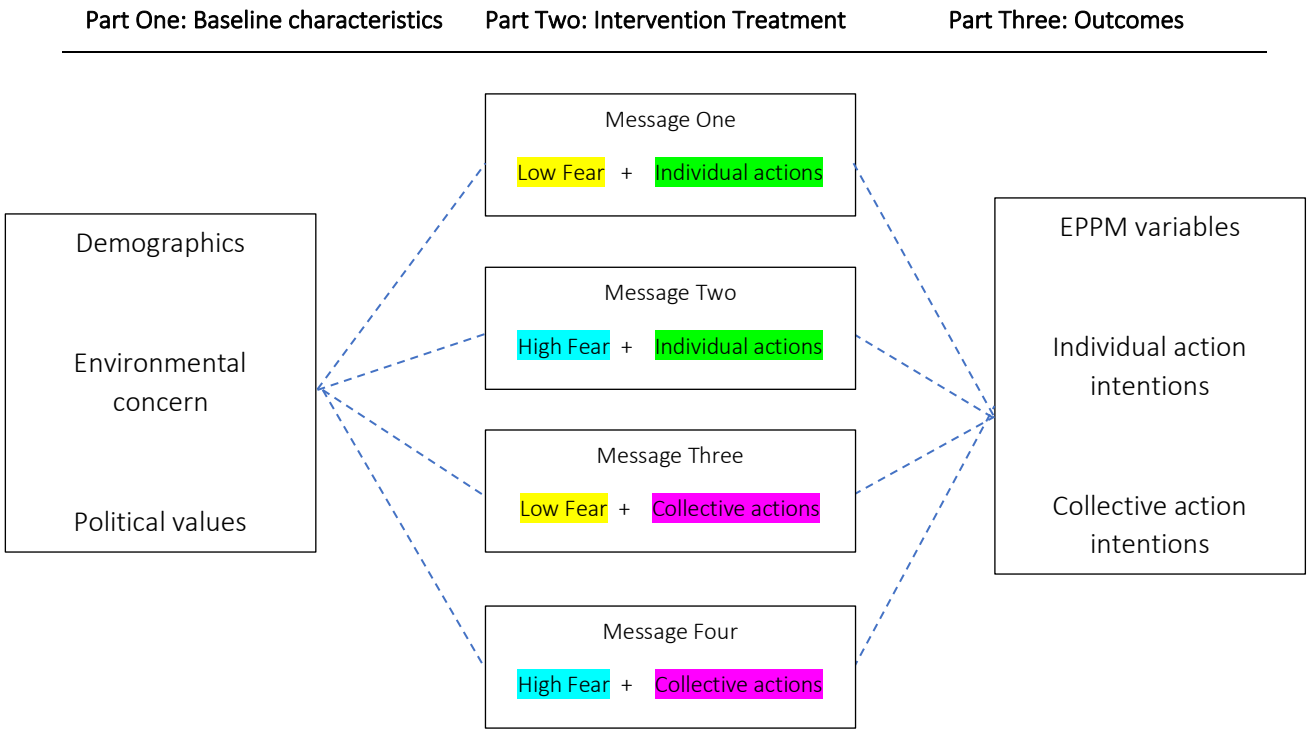


Figure 3.1 above provides an overview of the survey's structure. The survey was comprised of three main sections. The first section of the survey was designed to gather information about participant demographics, and several baseline characteristics, including environmental concern and political values. The second section of the survey consisted of an intervention treatment. Participants were randomly allocated via the survey tool to receive 1 of 4 short (520-530 word) messages about climate change. A 2 x 2 experimental design was used for these messages. Firstly, participants received either (1) a neutral message about climate change, or (2) a frightening message about climate change. Secondly, participants received a short list of either (1) individual actions, or (2) collective actions they could take to reduce climate change. This meant that people could receive 1 out of a total of 4 possible message combinations at the intervention stage. The third section of the survey was designed to measure several manipulation checks and outcomes

variables, including fear levels, perceived severity, vulnerability and collective efficacy in relation to climate change, and intentions to engage in individual and collective action to reduce climate change. At the end of the survey, participants were provided with a debrief that explained the full design and intention of the study. Post-debrief participants were provided with a final opportunity to withdraw consent for their responses to be used in the study.

3.5 Participant Recruitment

Convenience and snowball sampling was employed to recruit participants for this study. Ideally, a representative sample of the New Zealand population would have been obtained for this project, but this was not practical given time and resource constraints. Convenience sampling is a common method of participant recruitment in psychological research. It is a generally accepted method of recruitment, provided that the limitations of such an approach are clearly stated (Evans & Rooney, 2011). It is important to acknowledge, for instance, that inferences cannot be drawn from this research about the general New Zealand population as the sample is not representative.

The present study was conducted using an online survey tool, as this is considered to be an easy, cheap and time efficient way of conducting quantitative research (Sue & Ritter, 2007). There are, however, several limitations that come with conducting online surveys. Firstly, it excludes people who do not have internet access, which means that certain groups are underrepresented (Lefever et al., 2007). Secondly, the freedom of choice associated with completing online surveys can be a disadvantage in cases where participants postpone filling out the survey and then unwittingly forget to return to it (Lefever et al., 2007). Online surveys are also potentially limited by the demographic of internet users that are willing and able to spend time completing them (de Vaus, 2014; Sue & Ritter, 2007). The online survey tool, Qualtrics, was used to administer the online survey as this is free to use for Victoria University students. It is also a comprehensive survey tool with a wide range of settings appropriate for the type of survey design needed for this research. It enables, for example, the use of custom Likert-style scales, multiple choice questions and the ability to randomise respondents to different sections within the survey.

The online survey was open from 3rd November 2020 until 30th March 2021. It was advertised using email lists, social media and printed flyers. An invitation to participate in the survey was administered via email using the researcher's personal contacts and the staff and student email list of the School of Geography, Environment and Earth Sciences at Victoria University of Wellington. The researcher's personal Facebook and Instagram accounts were also utilised to advertise the survey. A total of 500 printed flyers with a QR code link to the survey were also placed in letter boxes around several suburbs in Wellington (Newtown, Kelburn, Mt Victoria and Mt Cook). Approximately 30 posters advertising the survey were also placed up around the Victoria University Kelburn campus. As an incentive to complete the survey, participants were offered the chance to go in the draw to win 1 of 4 $50 Countdown supermarket vouchers. Those who wished to enter the prize draw were given the opportunity to submit their email address in a separate database from the main survey to ensure anonymity. After the survey was closed, a random number generator was used to select 4 participants to receive the prize.

3.6 Research Sample

A total of 462 people accessed the online survey. Participants who did not complete more than 80 % of the survey questions were removed from the final dataset (n = 86). All respondents under the age of 18 were also removed (n = 3). A further 14 responses were removed because these participants did not provide consent for their data to be used in the study following the debrief section of the survey. The survey included a basic question regarding the topic of the message provided. The assumption was that if people did not choose the correct answer ("climate change") they had not actually read the message. Participants who answered this question incorrectly (n = 1) were also excluded from the analysis. A further two manipulation check questions were used to assess whether participants had interpreted the content of the different messages in the way that had been intended via the different framings (i.e. low fear *vs.* high fear, individual action *vs.* collective action). Both these questions included incorrect answers about the content of each part of the message. It was assumed that if participants chose an incorrect answer (related to nitrogen run-off, river pollution or ocean dead zones) they had not actually read the message. A further 12 responses were removed from the dataset because participants chose an incorrect answer for one or both manipulation checks. This means that a total of 346 survey responses were included in the final analysis.

3.7 Demographics

The final sample consisted of 78 males (22.5 %), 263 females (76.0 %), and 4 gender-variant/non-conforming individuals (1.4 %). The age of respondents ranged from 18-90 years old. The largest proportion of participants were between 21 and 30 years of age (n = 136, 39.3 %). The second largest proportion were in the 18 to 20 age range (n = 88, 26.3 %). Other age groups were relatively even in their distribution: 31-40 years old (n = 32, 9.3 %), 41-50 years old (n = 18, 5.2 %), 51-60 years old (n = 36, 10.4 %) and 60 years and over (n = 33, 9.5 %). A total of 3 respondents did not provide their age. Most respondents identified as NZ European/Pākehā (n = 282, 81.5 %). The second largest ethnic group was Other (n = 45, 13.0 %), followed by Māori (n = 26, 7.5 %), Indian (n = 12, 3.5 %) and Chinese (n = 7, 2 %). A large majority of respondents were from the Wellington region (n = 248, 71.7 %). The second largest proportion of respondents were from Auckland (n = 48, 13.9 %), followed by Other Region (n = 28, 8.1 %), Otago (n = 13, 3.8 %) and Canterbury (n = 8, 2.3 %). With regards to main occupation, the largest proportion of respondents were students (n = 179, 51.7 %), followed by paid employees (n = 105, 30.3 %), retirees (n = 23, 6.6 %) and self-employed individuals/business owners (n = 26, 7.5 %). Only 7 respondents (n = 2.0 %) were unemployed. The largest proportion of respondents had completed a secondary school qualification as their highest level of education (n = 116, 33.5 %), followed by those who had completed a Bachelor's degree (n = 94, 27.2 %), those with a Post-graduate degree (n = 90, 26.0 %) and an Occupational certificate or diploma (n = 41, 11.8 %). Only 5 participants (1.4 %) had no formal qualifications.

The large proportion of respondents from the Wellington region is not surprising given that recruitment flyers were only distributed in Wellington due to time and resource constraints. Furthermore, the use of snowballing from the researcher's personal contacts (most of whom reside in Wellington) and use of the Victoria University department email list likely resulted in a high proportion of Wellington residents accessing the survey. The large proportion of young people (18-30 year olds) (224, 65.6 %) and students (179, 51.7 %) is also not surprising given that flyers were placed around the Victoria University Kelburn campus and distributed in suburbs close to the Victoria and Massey University campuses. Snowballing via email was also used to distribute the survey among several groups of undergraduate students at Auckland and Otago University.

3.8 Environmental Concern

People's level of environmental concern was ascertained in the first section of the survey using a set of 8 questions. Pre-existing level of environmental concern was measured because studies have shown it is a key predictor of intention to engage in pro-environmental behaviours (Howell et al., 2016; Xue et al., 2016). Measuring environmental concern allows for the effect of this covariate to be controlled for. The original draft of the survey included two separate scales for measuring environmental concern. The first was a 4-question scale adapted from Howell et al. (2016) designed to measure 'Belief in the Reality of Climate Change.' The second was a 6-item scale adapted from Cruz and Manata (2020) that measured more general 'Environmental Attitudes.' Following a pilot test of the original survey, 2 items from the 6-item 'Environmental Attitudes' scale were removed in order to reduce survey length. In the final version of the survey the two scales ('Belief in the Reality of Climate Change' and 'Environmental Attitudes') were combined to form a new 8-item scale intended to measure environmental concern. Four of the 8 questions were specifically about climate change, while the other 4 were about environmental attitudes more generally. All 8 questions asked participants to respond to a statement on a Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree." The 8-item environmental concern scale had an internal consistency of $\alpha = 0.73$. An alpha of at least 0.7 is considered acceptable, although a score greater than 0.8 is ideal (de Vaus, 2014). An alpha < 0.8 may have occurred due to having adapted and condensed the scale items from their original form and length. Following data analysis, the mean environmental concern score was found to be 6.02 ± 0.71 (mean scores are presented as $\pm$ standard deviation unless stated otherwise) out of 7 ($n = 339$). This finding suggests that pre-existing levels of belief in the reality of climate change and environmental concern were very high overall in the sample.

3.9 Political Values

The first section of the survey also included two 4-item question scales designed to measure: (1) economic left-right wing political values and (2) libertarian-authoritarian social political values. Political values were included here because research has consistently suggested that economic left-wing and socially liberal political values are correlated with pro-environmental attitudes and behavioural intentions (Kim et al., 2013; Neumayer, 2004; Zia & Todd, 2010). Measuring political values, therefore, allows for the effect of this variable on pro-environmental intentions

to be controlled for. Both the 4-item political value scales used in the final survey were adapted from a UK study by Evans et al., (1996). Ideally, scales designed specifically for measuring political affiliation within a New Zealand context would have been used. It was, however, difficult to locate any New Zealand studies that had developed specific scales for separately measuring economic and social political values. The scales developed by Evans et al. (1996) were adapted for this study, since it is standard discourse in both the United Kingdom and New Zealand to categorise political affiliation orthogonally in terms of libertarian/authoritarian and left-wing/right-wing values (Carter, 2013; G. Evans et al., 1996; Neumayer, 2004). Due to British colonisation of New Zealand in the 19th-century, the New Zealand political system also bears many similarities in terms of structure and operation to that of the UK (Mulgan & Aimer, 2004). Both the political value scales used in the final version of the survey were condensed down to 4 questions each, compared to the 5-item left-right scale and the 10-item libertarian-authoritarian scale originally developed by Evans et al., (1996). This was done to reduce the length of the survey following a pilot test.

All questions for both scales asked participants to respond on a Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree." The 4-item economic left-right wing scale had an internal consistency of $\alpha = 0.74$. Ideally, an alpha score > 0.8 would have been obtained (de Vaus, 2014). Condensing the scale down to 4 items from 5 may have reduced its internal reliability. Upon data analysis, the mean score for economic left-wing/right-wing values was 5.53 $\pm$ 0.98 out of 7 (n = 342). A score of 1 represents extreme right-wing values and 7 represents extreme left-wing values. The 4-item libertarian-authoritarian social-political scale had an internal consistency of $\alpha = 0.67$. This reliability score is just short of the generally accepted 0.7. Since the scale was reduced from 10 items to 4, it was to be expected, however, that the internal consistency would be low compared with the established version of the scale. The scale was therefore maintained in the analyses. The mean score for libertarian/authoritarian social-political values was 5.26 $\pm$ 0.95 out of 7 (n = 342). A score of 1 represents extreme authoritarian values and 7 represents extreme libertarian values.

3.10 Information Intervention

The first stage of the information intervention required the design of two different messages about climate change intended to elicit a low *vs.* high fear response from participants. This was

attempted by systematically varying the content and wording of the two messages to either minimize perceptions of severity and vulnerability (for the low fear message) or maximize perceptions of severity and vulnerability (for the high fear message). It was important, however, that the two messages appeared equally credible and were of the same length. Failure to control for length and credibility may have led to unintended differences in message acceptability (Craig & McCann, 1978). To ensure similar credibility, both messages included references to scientific, peer-reviewed articles and to reports produced by the IPCC. Both messages were of a similar length. The 'high fear' message was 275 words, while the 'low fear' message was 255 words. Full transcripts of these two messages can be found in Appendix B.

The 'low fear' message included an explanation of the greenhouse effect and some statistics describing predicted average global temperature rises. The message also included a brief statement suggesting that sea level rise and ice sheet melting were possible outcomes of climate change. These facts and figures were adapted from several sources including Climate Central Inc. (2013) and reports produced by the IPCC (IPCC, 2014; 2018b). In order to limit perceptions of severity and vulnerability, further information was provided about the consequences of climate change or how it will likely affect New Zealand. Furthermore, the 'low fear' message did not contain any emotive language. In contrast, the 'high fear' message included a brief description of climate change followed by a more extensive summary of climate change outcomes including species extinction and increased risk of famine, disease, droughts, flooding, forest fires, heat waves and extreme weather events. These projections were adapted from Climate Central Inc. (2013) and IPCC reports (IPCC, 2014; 2018b). This information regarding extreme consequences was included in the 'high fear' message in order to emphasize the severity of climate change. Emotive language (such as "severe," "serious," "devastating" and "terrible") was also used in the 'high fear' message to manipulate perceptions of severity in a similar fashion to previous EPPM intervention studies (Chen, 2016; Xue et al., 2016). Furthermore, the 'high fear' message included information about the increased risk of flooding, drought and extreme weather in specific regions of New Zealand and the Pacific. This information was adapted from reports produced by NIWA (NIWA, 2011b, 2011a) and the CMEP (2018). New Zealand/Pacific-specific information was included in the 'high fear' message for the purpose of systematically varying perceptions of vulnerability by making climate change appear more personally relevant to the study demographic (i.e. New Zealanders).

The emotive and content discrepancy between the 'high fear' and 'low fear' messages was pilot tested on a small group of individuals (n = 4) who were asked to read copies of the two messages. They were then asked to discern, firstly, which message made climate change appear more serious, and secondly, which message made them feel most vulnerable to the effects of climate change. In this pilot test, all participants identified the 'high fear' message as more persuasive in relation to the seriousness of and their perception of vulnerability to climate change.

The second stage of the information intervention involved the design of two different messages that provided either individual action or collective action recommendations for reducing climate change. Participants randomly received one of these two messages. These messages were designed so that they differed only in the type of actions recommended. To control for unintended variation between the two messages, the recommendations were designed to be of similar length and credibility. The individual action message was 134 words, while the collective action message was 155 words. Full transcripts of these two messages can be found in Appendix B. The recommended individual actions were based on research by Wynes and Nicholas (2017) and included: (1) switching to renewable power, (2) reducing overall consumption of new products, (3) walking, biking and taking public transport, (4) carpooling, (5) reducing air travel, and (6) reducing meat consumption. The recommended collective actions were based on arguments put forth by collective action theorists such as Maniates (2001) McGregor (2014) and Baatz (2014). The collective action recommendations included: (1) participating in protests and petitions, (2) voting for a political party that prioritises climate change, (3) volunteering for a climate change organisation, (4) getting involved in climate change-related community project, (5) boycotting companies and institutions that are worsening climate change, and (6) staying informed about climate change and discussing it often with others.

Both sets of recommended actions were prefaced with a short statement that was designed to enhance participants' perception of response efficacy and collective efficacy. This statement assured people that the following recommended actions were the most effective way of reducing climate change, either as an individual or as a collective (i.e. emphasis was placed on response efficacy). Both messages also contained an appeal to collective efficacy, such as "we must work together," and "together we can make a difference." It was important to ensure that both messages contained similar appeals to response and collective efficacy in order to test if the

inherent efficacy of the action types themselves (individual *vs.* collective) would result in significantly different perceptions of efficacy between the two message groups.

The hypotheses underlying the design of the 'high fear' *vs.* 'low fear' and the 'individual action' *vs.* 'collective action' messages are as follows:

> **H_1:** Providing a fear-based message about climate change will significantly increase people's fear levels and perceptions of severity and vulnerability in relation to climate change compared with providing a more neutral message, as postulated by the EPPM.

> **H_5:** Providing efficacy-enhancing recommendations to participate in collective actions to mitigate climate change will result in higher perceptions of response and collective efficacy compared to providing efficacy-enhancing recommendations to participate in individual actions to mitigate climate change. This is based on the assumption that collective actions are inherently more likely to be perceived as having greater response and collective efficacy potential compared to individual actions (as discussed in Chapter 2).

> **H_2:** The fear-based message intervention will have no overall effect on intentions to adopt individual or collective actions to mitigate climate change. This is based on the reasoning that fear appeals in isolation will not increase intentions and must be combined with adequate efficacy messaging (Maloney et al., 2011; Witte, 1994).

> **H_3:** Among those who receive the efficacy-enhancing message to adopt *individual* actions to mitigate climate change, those who also receive the 'low fear' message will report significantly higher intentions to adopt individual mitigation actions compared with those who received a 'high fear' message. This is based on the assumption that individual actions may be perceived has having low inherent efficacy and should therefore be coupled with a lower fear appeal to prevent activating people's danger control pathways (Maloney et al., 2011; Witte, 1994).

H_4: Conversely, among those who receive the efficacy-enhancing message to adopt *collective* actions to mitigate climate change, those who also receive the 'high fear' message will report significantly higher intentions to participate in collective mitigation actions than those who received a 'low fear' message. This is based on the assumption that collective actions may be perceived as having inherently greater efficacy and can therefore be coupled with a high fear appeal without activating people's danger control pathways (Maloney et al., 2011; Witte, 1994).

The messages were randomly allocated to participants in a 2 x 2 design (as in Figure 3.2 below). Participants received either (1) a 'high fear' or (2) a 'low fear' message, followed by either (1) individual action recommendations, or (2) collective action recommendations. The number of participants who received the 'low fear' message and the individual action recommendations was 88 (25.4 %). A total of 85 participants (24.6 %) received the 'low fear' message and the collective action recommendations. Meanwhile, 87 participants (25.1 %) received the 'high fear' and the individual action recommendations, and 86 (24.9 %) received the 'high-fear' and the collective action recommendations. The difference in message allocation is due to the deletion of some surveys from the final dataset (n = 102) for the reasons outlined in section 3.6 above. Table 3.1 below provides an overview of the 2 x 2 message design.

Table 3.1 Overview of 2 x 2 Message Design

	Neutral Message	**Fear-based Message**
Individual Action Recommendations	*Message One:* Low fear message + Individual action recommendations (n = 88)	*Message Two:* High fear message + Individual action recommendations (n = 87)
Collective Action Recommendations	*Message Three:* Low fear message + Collective action recommendations (n = 85)	*Message Four:* High fear message + Collective action recommendations (n = 86)

To ensure that participants in the four groups were comparable on key characteristics, such as age, education, environmental concern and political values (and check that random assignment had been successful) a Kruskal-Wallis *H* test was performed for each baseline characteristic between the four groups (Table 3.2). Age responses were recoded into categorical variables to perform this test (1 = 18-20 years, 2 = 21-30 years, 3 = 31-40 years, 4 = 41-50 years, 5 = 51-60 years, 6 = 60+ years), as were ethnicity responses (1 = Pākehā, 2 = Māori, 3 = Pākeha/Māori, 4 = Other). As shown in Table 3.2 below, mean rank scores were similar between all four groups for all baseline characteristics. Hence, it was conluded that random allocation of participants to the four treatment groups had been successful.

Table 3.2 Tests for random assignment of participants in intervention groups on several key indicators

Characteristic	*N*	Degrees of freedom	*H* Test Statistic	p value
Age	343	3	3.817	.282
Gender	345	3	.698	.874
Ethnicity	345	3	2.414	.491
Location	345	3	1.149	.765
Occupation	346	3	.038	.998
Qualification	346	3	6.581	.087
Environmental Concern	339	3	5.877	.118
Economic Political Values	342	3	1.223	.748
Social Political Values	342	3	1.366	.714

3.11 Manipulation Checks

Manipulation checks are widely used in modern experimental psychology as a way of testing the validity of a manipulation or treatment variable (Haslam & McGarty, 2014). In other words, they are a way of assessing if the intended manipulation has had the desired effect on participants. The survey included several manipulation check questions immediately following the intervention (i.e. message) section.

3.11.1 Content Manipulation Checks

The first check was a simple attention manipulation check that asked participants what the information they just read was about. As discussed in Section 3.6, respondents who did not select the correct answer ("climate change") were removed from the dataset as it was assumed they had not read the message. A second manipulation check question was used to assess how participants had interpreted the content of the first part of the message (i.e. the 'high fear' *vs.* 'low fear' message). Two of the four possible answers for this question were incorrect as they pertained to the information presented being about nitrogen-run off or ocean dead zones.

Participants who selected one of these two incorrect answers not related to climate change were assumed not to have read the message and were removed from the dataset (n = 6). The remaining two options for this question were: (1) "the message I just read provided information about the greenhouse effect and how this relates to rising average global temperatures," or (2) "the message I just read provided information about how climate change will negatively impact plants, animals and people around the world, including New Zealand." Ideally, those who received the 'low fear' message would have selected the first option and those who received the 'high fear' message would have selected the second option. The majority of respondents (80.3 %) in the 'low fear' message group selected answer (1) above (i.e. the "correct" answer). Meanwhile, 88.4 % of respondents in the 'high fear' message group selected answer (2) above (i.e. the "correct" answer).

To test whether this intended difference in response rates was statistically significant a Pearson Chi-Squared test was run between the 'high fear' and 'low fear' message groups. As shown in tables 3.3 and 3.4 below, the Chi-Squared test revealed a significant difference (p = .001) in response rates to the manipulation question between the 'low fear' and 'high fear' message groups. It was deemed, therefore, that the content of the 'high fear' *vs.*'low fear' messages had been interpreted in the correct way.

Table 3.3 Manipulation check results for 'high fear' *vs.* 'low fear' intervention (Counts)

		Answer (1)*	**Answer (2)****
'High fear' message group (n = 173)	Count	20	153
	Expected count	79.5	93.5
	Residual	-59.5	59.5
'Low fear' message group (n = 173)	Count	139	34
	Expected count	79.5	93.5
	Residual	59.5	-59.5

*Answer (1): "The message I just read provided information about the greenhouse effect and how this relates to average rising global temperature."

**Answer (2): "The message I just read provided information about how climate change will negatively impact plants, animals and people around the world, including New Zealand."

Table 3.4 Manipulation check results for 'high fear' *vs.* 'low fear' intervention (Chi-Squared test)

	Value	Degrees of freedom	Asymptotic significance (2-sided)
Pearson Chi-Squared	164.790*	1	< .001
Continuity Correction	162.032	1	< .001
Likelihood Ratio	182.031	1	< .001

*O cells (0.0 %) have expected count less than 5. The minimum expected count is 79.50. Assumptions for an accurate Chi-Squared test are therefore met (Field, 2000).

A third manipulation question was used to assess how participants had interpreted the content of the second part of the message (i.e. the 'individual action' *vs.* 'collective action' message). Two of the four possible answers for this question were incorrect as they pertained to the information presented being about nitrogen-run off or river pollution. Participants who selected one of these two incorrect answers not related to climate change were assumed not to have read the message and were removed from the dataset (n = 6). The remaining two options for this question were: (1) "the message I just read provided information about simple things I can do as an individual to help reduce climate change," or (2) "the message I just read provided information about how I can work together with others to put pressure on the government and corporations to do something about climate change." Ideally, those who received the 'individual action' message would have selected the first option and those who received the 'collective action' message would have selected the second option.

The majority of respondents (93.7 %) in the 'individual action' message allocation selected answer (1) above (i.e. the "correct" answer). Meanwhile, 52.6 % of respondents in the 'collective action' message allocation selected answer (2) above (i.e. the "correct" answer). To test whether this intended difference in response rates was statistically significant, a Pearson Chi-Squared test was run between the 'individual action' and 'collective action' treatment groups. As shown in tables 3.5 and 3.6 below, the Chi-Squared test revealed a significant difference ($p < .001$) in response rates to the manipulation question between the 'individual action' and 'collective action'

message groups. It was deemed, therefore, that the content of the 'individual action' *vs.* 'collective action' messages had been interpreted in the correct way.

Table 3.5 Manipulation check results for 'individual action' *vs.* 'collective action' message intervention (Counts)

		Answer (1)*	Answer (2)**
'Individual action' message group (n = 175)	Count	164	11
	Expected count	123.9	51.1
	Residual	40.1	-40.1
'Collective action' message group (n = 171)	Count	81	90
	Expected count	121.1	49.9
	Residual	-40.1	40.1

*Answer (1): "The message I just read provided information about simple things I can do as an individual to help reduce climate change."

**Answer (2): "The message I just read provided information about how I can work together with others to put pressure on governments and corporations to do something about climate change."

Table 3.6 Manipulation check results for 'individual action' *vs.* 'collective action' intervention (Chi-Squared test)

	Value	Degrees of freedom	Asymptotic significance (2-sided)
Pearson Chi-Squared	89.876*	1	< .001
Continuity Correction	87.648	1	< .001
Likelihood Ratio	99.117	1	< .001

*O cells (0.0 %) have expected count less than 5. The minimum expected count is 79.50. Assumptions for an accurate Chi-Squared test are therefore met (Field, 2000).

3.11.2 Credibility Manipulation Check

Another manipulation check for perceived credibility was included in the survey. This was done to ensure that the content of the messages was interpreted as credible by participants, since this is a key factor known to influence message acceptance (Craig & McCann, 1978). A total of 5 questions were used to measure credibility. These were all semantic differential scales that asked respondents "on a scale of 1 to 7 the information I just read was: (1) credible, (2) valuable, (3) worthwhile, (4) meaningful, (5) understandable. The internal consistency of the scale was good with an alpha score of $\alpha = 0.92$. As shown in Table 3.7 below the mean credibility score for all four message groups was high at > 5.4 out of 7.

Table 3.7 Mean credibility scores between message interventions

	Message Group 1	**Message Group 2**	**Message Group 3**	**Message Group 4**
Mean Credibility Score ± SD	5.59 ± 1.60	5.66 ± 1.50	5.45 ± 1.63	5.50 ± 1.67

Note: ± SD = ± standard deviation

It was also important to test credibility between the four message treatments to ensure credibility had been successfully controlled for in their design. A one-way ANOVA was conducted between the four message groups to test for any difference in credibility scores. As shown in table 3.8 below, there was no significant difference in mean credibility score between the four treatment groups. Therefore, it was reasoned that credibility between the messages had been adequately controlled for. This result indicates that all four messages were interpreted by respondents as credible sources of information.

Table 3.8 ANOVA Results for credibility score between message intervention groups

	Sum of squares	Degrees of freedom	Mean square	F Statistic	Significance
Credibility Score between message groups (1, 2, 3, 4)	2.051	3	.684	.266	.850

3.12 EPPM Variable Outcome Measures

The first set of outcome variables measured in this study were perceptions of the four main EPPM variables: (1) severity, (2) vulnerability, (3) collective efficacy, and (4) response efficacy. Additionally, a check for fear levels was also conducted. This was done to assess whether the message interventions had succeeded in influencing these variables as intended. As discussed previously, the aim of the manipulation was that those who received the 'high fear' message would report higher levels of fear and greater perceptions of severity and vulnerability compared with those who received the 'low fear' message. Meanwhile, the intention behind the manipulation of the protective action recommendations was that those who received the collective action recommendations would report significantly higher perceptions of response and collective efficacy compared to those who received the individual action recommendations.

Perceptions of severity were measured using a manipulation check question adapted from Chen (2020) that asked participants to rank on a 7-point Likert scale to what extent they agreed with the following statement: "climate change is a serious issue." Overall, the mean score for perceptions of severity was 6.56 ± 1.09 out of 7. Perceptions of vulnerability were measured using a manipulation check question adapted from Hunter and Röös (2016) that asked respondents to rank on a 7-point Likert scale: "how likely is it that you will be affected by climate change?" (1= very likely, 7 = very unlikely). Responses to this question were reverse coded to produce a vulnerability score (1 = low perceptions of vulnerability, 7 = high perceptions of vulnerability). The overall mean vulnerability score was 5.97 ± 1.47 out of 7. Fear levels were measured using a set of two questions adapted from van Zomeren et al., (2010). The question

asked participants to rank of a 7-point Likert scale to what extent they agreed with the following two statements: (1) "I am fearful of the negative future consequences of climate change, and (2) "I am afraid of the negative future consequences of climate change." As was done by van Zomeren et al., (2010), the two fear check questions were combined as a scale to produce an overall fear score. The fear score scale had good internal consistency with an alpha of $\alpha = 0.88$. The overall mean fear score was 6.02 ± 1.17 out of 7.

Perceptions of collective efficacy were measured using three questions adapted from van Zomeren et al., (2010). Participants were asked to respond on a 7-point Likert scale to what extent they agreed with the following statements (1 = "not at all" and 7 = "very much"): (1) "people can jointly prevent the negative consequences of climate change, (2) "individuals can collectively stop the negative consequences of climate change?, and (3) "people can together, through joint effort, achieve the goal of preventing the climate crisis?" As was done by van Zomeren et al. (2010), these three questions were combined into a scale to produce a collective efficacy score. The internal consistency of the collective efficacy scale was good ($\alpha = 0.83$). The mean collective efficacy score overall was 5.43 ± 1.22 out of 7.

The original draft of the survey for this study included a question to measure perceptions of response efficacy. This question was adapted from Hunter and Röös (2016) and asked participants to rate to what extent they agreed with the following statement on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree): "if I follow the recommended actions in the message I just read, the consequences of climate change will decrease." Due to an error, this question was inadvertently left out of the survey when it was launched on 3rd November 2020. As a result, it is not possible to report results for response efficacy. A reflection on the consequences of this missing data is included in the discussion chapter of this thesis.

3.13 Intentions

The main outcome variable was intentions to engage in climate change mitigation behaviours. Ideally, a measure of actual behaviour would be obtained but since this study was conducted as an online survey it was not practical to do so. Several studies within the field of environmental research have demonstrated that measures of intended behaviour can be used to predict actual

behaviour (Kaiser et al., 1999; Nigbur et al., 2010). Of course, there is some limitation to using self-reported intentions as a proxy for actual behaviour since some evidence suggests that people tend to overstate their intentions in relation to their actual behaviour (Barr, 2006; Carrington et al., 2010). Nonetheless, intentions are a widely used outcome measure in EPPM studies since they are more convenient to measure than actual behaviour when dealing with large sample sizes (Chen, 2016; Meijnders et al., 2001; Sarrina Li & Huang, 2020; van Zomeren et al., 2010; Xue et al., 2016). They are considered an acceptable proxy for measuring actual behaviour, provided that limitations in doing this are acknowledged.

Intentions were measured using two sets of six questions. The first set of six questions asked participants about their intentions to engage in individual behaviours to reduce climate change. Participants were asked to rank on a Likert-scale how likely they were to take the following actions in the future: (1) switch to renewable power, (2) reduce overall consumption of new products, (3) walk, bike and take public transport, (4) carpool, (5) reduce air travel, and (6) reduce meat consumption. The format of these questions was adapted from a similar scale developed by Howell et al. (2016). The specific behaviours corresponded with the six individual behaviours that were recommended in the individual action message. These six behaviours were based on research by Wynes and Nicholas (2017) suggesting that they are the most effective for reducing individual carbon footprints. These six questions were used to create a scale for measuring individual action intentions. The individual action scale had an internal consistency of $\alpha = 0.69$. As discussed previously, this is close to being at the acceptable $\alpha = 0.7$. This alpha score may be due to having adapted the original version of the scale (Howell et al., 2016) to include a few additional actions from the study by Wynes and Nicholas (2017). It is not uncommon for internal consistency scales for behavioural intentions to have alpha scores < 0.7, because the behaviours can be diverse. Scales with similar internal consistency have been used to measure environment-related behavioural intentions in previous studies (Whitmarsh & O'Neill, 2010) and are generally considered acceptable.

A second set of six questions was used to measure intentions to engage in collective actions. Participants were asked to rank on a 7-point Likert scale how likely they were to take the following actions in future: (1) participate in protests, (2) sign a petition, (3) vote for a political party that prioritises climate change, (4) volunteer for a climate change organisation, (5) get involved in climate change-related community projects, and (6) boycott companies and

institutions that are worsening climate change. Once again, the wording and structure of the questions were adapted from a similar scale used by Howell et al. (2016). The six behaviours were changed to correspond with the six behaviours recommended in the collective action message. The behaviours were based on ideas put forward by collective action theorists (Baatz, 2014; Maniates, 2001; McGregor, 2014). The six collective action intention questions were used to develop a collective action intention scale. The scale had an good internal consistency of $\alpha = 0.85$.

3.14 Ethical Considerations

Ethics approval for this study was sought via the Human Ethics Committee of Victoria University of Wellington. Ethics approval was granted on 5th October 2020; ethics approval number 0000028592 (see Appendix D). The main ethical considerations for an online survey include consent, anonymity and confidentiality. A question to obtain participant consent was included at the start of the survey. Those who did not provide consent were automatically redirected to the end of the survey. Assurances of anonymity and confidentiality were provided in the information section at the start of the survey (see Appendix A). No personal information was collected in the survey with the exception of participants' email addresses for those who wished to enter the prize draw. Email addresses for this purpose were collected in a separate survey to ensure that they could not be linked to participant responses. All data was aggregated for analysis so that results presented in this thesis cannot be attributed to individuals. All data was kept confidential and was not shared with anyone outside of the researcher and their primary supervisor.

Another important ethical consideration for this study was how to manage the use of deception. Because this was an experimental study, it was necessary to withhold information from participants about the true purpose of the message intervention until after they had finished answering the survey. This deception was important because it ensured participant responses were spontaneous and not influenced by awareness of the intended manipulation. At the end of the survey, participants were provided with a debrief section that informed them of the true purpose and design of the study (see Appendix C). Following this debrief, respondents were given a second opportunity to withdraw consent from participating in the research. Participants who did not provide consent following the debrief were removed from the dataset (n = 14).

3.15 Chapter Summary

This chapter has presented a detailed discussion of the methodological approach taken in this research. A detailed outline of the study structure and design have been provided, alongside some preliminary data analysis. The following chapter will present the results of this study.

Chapter 4: Results

4.1 Introduction

The following chapter will present the results of this thesis. This chapter is organised in accordance with the research questions and the hypotheses outlined at the end of Chapter 2. Research Questions 1 and 2 investigate the effect of the two message interventions on the EPPM variables that were measured post-intervention (fear, severity, vulnerability and collective efficacy). Hypotheses 1 and 2 were tested via a series of one-way ANOVA analyses. Research Questions 3 and 4 look at the effects of the two message interventions on individual action intentions and collective action intentions respectively. These effects were tested via a series of two-way ANCOVA analyses. Lastly, Research Question 5 looks at the relationship between the EPPM variables measured and individual and collective action intentions respectively. Hypothesis 5 was tested via a series of regression analyses.

4.2 Effect of Fear-Based Message Intervention on EPPM Variables

Research Question 1. Does providing a 'high fear' message about climate change increase people's level of fear and perceptions of severity and vulnerability in relation to climate change compared to providing a 'low fear' message?
H_1: Providing a 'high fear' message about climate change will significantly increase fear levels and perceptions of severity and vulnerability in relation to climate change compared to providing a 'low fear' message, as postulated by the EPPM.

The aim of the first part of the message manipulation was to test the effect of a 'high fear' *vs.* 'low fear' message about climate change on intentions to participate in collective *vs.* individual actions to mitigate climate change. The 'high fear' message was purposely designed to enhance fear levels and perceptions of severity and vulnerability in relation to climate change. The aim of the fear message intervention was that people who received the 'high fear' message would report significantly higher levels of fear and higher perceptions of severity and vulnerability compared with those who received the 'low fear' message. Thus, the survey assessed whether the 'high fear'

vs. 'low fear' message intervention had succeeded in systematically varying levels of fear and perceptions of severity and vulnerability.

Fear scores and scores for perception of severity and vulnerability are all measured on a scale from 1 to 7. For all three measures, a score of 1 corresponds with very low levels/perceptions of that factor (i.e. low fear, low severity perceptions, low vulnerability perceptions). Meanwhile, a score of 7 corresponds with very high levels/perceptions of that factor (i.e. high fear, high severity perceptions, high vulnerability perceptions). Mean fear scores and perceptions of severity and vulnerability scores out of 7 were high (> 5.9) for all three variables in both the 'high fear' and 'low fear' message groups, as shown in Table 4.1. Mean scores for fear and perceptions of severity and vulnerability were all slightly higher for those in the 'high fear' message intervention group compared with the 'low fear' message intervention group, as shown below in Table 4.1.

Table 4.1 Mean scores for fear, severity and vulnerability between 'high fear' and 'low fear' message groups

	High Fear Mean ± SD (*n*)	**Low Fear Mean ± SD (*n*)**
1. Fear Score	6.09 ± 1.08 (170)	6.01 ± 1.18 (172)
2. Severity	6.64 ± 0.99 (173)	6.60 ± 0.99 (173)
3. Vulnerability	6.05 ± 1.43 (173)	5.97 ± 1.42 (172)

Note: ± SD = ± standard deviation; *n* = number of responses

A one-way ANOVA test was performed to assess whether the differences in mean scores for fear, severity and vulnerability were statistically significant between the 'high fear' and 'low fear' message intervention groups. Levene's test results demonstrated that assumption of equality of variance was met for all three variables (fear score p = .358; severity score p = .822; vulnerability score p = .976). This was important to determine since ANOVA analyses are considered sensitive to the assumption of equality of variance (Blanca et al., 2017). Scores for all three variables (fear, severity and vulnerability) were found to be non-normally distributed with Kolmogorov-Smirnov test significance values < .001. A one-way ANOVA test for all three variables was proceeded with, since ANOVAs are considered to be relatively robust against the assumption of normality (Blanca et al., 2017).

As shown in Table 4.2 below, a series of one-way ANOVA tests revealed that the mean score for fear, severity and vulnerability was not significantly different between the 'high fear' and 'low fear' message intervention groups ($p = .548$, $p = .665$ and $p = .572$ respectively). This result suggests that the 'high fear' *vs.* 'low fear' message intervention failed to systematically vary fear levels and perceptions of severity and vulnerability, as was intended.

Table 4.2 One-Way ANOVA results for EPPM outcome variable perception scores between 'high fear' and 'low fear' message intervention groups

Outcome Measure	Sum of squares	Degrees of freedom	Mean square	F Statistic	Significance
1. Fear Score	.465	1	.465	.362	.548
2. Severity	.185	1	.185	.187	.665
3. Vulnerability	.651	1	.651	.320	.572

Note: Fear, severity and vulnerability scores were measured on a scale from 1 to 7 (1 = low level/perception of variable, 7 = high level/perception of variable).

4.3 Effect of Recommendation Message Intervention on Efficacy Perceptions

Research Question 2. What effect does providing efficacy recommendations to participate in individual *vs.* collective actions to mitigate climate change have on perceptions of collective efficacy and response efficacy?

H_2: Providing efficacy-enhancing recommendations to participate in collective-level actions to mitigate climate change will result in higher perceptions of response and collective efficacy compared to providing efficacy-enhancing recommendations to participate in individual actions to mitigate climate change. This is based on the assumption that collective actions are inherently more likely to be perceived as having greater response and collective efficacy potential compared to individual actions (as discussed in Chapter 2).

The messages about protective action recommendations (focusing on individual or collective actions) were both designed to enhance perceptions of response and collective efficacy. Collective efficacy was targeted by both messages as previous studies have demonstrated that because climate change is a collective action problem, collective efficacy, as opposed to self-efficacy, is a stronger predictor of climate change reducing behaviours (Chen, 2016; Homburg & Stolberg, 2006; van Zomeren et al., 2010). The hypothesis was that people provided with a message recommending *collective* actions to mitigate climate change would report higher perceptions of response and collective efficacy, compared with people provided with a message recommending *individual* actions to mitigate climate change. This was based on the reasoning that collective actions may be perceived as having inherently greater response and collective efficacy potential compared with individual actions.

Initial inspection of group means showed that those who received the collective action recommendations did have a slightly higher mean collective efficacy score at 5.48 ± 1.25 out of 7 (n = 174) compared with those who received the individual action recommendations at 5.36 ± 1.18 out of 7 (n = 174). A one-way ANOVA was conducted to test whether there was a significant difference in mean collective efficacy score between the two recommendation message interventions. Assumption for equality of variance between the two message groups was met, as demonstrated by a Levene's test sore of p = .399. The assumption of normal distribution was violated in both message groups, but as with previous ANOVAs, it was decided to proceed with the analysis, as ANOVAs are relatively robust to the normality assumption (Blanca et al., 2017). As shown in Table 4.3 below, one-way ANOVA results showed no significant difference in collective efficacy score between those who received individual action recommendations and those who received collective action recommendations. This result, therefore, contradicts Hypothesis 2.

Table 4.3 One-Way ANOVA results for collective efficacy perception scores between individual and collective action recommendation message groups

Outcome Measure	Sum of squares	Degrees of freedom	Mean square	F Statistic	Significance
Collective Efficacy	1.191	1	1.191	.808	.369

Note: Collective efficacy score was measured on a scale from 1 to 7 (1 = low perception of collective efficacy, 7 = high perception of collective efficacy).

Because the question measuring perceptions of response efficacy had been inadvertently left out of the survey, it was not possible to assess whether there was a significant difference in perceptions of response efficacy between the two message groups. This means that this component of the research question cannot be answered. Implications of this will be discussed further in Chapter 5.

4.4 Effect of Message Treatments on Individual Action Intentions

Research Question 3. How do different messages about climate change affect people's intentions to engage in individual actions to reduce climate change? Specifically, a 'high fear' *vs.* 'low fear' message AND individual action recommendations provided *vs.* not provided.

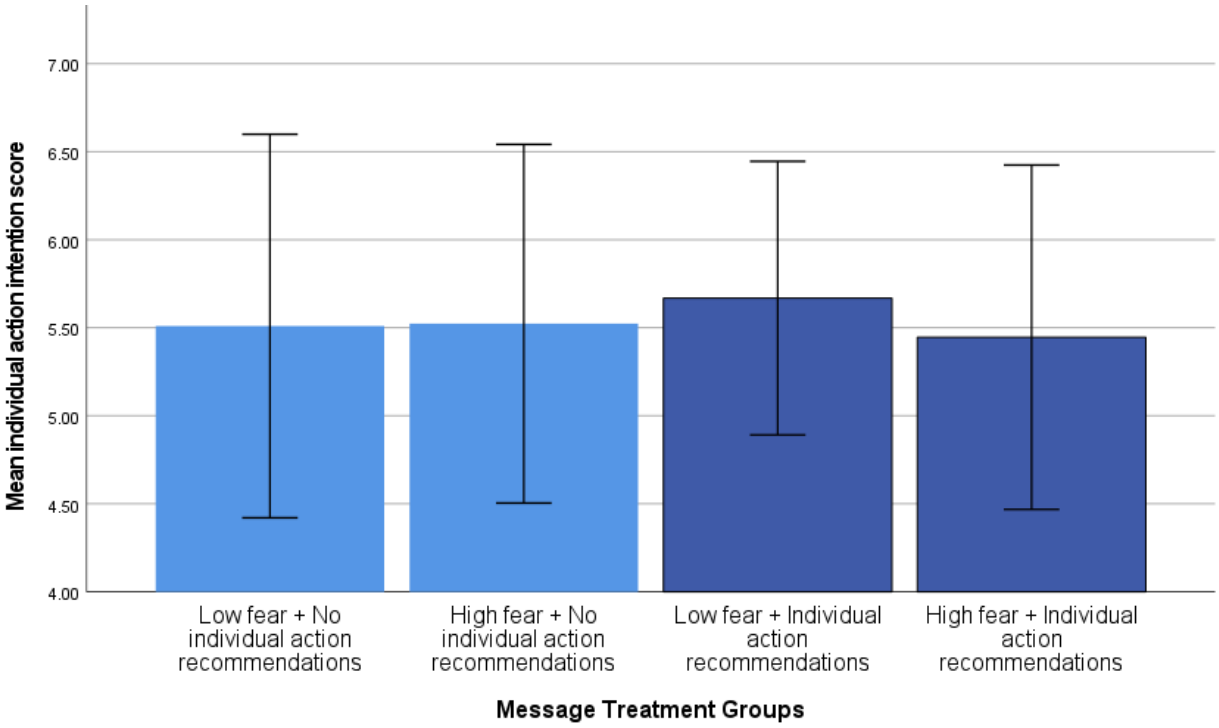
H_{3a}: Providing specific efficacy-enhancing recommendations to engage in individual actions to mitigate climate change will significantly increase people's intentions to engage in these actions compared with those who were not provided these specific recommendations.

H_{3b}: There will be no main overall effect of the 'fear-based' message intervention on individual action intentions. There will, however, be a significant interaction effect between the two message interventions. Among those who *did* receive an efficacy-enhancing message to engage in individual actions, those who also received a 'low fear' message will demonstrate significantly higher intentions to engage in the recommended individual actions compared with those who received a 'high fear' message.

To investigate the effect of the four different message treatments on intentions to engage in individual actions to mitigate climate change, an initial inspection of intervention group means for this outcome variable was conducted. Individual action intention scores were measured using a six-item scale that generated a score between 1 and 7 (1 = low level of intention, 7 = high level of intention). It was hypothesised that those who received no specific efficacy-enhancing recommendations to engage in individual actions would have the lowest mean individual action intention scores. Further, it was hypothesised that among those who *did* receive a specific efficacy message to participate in individual actions, individuals who also received a 'low fear' message about climate change would report significantly higher individual action intentions compared with those who received a 'high fear' message.

Initial inspection of mean individual action intention scores between the four message intervention groups is shown in Figure 4.21 below. As per Hypothesis 3, those who received the individual action recommendations plus the 'low fear' message had the highest mean individual action intention score at 5.67 ± 0.77 out of 7 (n = 88). The two groups who received no individual action recommendations but received a 'low fear' *vs.* a 'high fear' message had very similar mean individual action intention scores of 5.51 ± 1.09 out of 7 (n = 85) and 5.52 ± 1.02 (n = 86), respectively. Meanwhile, those who received the efficacy-enhancing recommendations to adopt individual actions plus the 'high fear' message had the lowest mean individual action intention score of the four message intervention groups at 5.45 ± 0.98 out of 7 (n = 87). This result partially contradicts Hypothesis 3, because it was assumed that those who received efficacy-enhancing recommendations for individual actions would report higher intentions to adopt these actions compared with those who received no efficacy recommendations for individual actions. The mean individual action intention scores for all four treatment groups were relatively high (> 5.4 out of 7).

Figure 4.1 Mean individual action intention scores



Note: Individual action intention scores were measured in a scale from 1 to 7 (1 = very low level of intention, 7 = very high level of intention). Error bars indicate ± 1 standard deviation.

In order to test whether the effect of either of the message interventions on individual action intention scores was statistically significant, a two-way ANCOVA analysis was performed. Firstly, a two-way ANCOVA analysis enables covariates such as environmental concern and political value scores to be controlled for, which are both key predictors of intentions to engage in climate change reducing behaviours (Howell et al., 2016; Kim et al., 2013; Neumayer, 2004; Xue et al., 2016; Zia & Todd, 2010). Secondly, performing a two-way ANCOVA enables a test of the effect of the two message manipulations (i.e. the fear manipulation and the recommendations manipulation) on individual action intentions simultaneously. Finally, a two-way ANCOVA can be used to test whether there is a significant interaction effect between the two message manipulations. Thus, an ANCOVA can help determine whether the effect of one manipulation on intentions is dependent on the effect of the other manipulation.

Relevant data was assessed to check that assumptions for a two-way ANCOVA were met. Firstly, data for the covariates (environmental concern and political affiliations) and the

dependent variable (individual action intention scores) were standardized via conversion to Percent of Maximum Possible (POMP) Scores. POMP Scores are derived by taking the raw score minus the minimum score, divided by the possible scoring range, then multiplied by 100 (Cohen et al., 1999; Fischer & Milfont, 2010). The end result is a score between 1 and 100 that represents percentage of the maximum possible score for that variable. POMP Scores are commonly used as a standardization method in psychological studies where the sample size is too small to allow meaningful comparison between standardized Z-Scores (Fischer & Milfont, 2010). Conversion to POMP scores enabled the covariates and outcomes variables to be treated more readily as continuous, rather than ordinal variables. Standardization of the outcome variable (individual action intention scores) also helped to bring the data closer to being normally distributed compared with the raw data set, as assessed via Q-Q Plots.

Next, the relationship between each of the 3 covariates (environmental concern, economic political score and social political score) and the dependent variable (individual action intention score) was assessed for linearity within each message group. This assessment was done via visual inspection of scatterplots with loess lines. The linearity assumption was met for both environmental concern and economic political score within each message group. Social political score, however, violated the linearity assumption in relation to individual action intention scores within 3 of the 4 message groups. It was therefore decided to exclude social political score as a covariate from the two-way ANCOVA.

Next, homogeneity of regression slopes in relation to the dependent variable for the 2 remaining covariates (environmental concern and economic political score) was assessed. Linear regressions analyses revealed no significant interaction effects for covariate-independent variable relationships between the 4 message groups. It was thus reasoned that the assumption of homogeneity of regressions slopes was met for both environmental concern and economic political score. Next, homoscedasticity of the covariate-dependent variable relationship for both environmental concern and economic political score within each cell of the study design was assessed. This was done by visually inspecting scatterplots of the studentized residuals against the predicted values with linear fit lines. The assumption of homoscedasticity for both covariates within each of the four message groups was deemed to have been met.

Levene's test results demonstrated that the assumption of equality of variance between the four message groups was met (p = .067). As mentioned above, conversion of the dependent variable data to POMP Scores served to bring the data closer to a normal distribution. Normality of data for the dependent variable (individual action intention score) was still violated, however, within each of the four message groups, with Kolmogorov-Smirnov and Shapiro-Wilks values > 0.05 in each case. It was decided to proceed with the two-way ANCOVA despite this violation of normality since ANOVAs are considered relatively robust to this assumption (Blanca et al., 2017). Stem and leaf plots were also used to identify a total of 8 outliers for individual action intention score. These outliers where retained for the final analysis, because removing them made little difference to the results.

Table 4.4 Two-way ANCOVA results for difference in individual action intention scores between message interventions

Variables	Type III sum of squares	Degrees of freedom	Mean square	F statistic	Significance
Intercept	3721.037	1	3721.037	17.565	.051
Covariates					
Environmental concern	11162.794	1	11162.794	52.693	< .001**
Economic political values	150.397	1	150.397	.710	.400
Independent variables: message interventions					
Fear message intervention	76.520	1	76.520	.361	.548
Recommendation message intervention	33.029	1	33.029	.156	.693
Interaction effect between message interventions					
Fear message intervention * recommendation message intervention	337.456	1	337.456	1.593	.208

Note: Environmental Concern, Economic Political Score and Individual Action Intention Score were all measured using Percentage of Maximum Percentage (POMP) Scores between 1 and 100. Both message interventions were coded as dichotomous dummy variables (High fear message = 1, Low fear message = 2; and Individual Action Recommendations provided = 1, not provided = 2).
*p < .05 | ** p < .01

Results for the two-way ANCOVA for difference in individual action intention score between message intervention groups are presented in Table 4.4 above. As expected, based on previous research, pre-existing level of environmental concern was significantly related to individual action intention scores ($p < .001$). Contrary to existing research, however, economic political score was not significantly related to individual action intention scores ($p = .400$). There was no significant main effect of the individual action recommendations (provided *vs.* not provided) on individual action intentions ($p = .693$). Therefore, contrary to Hypothesis 3a, when people were provided with specific recommendations to participate in individual actions this was not associated with significant differences in their intentions to participate in these actions, when compared with people who received no specific recommendations to participate in these actions. Thus, the efficacy-enhancing message to engage in individual actions, when compared with no efficacy-enhancing message, did not significantly increase people's intentions to participate in these actions.

As hypothesised, there was no significant main effect of the 'high fear' *vs.* the 'low fear' message intervention on individual action intentions ($p = .548$). There was also no significant interaction effect between the two message interventions for individual action intentions ($p = .208$). Therefore, contrary to Hypothesis 4b, there was no significant effect for the fear-based message manipulation among those who received the individual action recommendations. Thus, the 'low fear' message did not significantly increase individual action intentions compared to the 'high fear' message among those who also received efficacy-enhancing recommendations for these actions, as was hypothesised. This result may be partially explained by the fact that the fear-based message intervention did not succeed in systematically varying fear levels or perceptions of severity and vulnerability, as presented previously in Section 4.2.

4.5 Effect of Message Treatments on Collective Action Intentions

Research Question 4. How do different messages about climate change affect people's intentions to engage in collective actions to reduce climate change? Specifically, a 'high fear' *vs.* 'low fear' message AND collective action recommendations provided *vs.* not provided.

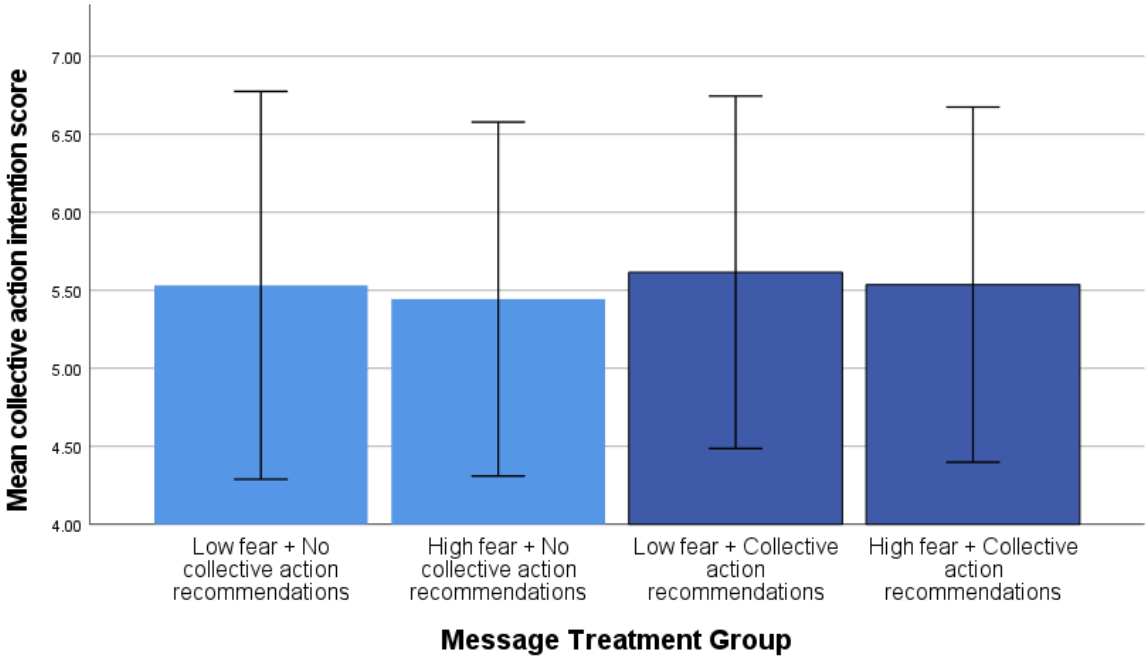
H_{4a}: Providing specific efficacy-enhancing recommendations to engage in collective actions to mitigate climate change will significantly increase people's intentions to engage in these actions compared with those who were not provided these specific recommendations.

H_{4b}: There will be no main overall effect of the 'fear-based' message intervention on collective action intentions. There will, however, be a significant interaction effect between the two message interventions. Among those who received efficacy recommendations to engage in collective actions, those who also received a 'high fear' message about climate change will demonstrate significantly higher intentions to engage in the recommended collective actions compared with those who receive a 'low fear' message about climate change.

To investigate the effect of the four different message interventions on intentions to participate in collective actions to reduce climate change, a similar analysis was conducted as for Research Question 3. It was hypothesised that those who received no specific recommendations to participate in collective actions (i.e. efficacy message) would have the lowest mean collective action intention scores. Furthermore, it was hypothesised that among those who *did* receive a specific efficacy message to engage in collective action, those who also received a 'high fear' message about climate change would report significantly higher intentions to engage in collective actions to reduce climate change compared with those who received a 'low fear' message.

Mean collective action intention scores between the four message intervention groups are presented in Figure 4.2 below. Contrary to Hypothesis 4, those who received the collective action recommendations plus the 'low fear' message had the highest mean collective action intention score at 5.62 ± 1.13 (n = 85) out of 7. The mean collective action score for those who received no collective action recommendations plus the 'low fear' message and for those who received the collective action recommendations plus the 'high fear' message were very similar at 5.53 ± 1.24 (n = 88) and 5.54 ± 1.14 (n = 86) out of 7, respectively. Those who received no collective action recommendations plus the 'high fear' message had the lowest mean collective action score at 5.44 ± 1.13 (n = 87) out of 7. Overall, the mean collective action intention scores for all four message groups was relatively high (> 5.4 out of 7).

Figure 4.2 Mean collective action intention scores



In order to assess if the effect of either of the two message interventions on collective action intentions was statistically significant, a two-way ANCOVA was conducted. The procedure for this two-way ANCOVA was the same as for Research Question 3 in the previous section, except that in this case collective action intention score was the dependent variable. Environmental concern and political affiliation measures were used as covariates, since previous research has demonstrated these are key predictors of intentions to engage in climate change reducing behaviours (Howell et al., 2016; Neumayer, 2004; Xue et al., 2016). The assumption of linearity was met for each of the 3 covariates (environmental concern, economic political score and social political score) and the dependent variable (collective action intention) within each of the four message intervention groups. The assumption of homogeneity of regression slopes between each of the 3 covariates and collective action intentions was found to have been met via assessment of interaction effects in a series of linear regression analyses.

Homoscedasticity for the relationship between each covariate and the dependent variable was also acceptable, as per visual assessment of studentized residuals *vs.* predicted value scatterplots. Assumption of equality of variance between the four message intervention groups was met with

a Levene's test score of p = .464. As for the previous research question, conversion of collective action intention scores to POMP Scores improved the normal distrubtion of the data. The assumption of normality was, however, still violated within each of the four message groups. The two-way ANCOVA was still proceeded with based on evidence that ANOVAs are fairly robust to violation of normality assumptions (Blanca et al., 2017). A total of 8 outliers were also retained for final analysis, as their removal did not significantly alter the results.

Table 4.5 Two-way ANCOVA results for difference in collective action intention scores between message interventions

Variables	Type III sum of squares	Degrees of freedom	Mean square	F statistic	Significance
Intercept	.350	1	.350	.001	.971
Covariates					
Environmental concern	12810.841	1	12810.841	48.043	< .001**
Economic political values	1912.433	1	1912.433	7.172	.008**
Social political values	835.535	1	835.535	3.133	.078
Independent variables: message interventions					
Fear message intervention	3.577	1	3.577	.013	.908
Recommendation message intervention	1108.429	1	1108.429	4.157	.042*
Interaction effect between message interventions					
Fear message treatment * recommendation message treatment	26.604	1	. 26.604	.100	.752

Note: Environmental Concern, Economic Political Score and Collective Action Intention Score were all measured using Percentage of Maximum Percentage (POMP) Scores between 1 and 100. Both message interventions were coded as dichotomous dummy variables (Fear message = 1, Neutral message = 2; and Collective Action Recommendations provided = 1, not provided = 2).
*p < .05 | ** p < .01

Both environmental concern and economic political scores were significant predictors of collective action intention score (p < .001 and p = .008 respectively), as shown in Table 4.5

above. This finding is consistent with previous research demonstrating that higher levels of pre-existing environmental concern and more left-wing economic political values are significantly and positively associated with collective action intentions. However, contrary to previous research, social political value score was not significantly associated with collective action intentions (p = .078). Notably, a significant main effect (p = .042) was observed for the recommendation message intervention in relation to collective action intentions. The mean collective action intention score for those who received efficacy-enhancing recommendations to participate in collective actions was significantly higher than for those who did not receive the efficacy-enhancing collective action recommendations (as shown in Table 4.6 below). This result confirms Hypothesis 4a.

Table 4.6 Mean collective action intention score for individual *vs*. collective recommendation message intervention groups

Individual Recommendation Message Group Mean ± SD	Collective Recommendation Message Group Mean ± SD
5.49 ± 1.19	5.58 ± 1.13

Note: ± SD = ± standard deviation

As hypothesised, there was no significant main effect (p = .908) of the fear-based message intervention on collective action intentions. This means that there was no significant difference in collective action intention scores between those who received the 'high fear' *vs*. the 'low fear' message. Contrary to Hypothesis 5b, however, there was also no significant interaction effect (p = .752) of the message interventions on collective action intentions. This means that, contrarty to the hypothesis, those who received the efficacy-enhancing recommendations to participate in collective actions and the 'high fear' message did report significantly higher collective action intentions compared with people who had seen the 'low fear' message. Once again, this result may be partially explained by the fact that the 'fear-based' message manipulation failed to systematically vary fear levels and perceptions of severity and vulnerability, as presented in Section 4.2 above.

4.6 Relationship Between EPPM Variables and Intentions

Research Question 5. Are the EPPM variables significant positive predictors of intentions to participate in both individual and collective actions to reduce climate change?

H_{5a}: As postulated by the EPPM, fear levels and perceptions of severity, vulnerability and efficacy in relation to climate change will be significant positive predictors of intentions to engage in both individual and collective actions to reduce climate change.

H_{5b}: Efficacy perceptions will be similarly significant positive predictors of intentions to engage in collective *vs.* individual actions to mitigate climate change. Meanwhile, perceptions of severity and vulnerability will be stronger predictors of intentions to participate in collective actions compared with individual actions. This is based on the assumption that a low appeal to fear may be more effective for motivating individual actions, while a high fear appeal many be more effective for motivating collective actions.

The purpose of this Research Question is to look directly at the relationship between perceptions of the EPPM variables measured in this study and both individual and collective action intentions. This was done by performing regressional analyses that also controlled for the 3 covarirables measured in this study (environmental concern, economic political values and social political values), as well as the effect of the experimental message interventions. Thus, the regression analyses demonstrated, after controlling for other factors, to what extent severity, vulnerability and collective efficacy predict both individual and collective action intentions.

4.6.1 Individual Action Intentions

Firstly, a regression analysis was conducted to investigate the relationship between the EPPM variables and individual action intentions. The hypothesis was that efficacy perceptions *would* significantly predict individual action intentions. Further, it was hypothesised that threat perceptions (severity and vulnerability) would significantly predict individual action intentions, but to a lesser extent than for collective actions. Before proceeding, data was tested to ensure that assumptions for a regression analysis were met. Data for all variables in the regression were standardized from 7-point Likert scores to POMP Scores for this analysis. This standardization enables the variables to be more readily treated as continuous variables. The assumption of linearity for met for each of the variables included in the regression, as assessed by scatterplots with loess lines. All outliers were retained in the final analysis, as their removal was not found to

significantly alter the results. The assumption of multicollinearity was not violated as demonstrated by variance inflation factor (VIF) values < 4 for each of the variables in the model. The assumption of homoscedasticity was met for each variable, as assessed by visually inspecting scatterplots of studentized residuals against predicted values. Studentized residuals for all variables, however, violated the normal distribution assumption. The regression analysis was proceeded with despite this violation of normality, as regressions are considered fairly insensitive to this assumption (Weisberg, 2014).

Table 4.7 Results of regression analysis for EPPM variables as predictors of individual action intentions

	Independent Variable	*N*	R^2 Δ	B	t	p-value
Covariates	Environmental Concern			.294	4.428	< .001***
	Economic Political Score			.085	1.450	.148
	Social Political Score			.006	.110	.913
Message Interventions	Fear-based Message			.045	.918	.359
	Action Recommendations			-.004	-.073	.942
EPPM Variables	Severity			.136	2.468	.014*
	Vulnerability			-.009	-.173	.863
	Collective Efficacy			.174	3.389	.001**
Model Summary		342	.237			

Note: *N* is number of participants, B is Standardized Coefficients Beta. All independent variables were converted to POMP Scores for this analysis, measured on a scale from 1 to 100.
*p < .05 | ** p < .01 | *** p < .001

As expected based on previous research, environmental concern was a significant positive predictor of individual action intentions (p < .001). Economic and social political scores did not significantly predict individual action intentions, as shown in Table 4.7 above. This was contrary to the assumption that political affiliation is a significant predictor of climate change related intentions. Furthermore, neither of the experimental message manipulation signficiantly predicted individual action intentions, which was to be expected based on the findings discussed in earlier sections of this chapter. As hypothesised, perceptions of collective efficacy significantly

predicted individual action intention scores ($p < .001$). This finding confirms Hypothesis 5. As anticipated, severity also significantly predicted individual actions intentions ($p = .014$). Meanwhile, perceptions of vulnerability did not significantly predict individual action intention scores ($p = .863$), which contradicts the hypothesis. Overall, the total regression model explained 23.7 % of the variance in individual actions scores.

4.6.2 Collective Action Intentions

To investigate the relationship between the EEPM variables and collective action intentions, a second regression analysis was performed. The same procedure was followed as for individual action intentions. The regression model included the 3 covariates (environmental concern, economic political values and social political values), both message interventions (fear-based and action reccommendations) and the 3 EPPM variables measured (severity, vulnerability and collective efficacy). Data was assessed for assumptions before proceeding with the regression analysis. Data for all variables were converted to POMP scores for the same reasons as discussed previously. Assumptions of linearity for all variables was met, as was homoscedasticity and multicollinearity. Outliers were retained since their exclusion did not significantly change the results. The normality assumption was violated for all variables in the regression. As this is considered one of the least important assumptions for regressions, the analysis was conducted despite these violations of normality (Weisberg, 2014). Conversion of all variables to POMP Scores did also help to bring distributions closer to normality.

Table 4.8 Results of regression analysis for EPPM variables as predictors of collective action intentions

	Independent Variable	*N*	R^2 Δ	B	t	p-value
Covariates	Environmental Concern			.223	3.737	< .001***
	Economic Political Score			.184	3.498	.001**
	Social Political Score			.130	2.484	.013*
Message Interventions	Fear-based Message			.003	.756	.450
	Action Recommendations			.073	1.646	.101
EPPM Variables	Severity			.141	2.848	.005**
	Vulnerability			.078	1.715	.087
	Collective Efficacy			.131	2.501	< .001***
Model Summary		342	.382			

Note: *N* is number of participants, B is Standardized Coefficients Beta. All independent variables were converted to POMP Scores for this analysis, measured on a scale from 1 to 100.
*p < .05 | ** p < .01 | *** p < .001

As expected based on previous research, environmental concern, economic political score and social political score were all significant predictors of collective action intetnions (p < .001, p = .001 and p = .013 respectively). As expected based on findings from previous sections of this chapter, the effect of the 'fear-based' message intervention did not add significantly to the regression model, as shown in Table 4.8 above. The regression results also indicate that the action recommendations message intervention did not significantly predict collective action intentions when the effect of threat and collective efficacy perceptions are controlled for. As hypothesised, collective efficacy was a significant positive predictor of collective action intentions (p < .001). As for individual actions, vulnerability was not found to be a significant positive predictor of collective action intentions (p = .087). Meanwhile, severity *did* significantly predict collective action intentions, as hypothesised (p = .005). Overall the regression model explained 38.2 % of the variance in collective action intentions.

4.6.3 Individual Compared with Collective Action Intentions

The results presented above confirm the hypothesis that threat perceptions would be more strongly associated with collective action intentions compared with individual action intentions. Severity was more strongly associated with collective action intentions ($p = .005$) compared with individual action intentions ($p = .014$). Although vulnerability was not a significant predictor of either individual or collective action intentions, this variable was still more strongly associated with collective action intentions ($p = .087$) than it was with individual action intentions ($p = .863$). Overall, the regression model (including covariates, the message interventions and the EPPM variables) explained a larger percentage of the variance in collective action intentions (38.2 %) compared with individual action intentions (23.7 %).

4.7 Results Summary

Table 4.9 Research Questions and Results Summary

Research Question 1. Does providing a 'high fear' message about climate change increase people's level of fear and perceptions of severity and vulnerability in relation to climate change compared to providing a 'low fear' message?
Contrary to Hypothesis 1, those who received the 'high fear' message did not report significantly higher levels of fear, or higher perceptions of severity or vulnerability compared with those who received the 'low fear' message. It was therefore assumed that the fear-based message manipulation had been unsuccessful.
Research Question 2. What effect does providing efficacy recommendations to participate in individual *vs*. collective actions to mitigate climate change have on perceptions of collective efficacy?
Contrary to Hypothesis 2, the efficacy-enhancing collective action recommendations did not significantly increase perceptions of collective efficacy compared with the efficacy-enhancing individual action recommendations. This suggests that collective action recommendations do not necessarily inherently elicit stronger perceptions of collective efficacy compared with individual actions. Meanwhile, it was not possible to determine if there was a difference in response efficacy perceptions between the two action recommendation groups due to missing data.

Research Question 3. How do different messages about climate change affect people's intentions to engage in individual actions to reduce climate change? Specifically, a 'high fear' *vs*. 'low fear' message AND individual action recommendations provided *vs*. not provided.

Contrary to Hypothesis 4a, there was no main effect found for the individual action recommendations provided *vs*. not provided message intervention on individual action intentions after controlling for environmental concern and political affiliation. In accordance with Hypothesis 4b there was no main effect found for the 'high fear' *vs*. 'low fear' message intervention after controlling for environmental concern and political affiliation.

Contrary to Hypothesis 4b, however, there was no interaction effect found between the two message interventions for individual action intentions. This means the 'low fear' message did not significantly increase individual action intentions compared with the 'high fear' message among those who also received the efficacy-enhancing recommendations, as hypothesised. This may be explained, however, by the fact that the 'fear-based' message intervention failed to systematically vary levels of fear or perceptions of severity and vulnerability as demonstrated by Research Question 2 results.

Research Question 4. How do different messages about climate change affect people's intentions to engage in collective actions to reduce climate change? Specifically, a 'high fear' *vs*. 'low fear' message AND collective action recommendations provided *vs*. not provided.

In accordance with Hypothesis 5a, there was main effect observed for the provision of recommendations to participate in collective action provided *vs*. not provided after controlling for environmental concern and political affiliation. As expected, those who received the collective action recommendations message reported significantly higher collective action intentions compared with those who did not receive the collective action recommendations.

In accordance with Hypothesis 5b, there was no main effect found for the 'high fear' *vs*. 'low fear' message intervention. Contrary to Hypothesis 5b, however, there was also no interaction effect observed between the two message interventions. This means the 'high fear' message did not significantly increase collective action intentions compared with the 'low fear' message among those who also received the collective action efficacy-enhancing recommendations, as hypothesised. This may, however, be explained by the fact that the 'fear-based' message intervention failed to systematically vary fear levels or perceptions of severity and vulnerability as demonstrated by results for Research Question 2.

Research Question 5. Are the EPPM variables significant positive predictors of intentions to participate in both individual and collective actions to reduce climate change?

As hypothesised, both severity and collective efficacy were significant positive predictors of both individual and collective action intentions when environmental concern and political affiliation and the message intervetions were controlled for. Contrary to Hypothesis 5, vulnerability perceptions did not significantly predict either individual or collective action intentions after controlling for other factors.

As predicted, perceptions of both severity and vulnerability were more strongly associated with collective action intentions than with individual action intentions. Overall the regression model explained a higher percentage of the variance (38.2 %) in collective action intentions compared with individual action intentions (23.7 %).

Chapter 5: Discussion

"…Actions that reduce greenhouse gas emissions must be taken by individuals, communities, cities, states, residents of entire nations, and the world."

~ Elinor Ostrom, Interview for *The New Humanitarian*, April 2012 ~

5.1 Introduction

As expressed by Elinor Ostrom in the quote above, efforts to mitigate climate change are urgently required on many different levels, including at the individual, community and policy level (The New Humanitarian, 2012). This study explored how the use of fear appeals might be applied to more effectively motivate collective and individual actions to mitigate climate change. In doing so, this research fills an important gap in the literature because thus far, studies do not seem to have investigated whether the EPPM framework may be best applied to motivating individual and collective actions in different ways. More specifically, to the best of my knowledge, research has yet to test whether a 'high-fear'/'high-efficacy' message is most effective for increasing collective action intnetions, while a 'low-fear'/'high-efficacy' message is most effective for increasing individual action intentions. Furthermore, based on the literature search conducted for this thesis, there have yet to be any studies applying the EPPM as a framework for motivating climate change-related behaviours in the context of Aotearoa/New Zealand. Given Aotearoa's high per capita emissions profile and the government's recent commitment to reach net zero GHG emissions by 2050, research that helps to improve climate change engagement in the New Zealand context is much needed.

This discussion chapter considers the findings from this research in more depth. The study findings will be compared with other relevant research where possible. I will then outline the limitations of this study and directions for future research. The chapter concludes with an overview of the study findings and their implications for climate change communicators.

5.2 Fear-Based Message Manipulation

As discussed previously, one of the experimental message manipulations conducted in this study was intended to systematically vary participant levels of fear and perceptions of severity and vulnerability in relation to climate change. This was done by randomising participants to receive either a 'high fear' or a 'low fear' climate change message. The hypothesis was that participants who received the 'high fear' message compared with the 'low fear' message would subsequently report significantly higher fear levels and higher perceptions of severity and vulnerability. As demonstrated in Section 4.2 of the Results Chapter, the 'fear-based' experimental manipulation failed to significantly manipulate fear, severity or vulnerability. There was no significant difference in mean scores for any three of these outcome variables between the 'high fear' and 'low fear' message groups.

This result can partly be explained by examining the manipulation checks. Participants understood that the 'high fear' message was about how climate change will negatively impact New Zealand, which suggests that the differences in content between the 'high fear' and 'low fear' messages were interpreted as intended by participants. The fear-based message manipulation, however, failed to generate a significant difference in subsequent reported fear levels and perceptions of severity and vulnerability. One reason for this may be that the differences in emotive language and content between the two messages was simply not sufficient to elicit a significant difference in fear response or perceptions of severity or vulnerability. As described in Chapter 3, the messages underwent a brief, informal pilot test. Thus, the messages may have benefited from a more rigorous pilot testing process, such as a formal focus group assessment or short preliminary online survey. Similar piloting procedures have been used, for instance, in Rogers' early PMT experiments when designing 'high-fear' *vs.* 'low fear' messages (Maddux & Rogers, 1983; Rogers, 1975). Time and resource constraints prevented a more in-depth pilot of the messages from being undertaken in the present study. More rigorous piloting and feedback could have been used to edit the messages so that the content and emotive difference between the two was more pronounced.

The impact of the messages on fear, severity and vulnerability were probably limited by the fact that they were text-only. Several similar studies have successfully manipulated levels of fear,

severity and vulnerability through the use of documentary footage (van Zomeren et al., 2010; Xue et al., 2016) or graphic images of climate change (Chen, 2016). Research suggests that visual stimuli (e.g., still images and film) typically produce higher levels of engagement with presented information compared with text-alone (Joffe, 2008; Li & Xie, 2020; Roberts, 2018). This may be partly to do with images being indexical, meaning they are viewed as a version of reality and thus closer to "speaking the truth" than textual information (O'Neill & Smith, 2014). According to Leiserowitz (2006), images are also more likely to activate the so-called "experiential" processing system associated with shaping emotions. Text information, on the other hand, may be interpreted more readily via the "cognitive processing system" associated with logic and abstract analysis (Leiserowitz, 2006). Given that fear is a state of emotion and severity and vulnerability perceptions theoretically moderated via fear within the EPPM framework, it is highly possible that the addition of visual images to the fear-based message manipulation could have enhanced the effect of the message manipulation on fear levels and perceptions of the PMT/EEPM variables. Further exploring the use of visual images in fear appeal messages related to climate change may be a promising avenue for future research in this area.

It is also important to consider the context in which the present study was conducted. The survey was open between 3rd November 2020 and March 30th 2021. The year 2020 was an unprecedented year for the global community with the outbreak of the COVID-19 pandemic resulting in 3.9 million deaths globally to date (Worldometer, 2021a). Due to New Zealand's rapid, early response to place the country in lockdown in March-April 2020, life in Aotearoa had more or less returned to business-as-usual by the end of 2020. There was, however, a small community outbreak that prompted a temporary lockdown in Auckland between 14th-24th February 2021 (i.e. during the period the survey was open). Although New Zealand was less affected by COVID-19 compared with many other parts of the world, the pandemic still dominated New Zealand's media and public attention between late 2020 and early 2021. Weber (2006) has proposed the Finite Pool of Worry (FPW) Theory, which postulates that humans may have a finite capacity to pay attention to, and worry about, frightening global phenomenon, such as climate change. It has been argued, for example, that concern about climate change dipped in the 2008-2009 period, possibly because people's attention and concern had been diverted towards the global recession (Whitmarsh, 2011). It is possible, therefore, that in the context of the present study, respondent's capacity to pay attention to and respond emotionally to a frightening message about climate change was somewhat limited due to recent and frequent exposure to similarly worrying messages regarding COVID-19. It is possible this may have

constrained the extent to which the fear based message intervention was able to influence fear levels.

Contrary to the hypothesis, participants who read the individual action recommendations as well as the 'low fear' message did not report significantly higher intentions to participate in individual action compared with those presented with a 'high fear' message. Similarly, the study results also failed to confirm the hypothesis that individuals who read the collective action recommendations combined with a 'high fear' appeal would report significantly higher intentions to participate in collective actions compared with those presented with a 'low fear' appeal. This finding is not surprising, however, given that the 'high fear' *vs.* 'low fear' messages failed to systematically vary reported fear levels or perceptions of severity or vulnerability. As per the EPPM, these variables are assumed to be associated with intentions (Maloney et al., 2011; Witte, 1994). Thus, the failure of the fear-based message intervention to affect intentions may be explained by the fact that fear, severity and vulnerability were also not affected. The 'high fear' and 'low fear' messages may not have been substantially different enough to elicit a significant difference in fear or severity or vulnerability perceptions. This presents an important opportunity for future research. It would be beneficial to conduct a similar study where the 'high fear' *vs.* 'low fear' message was more rigorously pilot tested. It may also be good to explore whether incorporating images into these messages would result in successfully varing levels of perceived fear, severity and vulnerability.

5.3 Action Recommendations Message Manipulation

Contrary to Hypothesis 2, there was no significant difference in reported perceptions of collective efficacy for those who received the collective action recommendations compared with those who received the individual action recommendations. This finding does not support the assumption that collective actions would be inherently associated with a greater sense of collective efficacy compared with individual actions, as discussed in Chapter 2. This may have been partially to do with the way the questions measuring collective efficacy were worded. As outlined in Chapter 3, the collective efficacy questions asked participants to respond on a 7-point Likert scale to what extent they agreed with the following statements (1 = "not at all" and 7 = "very much"): (1) "people can jointly prevent the negative consequences of climate change, (2) "individuals can collectively stop the negative consequences of climate change?, and (3) "people can together, through joint effort, achieve the goal of preventing the climate crisis?" This

wording was chosen based on an established scale developed by van Zomeren et al. (2010). The problem with these statements is that they arguably measure perception of collective efficacy in a general sense and do not ask respondents to relate this perception of collective efficacy to the specific recommendations they had read. The collective efficacy questions could have benefited from being prefaced with a statement such as: "Based on the recommended actions in the message I just read, to what extent do you agree with the following statements…" This would have made the collective efficacy measure a more direct measure of people's perceptions of the variable in relation to the specific recommendations they were provided. It could, therefore, be a promising avenue for future research to measure people's perception of collective efficacy with more direct relation to individual and collective actions. Furthermore, it would also be worthwhile for future research to explore whether messages designed to motivate individual *vs.* collective actions is associated with a significant difference in perceptions of response efficacy. As discussed, it was not possible to assess data for response efficacy in the present study due to an error in the contents of the survey.

The present study found that when people were provided with specific recommendations to participate in individual actions (*vs.* providing recommendations for collective actions) did not significantly affect participant individual action intentions. In contrast, people who were provided with specific recommendations to participate in collective actions (*vs.* recommendations for individual actions) *did* significantly increase collective action intentions. This was contrary to the hypothesis that the recommendations provided by the message intervention would affect both collective and individual action intentions. The difference in mean collective action intention scores was not large overall between the two message groups (the collective action intention mean for the 'collective action' message group was only slightly higher at 5.58 ± 1.13 out of 7 compared with 5.49 ± 1.19 out of 7 for the 'individual action' message group). This difference was, however, found to be statistically significant when controlling for environmental concern and political values. Since the collective *vs.* individual recommendation messages did not systematically vary perceptions of collective efficacy, the difference may be due to some other factor. It is possible that the collective action message elicited higher perceptions of response efficacy, which led people to report higher collective action intentions compared with those who received the individual action recommendations. Since response efficacy was not measured, however, it is inappropriate to draw any further conclusions about this.

It is also possible that the 'individual *vs.* collective' recommendations intervention had an effect on collective action intentions but not individual action intentions due to an unintended 'novelty' effect. Outside the context of experimental studies, a focus on individual consumer behaviours is common in mainstream climate change communication. Checklists promoting daily behaviour changes like "drive less" and "recycle more" are frequently promoted by environmental organisations (Greenpeace, 2012; WWF, n.d.), social media influencers (Going Zero Waste, 2018) and mainstream media outlets (Holth, 2017). Government campaigns have similarly promoted individual actions to mitigate climate change. In 2007, for example, the New Zealand Government launched the "Household Sustainability Campaign" encouraging New Zealanders to reduce household waste, water and energy use (Ministry for the Envrionment, 2009). Because individual behaviours are commonly promoted, it is possible that people have become somewhat desensitised to hearing these recommendations. By comparison, collective actions are typically promoted less frequently in the media and by environmental campaigns (Kent, 2009). Thus, it is possible that exposure to the collective action message may have been more of a novelty and therefore significantly increased people's collective action intentions. Meanwhile, exposure to the individual action message may have presented as less novel, and therefore had no significant effect on increasing individual action intentions. As the result of the external media and information environment, it is difficult to control for this potential novelty effect when comparing individual and collective action recommendations. It is worth, however, bearing in mind for future research regarding the communication of collective mitigation actions.

In the 2 x 2 study design the individual action *vs.* collective action messages were intended to act as a form of control for one another. This was not ideal, however, because it did not provide a 'true' control group. It is possible that being exposed to the efficacy message about either type of action increased people's overall intentions to take mitigation action. More precisely, receiving a message encouraging individual actions may have inadvertently increased collective action intentions more so than if participants had received no efficacy message at all. Conversely, receiving a message encouraging collective actions may also have inadvertently increased individual action intentions compared with no efficacy message. The study design, therefore, could have benefited from the inclusion of a 'true' control message for the efficacy message intervention. It would have been ideal to perform a 2 x 3 intervention where participants were randomly assigned to receive either: (1) efficacy-enhancing individual action recommendations, (2) efficacy-enhancing collective action recommendations, or (3) a control message containing no efficacy enhancement and no specific recommendations. This design would have allowed for a

comparison between each of type of recommendations (individual and collective) and a true control group who received no efficacy message. Because of time and resource constraints it was decided not to perform a 2 x 3 design because this would have increased the number of message groups from 4 to 6 and therefore required a larger sample size. If the present study were to be replicated, it would be ideal to obtain a larger sample size ($n > 800$) and include a control group who receive no efficacy message. This would ensure a more robust study design and allow for stronger conclusions to be drawn about the effect of efficacy messaging on individual *vs.* collective action intentions.

5.4 EPPM Variables as Predictors of Individual and Collective Action Intentions

To the best of my knowledge, this is the first study to examine the EPPM variables as predictors of collective mitigation actions as well as individual actions. Previous research has suggested that threat perceptions are weaker predictors compared with efficacy perceptions for actions such as reducing meat consumption (Hunter & Röös, 2016) and adopting EVs (Bockarjova & Steg, 2014). The hypothesis for the present study was that efficacy perceptions would be strong predictors of both individual and collective action intentions. This was based on the existing evidence suggesting that efficacy perceptions, in general, are more closely related to intentions compared with threat perceptions (Ruiter et al., 2001). Furthermore, it was hypothesised that threat perceptions would be associated with both individual and collective action intentions, but would be stronger predictors for collective action intentions compared with individual action intentions. This was based on the assumption that individual recommendations would benefit from a lower fear appeal, thereby prompting lower threat perceptions in order to counter the potentially lower perceived efficacy of individual actions. Meanwhile, collective actions may be perceived as having higher efficacy and may therefore be more strongly associated with threat perceptions.

The regressions analyses to investigate to what extent the EPPM variables predicted collective individual action intentions were, unfortunately, limited by the fact that a measure of response efficacy was not able to be obtained. Nevertheless, as hypothesised, collective efficacy was a significant positive predictor of both individual and collective actions ($p < .001$ for both types of intentions). As hypothesised, this study found that severity was a significant positive predictor of both individual and collective action intentions ($p = .014$ and $p = .005$ respectively) when

controlling for environmental concern, political values and the message interventions. Furthermore, severity was a stronger predictor of collective action intentions than individual action intentions, as hypothesised. This finding supports the idea that exposure to a fear appeal that is able to significantly increase perceptions of severity may be more effective at increasing collective action intentions compared with individual action intentions. It is possible this may be because the inherent perceived efficacy of collective actions is higher and therefore benefits from a higher fear appeal. Since the present study did not find any difference in perceived efficacy between the individual and collective action message groups, however, it is not possible to draw a definite conclusion about this.

Contrary to the hypothesis, vulnerability was found not to significantly predict either type of action intentions, even when controlling for other relevant factors. Vulnerability was, however, more strongly associated with collective action intentions ($p = .087$) than with individual action intentions ($p = .863$). These findings align with some previous research suggesting that vulnerability may be a weaker predictor compared with severity for climate change mitigation intentions (Bockarjova & Steg, 2014; Hunter & Röös, 2016; Kim et al., 2013). The evidence suggesting that vulnerability is not associated with mitigation intentions is interesting. A number of studies have demonstrated that people have a tendency to associate the most serious effects of climate change as occurring "elsewhere" (Gifford et al., 2009; Reser et al., 2014; Spence et al., 2012). It is reasonable to postulate this tendency may remain even when people are exposed to a message emphasising their personal vulnerability. Several studies have suggested that mitigation intentions may therefore be more readily associated with a sense of moral obligation to protect ecosystems, animal species and vulnerable human populations in other parts of the world, rather than with personal vulnerability (Chen, 2020; Hunter & Röös, 2016). This may be particularly true for populations in developed countries (Reser et al., 2014). Chen (2020) has suggested that, in the context of climate change, the EPPM framework should be expanded to include levels of moral obligation as a factor that also moderates intentions to take action. Given that the present study provides further evidence that personal vulnerability may play a weak role in predicting mitigation action, exploring whether "vulnerability of others" (i.e. moral obligation to protect others) is a better fit for the EPPM model when applied to climate change may be a promising area for future study.

Overall the regression models including environmental concern, political values, the message interventions and the EPPM variables explained a fairly large percentage of the variance in both individual and collective actions (23.7 % and 38.2 % respectively). This is lower compared with some previous studies suggesting that the EPPM variables may explain up to 50 % of the variation in mitigation action intentions (Rainear & Christensen, 2017). This may, however, be partially to do with the fact that response efficacy was not included in the analysis, as was done in previous studies (Rainear & Christensen, 2017). Overall, the findings from the present study suggest that threat perceptions (severity and vulnerability) may be stronger predictors of collective action intentions compared with individual action intentions. As such, the foundational premise of this research –the assumption that the EPPM may warrant different application for individual *vs.* collective action intentions– may yet prove a promising avenue for further study.

5.5 Study Limitations

One of the limitations of the present study was the snowballing method used to recruit participants. As described in Chapter 3, this method resulted in a sample with a high percentage of females (76 %), young people (65.6 % under the age of 30), students (51.7 %) and Wellington residents (71.7 %). As discussed, snowball sampling was employed due to time and resource constraints and is a common sampling method in psychology research (Evans & Rooney, 2011). It means that the participant sample is not representative of Aotearoa's population as a whole. Therefore, conclusions drawn from the present study cannot be generalised to the wider New Zealand population. Ideally, future research in this area would recruit a participant sample that better represented the New Zealand population.

In order to ensure an adequate response and completion rate for the survey it was also necessary to limit survey length. This meant a number of outcome measures that have been included in previous EPPM experimental studies were not included in the present study. For example, previous studies applying the EPPM to climate change have also obtained measures of attitudes towards the recommended behaviours (Meijnders et al., 2001). Measuring attitudes in addition to intentions provides greater insight into the full spectrum of "engagement" as defined by Lorenzoni et al. (2007). The exclusion of attitude measures from the present study was based on evidence suggesting that attitudes towards particular behaviours typically predict intentions to

adopt that behaviour (Meijnders et al., 2001). Therefore, despite attitudes being distinct from intentions, they are closely related to one another.

Several previous climate change EPPM studies obtained measures of fear control and danger control responses (Sarrina Li & Huang, 2020; Xue et al., 2016). In Xue and colleague's study (2016), for example, danger control response was gauged using questions measuring the perceived value of the messages and people's intention to seek out further information and take action. Fear control response was measured via questions asking to what extent respondents perceived the messages to be manipulative, exaggerated and untrustworthy. These danger and fear control measures allowed these researchers to draw conclusions about the effect of a high threat/low efficacy and high threat/high efficacy appeal had on levels of message acceptance *vs.* message rejection. Obtaining measures of danger and control response provides added insight in addition to only measuring intentions as to how messages may be responded to as per the EPPM. Had measures of danger and fear control processes been measured in the present study, this could have provided some further insight into the effect of the different message interventions. In particular, they may have provided some further context as to why the individual *vs.* collective recommendations intervention had a significant effect on collective, but not individual, intentions. It is possible, for instance, that the collective action recommendations prompted higher levels of danger control processing, whilst the individual recommendations prompted higher levels of fear control processing. Future research could explore the role of danger and fear control processing in relation to fear-based messages about climate change.

Based on previous research, it was concluded that collective efficacy was more relevant for explaining actions related to a global-scale collective action problem like climate change than self-efficacy. For this reason, a measure of self-efficacy was not included in this study. It is reasonable to assume, however, that individual action intentions may be predicted to some extent by both collective *and* self-efficacy. This would make sense given that the efficacy of individual actions requires a degree of individual ability to perform in addition to requiring people to collectively perform them. It is possible that collective actions may only (or largely) be associated with collective efficacy, rather than self-efficacy, because they rely more readily on the cooperation of others people. Thus, the present study was limited because this hypothesis was not tested. Future research in this area could include a measure of self-efficacy to assess this potential relationship.

5.6 Implications and Recommendations

Findings from the present study have a number of implications for climate change communication. Firstly, they partially corroborate previous research suggesting that collective efficacy perceptions are a stronger predictor of intentions to act on climate change compared with threat perceptions (Bockarjova & Steg, 2014; Hunter & Röös, 2016). This was reflected in the fact that collective efficacy appeared to be a stronger predictor or individual action intentions compared to severity. This reinforces the underlying concept of the EPPM; that fear appeals should be combined with adequate efficacy messaging in order to most effectively increase behavioural intentions (Maloney et al., 2011; Witte, 1994). It is less clear, however, whether collective efficacy is a stronger predictor of collective actions intentions compared to severity, noting that the Beta coefficients for these two effects were similar (.131 and .141 respectively).

This study has also demonstrated that the EPPM framework should be taken into consideration when designing messages to motivate, not just individual actions, but also collective action on climate change (e.g. protest and community project participation). In fact, the EPPM framework may be more relevant for increasing collective action intentions compared with individual action intentions. This was partially demonstrated by the fact that the individual *vs.* colletive action message intervention significantly increased collective action intentions but not individual action intentions. It is possible, however, this effect may be partially explained by the 'novelty' of collective action recommendations, as discussed above. The regression analyses further demonstrated that perceptions of severity were more strongly associated with collective action intentions than with individual action intentions. Therefore, the assumption that a 'high-fear' message emphasising the severity of climate change is the most effective for motivating protective actions may be particularly applicable to collective mitigation actions rather than to individual mitigation actions. This has potential implications for communicators and campaingers wanting to engage the public with climate change action. These findings imply that campaigns encouraging individual actions should focus predominantly on enhancing efficacy perceptions. Meanwhile, campaigns focused on collective actions may benefit from a greater focus on communicating the severity of climate change coupled with adequate efficacy messaging. These implications should, however, be explored further before drawing definitive conclusions.

The present study also corroborates findings suggesting that perceptions of personal vulnerability are weak predictors of climate change mitigation intentions (Bockarjova & Steg, 2014; Hunter & Röös, 2016). This implies that climate change fear appeals may benefit from emphasising severity over personal vulnerability. It may also suggest that communicating additional factors, such as the vulnerability of others (i.e. sense of moral obligation), could be a better alternative to emphasising personal vulnerability to climate change (Chen, 2020).

5.7 Summary of Findings

This study has cotributed to a growing body of research that applies fear appeal frameworks to climate change communication. This thesis presents a novel argument, reasoning that collective mitigation actions may be perceived as having greater inherent efficacy compared with individual mitigation actions. Consequently, a 'high fear' appeal may be most effective for increasing collective action intentions and a 'low fear' appeal most effective for increasing individual action intentions. This hypothesis was based on the framework of the EPPM, which posits that the perceived efficacy of protective action recommendations must be sufficient to counter threat perceptions, otherwise individual's danger control pathways may be triggered (Maloney et al., 2011; Witte, 1994).

Contrary to the study hypothesis, the 'high fear' *vs.* 'low fear' message intervention did not succeed in systematically varying participant fear levels or perceptions of severity and vulnerability. This result may explain why the anticipated effect of the fear message intervention on collective and individual action intentions was not observed. Ideally, the present study would be replicated with more rigorous pilot testing of the 'high' *vs.* 'low' fear messages in order to retest the study hypothesis. Contrary to the hypothesis, exposure to the collective action recommendations did not significantly increase perceptions of collective efficacy among study participants compared with exposure to the individual action recommendations. This finding, however, may be partially explained by the fact that the questions designed to measure collective efficacy did not ask participants to explicitly link their perception of collective efficacy to the specific message they read. Furthermore, it was not possible to measure differences in perceptions of response efficacy between the individual and collective action message groups due to an error in the survey. This is a key gap in the findings that presents an avenue for future research.

It was hypothesised that the individual *vs.* collective recommendations intervention would significantly affect both collective and individual actions. The results demonstrated, however, that exposure to the collective action recommendations (*vs.* not) significantly increased collective action intentions, whilst exposure to the individual action recommendations (*vs.* not) did not significantly increase individual action intentions. This may be because the collective action recommendations significantly increased response efficacy perceptions compared with the individual action recommendations. Since response efficacy was not measured, however, no definitive conclusions can be drawn about this. It is also possible this result may be explained by the relative novelty of the collective action recommendations compared with the individual action recommendations.

This study suggests, in line with previous research, that collective efficacy may be a stronger predictor than threat perceptions for individual action intentions. This finding reinforces the underlying assumption of the EPPM that efficacy perceptions must be sufficient to counter fear appeals. Findings from this study have also corroborated previous research suggesting that perceptions of personal vulnerability may be a weaker predictor of intentions to take mitigation action compared with perceptions of severity. This suggests that future research should explore alternative variables that may be stronger predictors of mitigation intentions, such as perception of the vulnerability of others (i.e. moral obligation). Findings from this study also imply that perceptions of severity are more strongly associated with collective action intentions than with individual action intentions. This supports the assumption that emphasising the threatening nature of climate change may be more effective for increasing collective action intentions compared with individual action intentions. Thus, there is promising scope for future research to further explore this hypothesis.

5.8 Conclusion

Climate change is one of the most pressing global issues. Despite overwhelming scientific evidence regarding the serious impacts of climate change, global GHG emissions are continuing to rise. Climate change is also a complex, collective action problem, which makes it challenging to engage people with the issue. Thus, research to understand the most effective ways of

communicating the problem in order to motivate action is vitally important. In line with previous research, this study has demonstrated that peoples' perception of collective efficacy is a stronger predictor of intentions to take mitigation action compared with threat perceptions. This finding inplies that fear appeals should be countered with appropriate efficacy messaging. This study has also identified that messages encouraging collective compared with individual mitigation actions may benefit from different degrees of fear appeal messaging. As expressed by Elinor Ostrom in the quote below, cumulative action taken on multiple levels has the potential to significantly reduce emissions. This research has contributed to a better understanding of how to motivate people to take these vital actions to solve climate change.

"…By cumulatively taking action [to mitigate climate change]…we can make a difference, and we should."

~ Elinor Ostrom, Interview for *The New Humanitarian*, April 2012 ~

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Appendix A. Participant Information Sheet

Aotearoa/New Zealand Environmental Opinions Survey

Kia ora,

Thank you for your interest in taking part in this survey. I am investigating New Zealander's opinions about, and behaviours related to, key environmental issues – such as climate change. The findings of this survey will add new information to the current body of research concerning people's environmental opinions in Aotearoa. Through this research I also hope to discover information relevant for environmental activism and policy making in New Zealand. Your participation is greatly appreciated and will contribute to expanding knowledge about people's relationship with the environment.

Everyone who completes this survey will be given the opportunity to go in the draw to win one of four $50 supermarket vouchers. Good luck!

INFORMATION FOR PARTICIPANTS

Please read the following information before deciding whether to take part. If you decide to participate, thank you. If you decide not to participate, thank you for considering this request.

Who is conducting this research?

My name is Azura Patterson and I am a Master's student in Environmental Studies at Victoria University of Wellington. This research project is work towards my thesis and has received approval from the Victoria University Human Ethics Committee (application number 0000028592).

What is involved?

If you agree to take part in this research, you will fill out an online survey. The survey will take you about 15 minutes to complete. It will mostly consist of multiple-choice style questions. You will be asked about your opinions related to environmental issues (e.g. climate change). You will also be asked some questions about your values and political beliefs to gain an understanding of the connection between people's general world views and their opinions about specific environmental issues.

Privacy/Confidentiality

This research is completely anonymous. This means that nobody, including the researchers will be aware of your identity. By answering the survey, you are giving consent for us to use your responses

in this research. Your answers will remain completely anonymous and unidentifiable. You are free to exit the survey at any point. In doing so, your responses will be withdrawn from the study. Please be aware that once you complete and submit the survey, it will no longer be possible to withdraw your participation. Please do not include any personal identifiable information in your responses. Data collected from this survey will be kept in confidence. This means that no one besides myself and my supervisor, Dr. Wokje Abrahamse, will have access to the raw data.

Personal details will be collected only for those who wish to enter the prize draw. If you wish to enter the prize draw you will be directed to a separate survey. This means that all personal details will be received separately from the survey data. This information will be held in confidence. This ensures that your answers to the survey questions will not be linked to your identity in any way.

What will the project produce?

The information from this research will be used to produce a Master's thesis. This thesis will be submitted for assessment to the School of Geography, Environment and Earth Sciences, and will later be available in the Victoria University Library. It is also possible that the results will be published in an academic journal or presented at a conference. A summary of the findings from this project will be available on my supervisor, Dr. Wokje Abrahamse's, webpage on or after March 2021: https://people.wgtn.ac.nz/wokje.abrahamse/.

The data collected via the survey will be destroyed within five years of the study's completion.

If you have questions, please feel free to contact:

Student Researcher

Azura Patterson (Master's Student)

School of Geography, Environment and Earth Sciences, Victoria University of Wellington

Contact information removed for confidentiality purposes.

Academic Supervisor

Dr. Wokje Abrahamse (Senior Lecturer in Environmental Studies)

School of Geography, Environment and Earth Sciences, Victoria University of Wellington

Contact information removed for confidentiality purposes.

Human Ethics Committee information

If you have any concerns about the ethical conduct of the research you may contact the Victoria University of Wellington HEC Convenor.

Contact information removed for confidentiality purposes.

Thank you for taking the time to consider taking part in this research.

Sincerely,
Azura Patterson

Appendix B. Survey Transcript

Please note that highlighted sections in this suvey transcript were not included in the online version used for this research. They are additional notes to provide clarity on the structure of the survey.

Aotearoa/New Zealand Environmental Opinions Survey

How to answer this survey

Please read each question carefully. There are no right or wrong answers in this survey; we are interested in understanding your opinions. If you feel a question is not relevant to your situation, please try to provide an answer that feels most appropriate. If you do not wish to answer a question, please move on to the next.

This survey is anonymous and your responses will remain confidential.

You are free to stop this survey at any time if you do not wish to continue. If you stop before completion your answers will be withdrawn from the study.

Please be aware that **once you have completed the final question** and your answers are submitted, **you will no longer have the opportunity to withdraw from the study**. Because this survey is anonymous we are unable to separate out individual responses from the data set and remove them once fully completed.

Do you agree to take part in this survey?

- Yes
- No

Section 1: Background Information

This section provides us with some important information about your personal context and background. Your responses remain anonymous. Please answer the following questions about yourself.

1. What is your age?

2. Which gender identity do you most identify with?

   - Male
   - Female
   - Gender variant/non-conforming
   - Prefer not to say
   - Other, please specify

3. Which ethnic group(s) do you most identify with? Select all that apply to you.

   - New Zealand European
   - Māori
   - Samoan
   - Cook Islands Maori
   - Tongan
   - Niuean
   - Chinese
   - Indian
   - Other: Please state

4. Are you a New Zealand Citizen or Permanent Resident?
   - Yes
   - No

5. Please select the region of Aotearoa/New Zealand you reside in.
   - Auckland/Tāmaki-makau-rau
   - Wellington/Te Whanga-nui-a-Tara
   - Canterbury/Waitaha
   - Otago/Ōtākou
   - Other region: Please specify

6. What is your highest completed qualification?

- No formal qualifications
- Secondary school qualification
- Occupational certificate or diploma
- Bachelor's degree
- Post-graduate degree

7. What is your main occupation?

- Student
- Paid employee
- Self employed and not employing others
- An employer of other person(s) in your own business
- Un-employed
- Retired
- Other, please specify

Section 2: Environmental Opinions

In this section we are interested in understanding some of your opinions about the environment. There are no right or wrong answers. Please read the questions carefully and answer as best you can.

On a scale of 1 = strongly agree to 7 = strongly disagree, to what extent do you agree or disagree with the following statements?

1. Climate change is happening.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

2. Maintaining economic growth is more important than protecting the environment.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

3. Climate change is entirely or mainly caused by natural processes.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

4. I often try to persuade others that the environment is important.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

5. The seriousness of climate change is exaggerated.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

6. Protecting the environment is more important than maintaining economic growth.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

7. Most scientists agree that humans are causing climate change.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

8. I would never try to persuade others that the environment is important.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

*Scores were reverse coded for analysis

Section 3: Political Views

In this section we are interested in understanding your political views about the economy and the role of government. Remember there are no right or wrong answers, we are interested in your opinion. Your responses remain totally anonymous.

On a scale of 1 = strongly agree to 7 = strongly disagree, to what extent do you agree or disagree with the following statements?

1. There should be policies to resolve the gap between the rich and the poor.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

2. Ideally, the government should intervene in the economy as little as possible.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

3. The rich should be taxed more.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

4. It is better for schools, hospitals and prisons to be privately owned.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

*Scores were reverse coded for analysis

On a scale of 1 = strongly agree to 7 = strongly disagree, to what extent do you agree or disagree with the following statements?

1. It is important to always respect authority.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

2. Organising protest marches and demonstrations should be allowed.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

3. Maintaining order in society is more important than any single issue or cause.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

4. It is important to always question authority.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

*Scores were reverse coded for analysis

Section 4: Information Section

In this section we want to investigate how people respond to information about an important environmental issue. **Please read the following message carefully as you will be asked some questions about the information you read in a later section of this survey.**

Randomly assigned 1 of the following 2 messages:

MESSAGE ONE

('Low Fear' Message)

What is Climate Change?

Global climate change refers to the average long-term changes over the entire Earth. Earth's climate has constantly been changing — even long before humans came into the picture. However, scientists have observed that Earth's average temperature over the past 100 years has been increasing much more quickly than they would expect.

There are lots of factors that contribute to Earth's climate. However, 95 % of climate scientists agree that Earth has been getting warmer in the past 50 to 100 years due to human activities.[1] Certain gases, such as carbon dioxide and methane, in Earth's atmosphere block heat from escaping. This is called the greenhouse effect. These gases keep Earth warm like the glass in a greenhouse keeps plants warm.

Human activities — such as burning fossil fuels to generate electricity and power factories and cars — are changing the natural greenhouse. These changes cause the atmosphere to trap more heat than it used to, leading to a warmer planet Earth.

Atmospheric carbon dioxide concentration, for example, has increased by more than a third since the Industrial Revolution began.[2]

If global greenhouse gas emissions (e.g. carbon dioxide) continue as they are now, scientists predict there could be an increase in global mean temperature of 3.7 to 4.8 °C relative to pre-industrial levels by the year 2100.[3]

Likely effects of this warming include rising sea levels and ice sheet melting in Greenland, Antarctica, and the Arctic.[4]

The good news is that how much the climate will continue to warm is dependent on the choices we make.

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[1] Cook, J., et al. "Consensus on consensus: a synthesis of consensus estimates on human-caused global warming," *Environmental Research Letters*, Vol. 11; No. 4 (13 April 2016): DOI: 10.1088/1748-9326/11/4/048002

Quotation from page 6: "Among papers expressing a position on AGW [Anthropogenic, or human-caused, Global Warming], an overwhelming percentage (97.2 % based on self-ratings, 97.1 % based on abstract ratings) endorses the scientific consensus on AGW."

[2] Climate Central Inc.. *Global Weirdness: Severe Storms, Deadly Heat Waves, Relentless Drought, Rising Seas and the Weather of the Future*. 1st Vintage book ed. New York: Vintage Books.

[3] IPCC. (2018). *Global Warming of 1.5oC: Summary for Policy Makers*. Geneva: Switzerland: IPCC.

[4] IPCC. (2014). *AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability*. NY, USA; Cambridge, UK: Cambridge University Press.

MESSAGE TWO

('High Fear' Message)

The Climate Crisis

Since the industrial revolution, the earth's average temperature has increased by almost one degree. This may seem small, however continued increases can result in serious consequences.

If greenhouse gas emissions continue at current levels, the consequences of climate change will be devastating for people, plants and animals across the entire planet. Everyone will be affected in some way, including New Zealand.

- 20–30 % of plant and animal species face increased risks of extinction if temperatures rise 1.5–2.5 °C.[1]
- In areas close to the equator, even small increases in temperature (1–2 °C) lead to lower crop yields and an increased risk for starvation.[2]
- Expected climate change is likely to affect the health of millions of people globally, through increased malnutrition and related diseases, and increased deaths, disease and injury due to heat waves, floods, storms, fires and droughts.[3]
- It is highly likely that sea level rise will cause parts of coastal Auckland, Coromandel, South Dunedin, and parts of northern Christchurch to be below annual flood level within the next 30 years.[4]
- New Zealand will also experience increases in extreme wind speeds and extreme daily rainfalls.[5] Droughts in many parts of the country will also get worse and occur more often.[6]
- Many of our Pacific neighbours are already experiencing coastal erosion and flooding from rising sea levels, increased incidents of tropical cyclones and declining fish populations due to ocean acidification and coral bleaching. Atoll nations, such as Kiribati and Tokelau, are likely to be fully submerged before the end of the century.[7]

The good news is that the likelihoods of these terrible outcomes are dependent on the choices we make.

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[1] IPCC. (2014). *AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability*. NY, USA; Cambridge, UK: Cambridge University Press.

[2]Same as above.

[4]Same as above.

[4]Climate Central Inc. (2020). COASTAL RISK SCREENING TOOL LAND PROJECTED TO BE BELOW ANNUAL FLOOD LEVEL IN 2050. https://coastal.climatecentral.org/map/

[5]NIWA. (2011). *Scenarios of Storminess and Regional Wind Extremes Under Climate Change.* Wellington, NZ: National Institute of Water and Atmospheric Research Ltd.

[6]NIWA. (2011). *Scenarios of Regional Drought Under Climate Change.* Wellington, NZ: National Institute of Water and Atmospheric Research Ltd.

[7]CMEP. (2018). Pacific Marine Climate Change Report Card 2018. https://www.sprep.org/attachments/Publications/CC/cefas-pacific-islands-report-card.pdf

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Randomly assigned 1 of the following 2 messages:

MESSAGE ONE

(Individual Action Recommendations Message)

What you can do to help

If everyone does what they can, together this can have a big impact. There are many simple things you can do to help reduce climate change. According to research,[1] some of the most effective things you, as an individual, can do include:

- Switching to a power company that uses 100 % renewable energy
- Reducing your overall consumption of new products. Only buy items you really need, consider repairing broken items before replacing them, and try to buy second-hand when possible.
- Walking, biking, or taking public transport whenever possible
- If you must drive, consider carpooling or using a carshare app
- Avoiding unnecessary air travel
- Reducing your meat consumption
- Encouraging friends and whānau to join you in making more climate friendly choices

Every bit you can do makes a difference!

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[1] Wynes, S., & Nicholas, K. (2017). The climate mitigation gap: education and government recommendations miss the most effective individual actions. *Environmental Research Letters, 12*(7), 091001. https://doi.org/10.1088/1748-9326/aa7541

MESSAGE TWO

(Collective Action Recommendations Message)

What you can do to help

Individuals cannot fight climate change alone. We must work together to re-structure our power and transport industries so that living an emissions-free lifestyle is possible for everyone. This requires putting pressure on the government, corporations, and businesses to make this re-structuring happen.[1]

One of the most effective things you can do to help fight climate change is to take part in collective efforts towards change, such as:

- Participating in public protests and/or signing petitions encouraging the government to take action on climate change.
- Voting for a political party that prioritizes climate change.
- Volunteering for an organisation that does work to reduce climate change.
- Getting involved in a local community project aimed at reducing climate change.
- Take part in boycotting companies and institutions that are worsening climate change (e.g. companies that invest in fossil fuels or that are responsible for high emissions).
- Staying informed about climate change and discussing the issue often with friends and whānau.

Together we can make a difference!

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[1]Baatz, C. (2014). Climate Change and Individual Duties to Reduce GHG Emissions. Ethics, Policy and Environment, 17(1), 1–19. https://doi.org/10.1080/21550085.2014.885406

All respondents redirected to Section 6.

Section 6: Response to Message

In this section we will ask some questions to understand your thoughts and opinions about the message you just read. Please answer the following questions carefully.

For the following 3 questions please select one option that best applies.

1. The message I just read was about
   - o Climate change

- Ocean dead zones
- River pollution
- Nitrogen run-off

2. The message I just read provided
   - Information about the greenhouse gas effect and how this relates to rising average global temperatures.
   - Information about how nitrogen run-off from farming is damaging the health of New Zealand's rivers.
   - Information about how climate change will negatively impact plants, animals and people around the world, including New Zealand.
   - Information about how nitrogen run-off from farming is contributing to ocean dead zones in various regions around the world.

3. The message I just read provided
   - Information about simple things I can do as an individual to help reduce climate change.
   - Information about simple things I can do as an individual to help reduce river pollution.
   - Information about how I can work together with others to put pressure on the government and corporations to do something about climate change.
   - Information about how I can work together with others to put pressure on the government and the farming industry to reduce levels of nitrogen run-off.

On a scale of 1 to 7 the information I just read was

	1	2	3	4	5	6	7	
Credible								Not credible
Convincing								Not convincing
Of no value*								Of value
Meaningful								Not meaningful
Understandable								Not understandable

*Scores were reverse coded for analysis

On a scale of 1 = strongly agree to 7 = strongly disagree, to what extent do you agree or disagree with the following statements?

1. If I follow the recommended actions in the message I just read, the consequences of climate change will decrease.*

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

*This question designed to measure response efficacy was inadvertently excluded from the online version of the survey.

Section 7: Thoughts on Environmental Issue

In this section we want to gauge your thoughts and feelings about the environmental issue you just read about. Please answer the following questions carefully. There are no right or wrong answers.

On a scale of 1 = strongly agree to 7 = strongly disagree, to what extent do you agree or disagree with the following statements?

1. I am fearful of the negative future consequences of climate change.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

2. I am afraid of the negative future consequences of climate change.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

3. Climate change is a serious issue.

	1	2	3	4	5	6	7	
Strongly disagree								Strongly agree

For the following question please respond on a scale of 1 = very unlikely to 7 = very likely

4. How likely is it that you will be affected by climate change?

	1	2	3	4	5	6	7	
Very unlikely								Very likely

For the following 3 questions please respond on a scale of 1 = not at all to 7 = very much

5. To what extent do you think that people can jointly prevent the negative consequences of climate change?

	1	2	3	4	5	6	7	
Not at all								Very much

6. To what extent do you think that individuals can collectively stop the negative consequences of climate change?

	1	2	3	4	5	6	7	
Not at all								Very much

7. To what extent do you think that people can together, through joint effort, achieve the goal of preventing the negative consequences of climate change?

	1	2	3	4	5	6	7	
Not at all								Very much

Section 8: Environmental Action

Below are some actions that could help reduce climate change. Not all will necessarily be possible for you, or you may not want to do them. Please indicate how likely or unlikely you are to take each action in the future to help reduce climate change. (If you are already taking any of these actions and intend to continue to do so, please chose 6 = "likely" or 7 = "very likely" as the response.)

1. Switch to a power company that uses 100 % renewable energy.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

2. Reduce your overall consumption of new products.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

3. Walk, bike or take public transport instead of driving.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

4. If you must drive, carpool or use a carshare app.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

5. Reduce your air travel.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

6. Reduce your meat consumption.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

7. Sign a petition to promote measures against climate change.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

8. Attend a protest aimed at reducing climate change.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

9. Vote for a political party that prioritizes reducing climate change.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

10. Volunteer for an organisation that does work to reduce climate change.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

11. Get involved in a local community project aimed at reducing climate change.

	1	2	3	4	5	6	7	
Very unlikely								Very likely

12. Take part in boycotting a company or institution that is doing something to worsen climate change (e.g. investing in fossil fuels or responsible for high emissions).

	1	2	3	4	5	6	7	
Very unlikely								Very likely

Appendix C. Debriefing Form

Aotearoa/New Zealand Environmental Opinions Survey

Debriefing Form

Thank you for your participation in this study!

Your time is greatly appreciated. Please read the following information carefully as there are some important things to know about this research now that you have completed the survey.

Purpose of the Study

The purpose of the study was to investigate New Zealander's opinions about, and behaviours related to, key environmental issues – such as climate change. The aim of this study was to investigate how people reacted to differently worded messages about climate change. For this purpose, we designed four different messages about climate change and you would have seen one of these four messages.

These messages varied in content. You would have read either a neutral or a more threatening message about the consequences of climate change. You would also been provided with recommendations to take action against climate change, either as an individual, or as part of collective efforts. The purpose of the study is to look for trends in how people respond to these different messages and identify the kind of message that may be most effective to engage people in climate action.

Not providing you with details about the four messages beforehand ensures that your reactions to the survey questions were spontaneous. We hope you understand the reason for this.

Accuracy of Information

Regardless of which message you were asked to read, all information contained in all four messages was based on accurate, peer reviewed studies and/or academic sources related to climate change. In other words, none of the facts, information or recommendations you read

were false or fabricated. The differences between the messages was a change in the wording and tone and the type of recommendations given.

Privacy/Confidentiality

Please note that the information provided to you on the consent form is correct. This includes that your survey responses are anonymous and will remain confidential.

Summary of Findings

A summary of the findings from this project will be available on my supervisor, Dr. Wokje Abrahamse's, webpage on or after March 2021: https://people.wgtn.ac.nz/wokje.abrahamse/

Human Ethics Committee

If you have any concerns about the ethical conduct of the research you may contact the Victoria University of Wellington HEC Convenor. Contact information removed for confidentiality purposes.

Concerned About Climate Change?

You may have received a message containing some concerning facts about the potential consequences of climate change. It is normal to feel worried, anxious or angry when presented with this type of information. If this is the case, please check out the following resource for some tips on coping with climate change anxiety: https://au.reachout.com/articles/how-to-cope-with-anxiety-about-climate-change

Withdrawal of Participation

Now that you have a better understanding of the purpose of this study, we remind you that you are free to end the survey now by exiting this web page. If you do this, your responses will not be included in the analysis and results of the study.

If you wish to proceed to the end of the survey and enter the prize draw, you are agreeing for your responses to be used in this study. You will no longer have the option to withdraw your responses once you proceed past this point in the survey.

- o I have read and understood the information above and ready to proceed to the prize draw entry

Final Section: Prize Draw

Thank you again for taking the time to complete this survey. Your participation is much appreciated.

If you would like to go in the draw to win one of four $50 Countdown supermarket vouchers, please click here.

Link redirects respondents to separate survey:

The four prize winners will be drawn at the conclusion of the survey. The winners will be notified by email.

If you wish to enter the draw, please submit your email address below.

Note that the email you provide is collected on a separate database and with not be linked to your survey responses in any way. This is to ensure anonymity of your survey responses.

Your email (only one entry per person allowed):

Thanks again for your participation and good luck!

Appendix D. Ethics Approval

VICTORIA UNIVERSITY OF WELLINGTON TE HERENGA WAKA

Contact information removed for confidentiality purposes.

TO	Azura Patterson
FROM	Associate Professor Judith Loveridge, Convenor, Human Ethics Committee
DATE	5 October 2020
PAGES	1
SUBJECT	**Ethics Approval** **Number: 28592** **Title: Climate Change Communication: Engaging New Zealanders in Climate Action**

Thank you for your application for ethical approval, which has now been considered by the Human Ethics Committee.

Your application has been approved from the above date and this approval is valid for three years. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Kind regards,

Signature removed for confidentiality purposes.

Judith Loveridge

Convenor, Victoria University of Wellington Human Ethics Committee