**The role of efficacy beliefs in emotional and behavioral responses to climate change**

**Fields of research:** General field: social science. Specific field: Psychology – other topics

**Keywords**: climate change emotions, climate anxiety, pro-environmental behavior, self-efficacy, collective efficacy, environmental education, collective action

1. **Scientific Background**
2. **Psychological aspects of climate change mitigation and adaptation**

Climate Change (CC) is one of the most pressing issues facing humanity today. The global temperature has reached approximately 1°C above pre-industrial levels and is expected to continue rising as a consequence of anthropogenic green gases emissions (IPCC, 2018; IPCC 2014). CC is expected to have widespread impacts on human and natural systems worldwide (IPCC 2014). Policymakers worldwide are concerned about meeting the goal of limiting global temperature rise to 1.5°C, which is considered the threshold point (IPCC, 2018), and reducing the level of greenhouse gas (GHG) emissions to net-zero no later than 2050 (European Commission, 2019). Individuals have an impact on climate change through private sphere behavioral choices (e.g., transportation choices, dietary choices, and energy consumption; Dietz et al., 2009; Wolske & Stern, 2018), and collective actions (e.g., signing a petition for climate regulation, or participating in the activities of environmental NGOs; Bamberg et al., 2018; Schulte et al., 2021). Profound changes in individual and collective behaviors are essential if we are to achieve the required reduction in GHG emissions (IPCC, 2018; Wolske & Stern, 2018). Behavioral science can provide insights that will help us to meet this challenge (Clayton & Manning, 2018; Nielsen et al., 2021). Nonetheless, as CC becomes a reality worldwide, mitigation (i.e., efforts to reduce or prevent greenhouse gas emissions) is no longer sufficient to protect humanity from its consequences, and adaptation (i.e., actions taken to prepare for, and adjust to, effects and predicted impacts of CC) has become an urgent issue as well (European Commission, 2021; Reser & Swim, 2011; Urban et al., 2021).

Adaptation strategies include various actions that are taken in order to adapt to the anticipated consequences of CC, such as rising sea levels, floods, and heat waves. As human perceptions and behaviors clearly contribute to and are influenced by CC, psychological research is essential for informing the planning and implementation of effective mitigation and adaptation policies (APA, 2022; Clayton & Manning, 2018). The development of personal and community resilience and well-being in the face of CC is an essential part of CC adaptation (Chapman et al., 2018; Doherty, 2018). Studying people’s emotional responses to CC is an important part of such research as emotions are related both to CC mitigation behavior and to the promotion of resilience and well-being (Brosch, 2021; Clayton, & Karazsia, 2020; Doherty, 2018; Pihkala, 2022). **Identifying interventions that provide people with the capabilities required to confront CC challenges can serve as an important means to enhance these objectives** (APA, 2022; Molthan-Hill et al., 2019; Mochizuki, & Bryan, 2015). The proposed research will contribute to these challenges by proposing and testing an innovative theoretical framework on the inter-relations between efficacy beliefs, emotional responses, and behavioral responses toward CC. Research and theories on four themes—efficacy beliefs, collective action, coping strategies, and action-based environmental education—are integrated here to provide new ways of thinking about the role of efficacy beliefs in promoting adaptive responses to CC and the potential for active engagement to enhance efficacy beliefs. The framework focuses on the bi-directional relations between efficacy beliefs and pro-environmental behavior, and on the moderating and mediating role of efficacy beliefs in the relationships between emotional and behavioral responses toward CC. As CC is a social challenge that requires both individual and collective mitigation and adaptation actions, the framework focuses on both self-efficacy and collective efficacy, and individual and collective behavior. Although previous research has addressed specific aspects of the proposed framework (e.g., the influence of efficacy beliefs on pro-environmental behavior, and the way engagement with environmental action can enhance well-being), this novel framework proposes a holistic and comprehensive view of the mutual relations between participating in a pro-environmental activity, efficacy beliefs, and emotional responses to CC. The research aims are twofold. **Firstly,** **I will empirically test the proposed theoretical framework.** **Secondly, I will investigate the influence of action-based interventions on efficacy beliefs, behavioral intentions, and emotional responses to CC** (see Figure 2). The study will focus on young adults in Israel. This focus is motivated by recent studies that suggest that young people are particularly vulnerable to CC distress (Hickman et al., 2021; Wu et al., 2019), and the need to better understand coping strategies that can help in the adaptation and enhancement of resilience (Clayton, 2020; Doherty, 2018; Ojala, 2012). In sections two to five, I will describe a different part of the proposed framework. The sixth section of the scientific background will provide a summary of the framework.

1. **The influence of emotional responses to CC on pro-environmental behavior and well-being**

Emotional responses to CC are many and varied and exist on a broad spectrum that can range from negative feelings such as despair, anger, and shame to positive feelings such as hope and pride (Pihkala, 2022; Stanly et al., 2021). Climate emotions are associated with both impairments in well-being and adaptive responses. Hence, an interplay of emotions needs to be considered when studying them and explaining their effect on climate action (Sangervo et al., 2022). Negative emotions such as worry, grief, and guilt are associated with psychological distress and impairment in mental health (Clayton & Karazsia, 2020; Ogunbode et al., 2021; Van Susteren, & Al-Delaimy, 2020). Young adults and children are particularly vulnerable to climate-related distress; they do not have any power to influence current policy, but they will be the ones most affected by it (Hickman et al., 2020; Simon et al., 2021; Wu, et al., 2021). Special attention in CC research has been given to the phenomenon of climate anxiety (Clayton & Karazsia, 2020; Hickman et al., 2021; Sangervo et al., 2022), which although commonly defined as a form of negative emotion, seems as notably important in capturing the feeling of worry and concern (Clayton, 2020). Climate anxiety is commonly defined as distress relating to climate crises, and not as a mental disorder (Hickman et al., 2021; Sangervo et al., 2022). Because of its unique characteristics, it is commonly studied as a separate construct, distinct from other negative emotions (e.g., Clayton & Karazsia, 2020; Stanley et al., 2021). Climate anxiety is considered a rational response that causes people to search for information and solutions. While negative emotions are disturbing and may affect well-being, they also encourage individuals to engage in pro-environmental actions (Stanly et al., 2021; Xie, 2019; Landmann, & Rohmann, 2020) and predict adaptive behaviors such as purchasing insurance or seeking information about hazards (Van Valkengoed & Steg, 2019). Similarly, climate anxiety has been shown to lead to both action and paralysis (Sangervo et al., 2022). Furthermore, in some instances, it might also become overwhelming, and impact daily functioning (Clayton & Karazsia, 2020; Hickman et al., 2020).

The complex and challenging pattern of positive and negative outcomes of emotions toward CC raises the question of how adaptive responses can be promoted, and how individual resilience can be strengthened along with pro-environmental behavior (Doherty & Clayton, 2011; Doherty, 2018; Pihkala, 2022). **Having a better understanding of coping strategies can provide some important insight regarding these challenges (Clayton et al., 2021; Ojala, 2012).** Coping refers to a person's cognitive and behavioral efforts to manage stress (Lazarus & Folkman 1984). Ojala (2012) argues that as negative emotions in the face of CC are a realistic response, the important thing is to find effective ways of handling these feelings. Similarly, Sangervo et al. (2022) argue that it is important to measure forms of climate hope and efficacy since they may moderate the effect of climate anxiety on behavior (Sangervo et al., 2022). The study of coping in climate adaptation is an emerging field of research. Ojala advocates for meaning-focused coping: a strategy that aims to elicit positive feelings associated with a stressor, which do not eliminate the negative emotions but buffer the detrimental effect of those emotions on well-being (Ojala 2012, 2015). This approach is in line with research on the role of positive affect in coping with stressful events. Positive affect broadens an individual's attentional focus and behavioral repertoire and consequently builds the social, intellectual, and physical resources required to facilitate coping and adaptation to stress (Folkman & Moskowitz, 2000; Fredrickson, 1998). Moreover, experiencing positive affect during stressful circumstances may interrupt the adverse effect of negative affect and prevent a decline in its negative outcomes (Folkman & Moskowitz, 2000). Studies that investigated the role of positive affect in coping during stressful events provide further support to this claim (Israel-Cohen et al., 2015; Kaplan Mintz et al., 2021). An example of such a coping strategy is in eliciting hope. Research findings show that in the case of CC hope is associated with pro-environmental behavior and reduced levels of climate anxiety (Geiger et al., 2021; Ojala, 2012, 2015; Snyder, 2000). In addition to their influence on well-being, it was also found that positive emotions such as hope, gratitude, and pride have a positive direct influence on pro-environmental behavior (Brosch, 2021; Schneider et al., 2021). Problem-focused coping (Lazarus & Folkman 1984) is another strategy for dealing with negative emotions. In the case of CC, problem-focused coping involves an active search for solutions, planning, and trying to do something to fight CC (Ojala, 2012). Because coping with global environmental problems can inhibit or foster behavioral changes, coping is an essential predictor of pro-environmental behavior (Chen, 2015). Furthermore, several studies have found a positive association between pro-environmental behavior and emotional well-being (Zawadzki et al., 2020). It follows that encouraging individuals to participate in pro-environmental action can serve to promote well-being (Clayton, 2020; Doherty, 2015).

1. **The influence of efficacy beliefs on emotional and behavioral responses to CC**

Efficacy beliefs are beliefs about the ability to produce results through action. Whereas self-efficacy refers to beliefs in “how well one can execute courses of action required to deal with prospective situations,” collective efficacy refers to one's belief in a group’s ability to effect change in a societal situation (Bandura, 1982). According to Bandura, as many of the challenges people face reflect group problems requiring sustained collective effort to produce a change, the strength of groups, organizations, and nations lies partly in people's sense of collective efficacy—that they can solve their problems through combined effort (Bandura, 1982). Self-efficacy has an impact on various affective and cognitive aspects such as outcome expectations, perception of impediments and opportunities in the social environment, behaviors, and behavioral intentions (Bandura, 2000). It influences behaviors in many aspects of life including work, learning, and health (Gwaltney, Metrik, et al., 2009; Schunk, 1985; Stajkovic & Luthans, 1998). It also can contribute to well-being and resilience (Liu et al., 2010; Siddiqui, 2015). Concerning CC mitigation, efficacy beliefs are among the most powerful determinants of CC engagement. Higher levels of efficacy beliefs lead to higher levels of private sphere pro-environmental behavior (Bradley et al., 2020; Gregersen et al., 2019), collective action (Hornsey et al., 2021a,b; Schulte et al., 2021; Van Zomerenet al., 2010), and support of GHG emission reduction policy (Kothe et al., 2019; Wolters & Steel, 2021). Some scholars have also pointed out **the potential of efficacy beliefs in enhancing well-being** **in the face of CC**. Reser and Swim (2011) offer a model in which self-efficacy serves as an antecedent of emotional and behavioral adaptation to CC, and as one of several possible coping strategies (Reser & Swim, 2011). Doherty (2015) suggests that perceived efficacy serves as a mediator between pro-environmental action and emotional well-being (Doherty, 2015), and Clayton (2020) suggests that attention to self-efficacy can help in better understanding the relationship between climate anxiety and behavioral responses. **Nevertheless, while much attention has been given to the association between efficacy beliefs and mitigation responses, research on the role of efficacy beliefs in promoting psychological resilience and well-being is scarce.** One of the challenges regarding CC efficacy beliefs relates to the fact that CC is a global issue and that the action of an individual is not felt to be significant enough to make a change. This can lead to low perceived control, and a feeling of inefficacy (Bamberg et al., 2018; Brik et al., 2021; Hornsey et al., 2021b), which was identified as one of the leading barriers to mitigation responses (Gifford, 2011; Gifford et al., 2018). It has been therefore suggested that collective efficacy beliefs need to be studied in addition to, or instead of, self-efficacy (Bamberg et al., 2018; Chen, 2015; Schulte et al., 2021). It was also suggested that researchers should find a way to confront the challenge of CC inefficacy by boosting both individual and collective efficacy (Brick et al., 2021). **The proposed study aims to address these gaps by studying the influence of both self-efficacy and collective efficacy on CC emotional responses and CC behavioral responses.** In addition, this study will focus on the ways efficacy beliefs can be developed through active engagement and educational interventions.

1. **Promoting efficacy through active engagement and educational interventions**

Given the important role of efficacy beliefs in CC mitigation and adaptation, it is important to understand their determinants and know how to develop interventions that can enhance them (Hornsey et al., 2021a,b; Molthan-Hill et al., 2019). A common belief is that providing people with information on how their actions can influence CC could lead to a change in their efficacy beliefs (Brosch, 2021; Hornsey et al., 2021). Some studies have confirmed this assumption (e.g., Van Zomeren et al., 2010). Nevertheless, according to Bandura (1982), efficacy is not a fixed act or simply a matter of knowing what to do, but rather involves a generative capability in which the components of cognitive, social, and behavioral skills are organized into integrated courses of action. It can therefore be concluded that gaining knowledge of a subject is not sufficient to enhance efficacy (Bandura, 1982). In line with this argument, in the case of climate mitigation and adaptation, studies have revealed that providing the information is not always sufficient to make a change in efficacy beliefs (Hornsey et al., 2021a,b). In addition, although making people aware of CC is important, if we want people to be prepared to cope with its impacts and related stress, simply informing them of this is unlikely to encourage adaptive coping (Mah et al., 2020). Another important route for empowering individuals to be active agents in society is actively engaging in pro-environmental activity, as is commonly suggested in environmental education literature (Trott, 2022; UNESCO, 2011). It is recommended that students not only actively participate in environmental action, but also take an active role in analyzing alternatives, envisioning alternative solutions, and designing actions (Jensen & Schnack, 1997; Vaughter, 2016). Furthermore, successfully working to achieve a common goal, and engaging in collective environmental actions, can enhance collective efficacy (Krasny, 2020). Research on higher education for sustainable development found that active engagement as part of course pedagogy promotes motivation and students’ perceived ability to enhance sustainability (Mintz et al., 2014; Mintz & Tal, 2018). Furthermore, active engagement in environmental issues can also support learners' psychological well-being (Krasny & Tidball, 2009; Trott, 2022; Venhoeven et al., 2013; Zawadzki et al., 2020). The importance of active engagement in promoting affective outcomes is also found in research on civic engagement in environmental issues (Krasny & Tidball, 2009; 2015). Krasny and Tidball have found that participating in communal environmental practices such as community gardening and watershed restoration gives rise to a positive loop in which individual and collective resilience are developed (Krasny & Tidball, 2009; 2015). To summarize, participating in active engagement with the environment, and actively searching for solutions to environmental issues gives rise to adaptive behavioral and emotional outcomes.

1. **Studying perceptions and emotions toward climate change among young adults in Israel**

The study will focus on young Israeli adults. The rate of global warming in Israel is almost twice as high as the global rate. In 2020 Israel warmed by an average of 1.5⁰C compared to 1950 (Israel Meteorological Service, 2021). Israel is defined as a high-risk area, and more exposed to CC risks (Israel Meteorological Service, 2021; The State Comptroller and Ombudsman of Israel, 2021). Predicted impacts of CC on the country include an increase in the duration and intensity of heat waves, an increase in desertification processes, an increased risk of floods, and an increased probability of forest fires (ICCIC, 2011). Nevertheless, according to the State Comptroller, until 2021 the state of Israel has yet to make the necessary perceptual shift. Only a few public entities have taken any action for improving adaptation to CC, or mitigation efforts. The per capita emissions in Israel, though exhibiting a downward trend, were ranked tenth on a list of countries with the highest per capita rate in 2016 (The State Comptroller and Ombudsman of Israel, 2021). In the last UN Climate Conference in Glasgow, Israel signed several international agreements and declared a goal of reducing GHG emissions to zero by 2050. Yet, a recent report for the Knesset from May 2022 suggests that the required main moves have not been taken yet (Shahak & Benita, 2022). Data on individuals' perceptions and feelings toward CC in Israel is very limited. Only a few studies thus far have focused on these themes and, as far as I know, none of them have focused on emotions toward CC, climate anxiety, or efficacy beliefs. Yet, it seems that there is some increase in public awareness and concern about CC during the last decade. In research conducted in 2014 CC was reported as less threatening to participants and more distant than other threats (Carmi & Bartal, 2014). In a 2016 survey, relative to the citizens of most other [EUROPEAN?] nations, Israelis were rather skeptical or unaware of CC (Poortinga et al., 2019), with the lowest average rate of concern about CC of all 24 countries surveyed. However, a more recent survey from 2020 showed some shift in public awareness. Most of the participants were aware of CC and expressed concerns about the dangers of global warming (Aviram-Nizan & Shoef-Kolviz 2021). While these findings provide some insights into public opinion regarding CC, a more in-depth investigation is needed to explore emotional and behavioral responses to CC in Israel and coping strategies, particularly in young adults. The proposed research will address these aims.

1. **Summary of the proposed framework**

The research framework focuses on the role of efficacy beliefs in enhancing both behavioral engagement and well-being in the context of CC mitigation and adaptation. While negative emotions may lead to distress and climate anxiety, efficacy beliefs can serve as a moderator in the relations between negative emotions and climate anxiety: when experiencing high levels of negative emotions, having high levels of efficacy beliefs can serve as a buffer and reduce the odds of feeling anxious and stressed. The framework also suggests that efficacy beliefs have a mediating role in the relations between behavioral engagement and felt anxiety: participating in behavioral engagement enhances the level of efficacy beliefs, which in turn reduces the level of felt anxiety. Finally, it is suggested that efficacy beliefs enhance positive emotions, which in turn enhance well-being and engagement in pro-environmental behavior. Efficacy beliefs are assumed to be enhanced by engagement in pro-environmental behavior. Therefore, it is suggested that participating in environmental engagement (e.g., as part of an academic course or community activity) can lead to the development of a positive feedback loop in which efficacy beliefs are enhanced, leading to emotional well-being, and intention to further participate in pro-environmental behavior. Because of the important role of collective action in CC mitigation and adaptation, the framework focuses on two kinds of efficacy beliefs: self-efficacy, and collective efficacy, and on both individual and collective pro-environmental behavior. It is suggested that both have a moderating influence on the link between negative emotions and climate anxiety, and a direct influence on positive emotions, climate anxiety, and pro-environmental behavior. Collective efficacy is assumed to have a greater association with collective action compared to self-efficacy, and self-efficacy to have a greater association with private sphere behavior. Figure 1 summarizes the proposed framework.



*Figure 1*: an integrated framework for the relationship between pro-environmental behavior, emotions toward climate change, climate anxiety, and efficacy beliefs

1. **Research objectives & expected significance**
2. **Research Objectives**

The research has the following objectives:

1. Explore the level of emotional responses to CC, climate anxiety, and climate efficacy beliefs (self and collective) in young adults in Israel
2. Map the relationships between pro-environmental behavior (individual and collective), efficacy beliefs (self and collective), emotional responses to CC, and climate anxiety
3. Identify the influence of action-based climate educational interventions on climate efficacy beliefs (self and collective).
4. **Expected significance**

The study of emotional and behavioral responses to CC is an emerging field of research. Further research is needed on the interplay between emotional and behavioral responses and the role of coping strategies and, specifically, efficacy beliefs (Clayton, 2020; Sangervo et al., 2022). The proposed research will address these challenges. It will focus on the role of efficacy beliefs as both a source and a product of environmental engagement and clarify the potential of such engagement as a strategy for coping with and adapting to CC. The multifaceted approach of the proposed research, which explores the bi-directional relationships between behavioral and emotional responses to CC, and the role of efficacy beliefs in these relationships, is innovative and timely. A second significant contribution of this study lies in the integration of psychological and educational models for enhancing our understanding of effective interventions. Furthermore, acquiring a good understanding of what contributes to the development of efficacy beliefs related to CC will help in designing effective science-based educational interventions. Finally, the research will provide important information on emotions toward CC, climate anxiety, and efficacy beliefs in young people in Israel. As the awareness of CC is rising in Israel, and as actual incidents of extreme weather are becoming more common, such understanding will be important in supporting policy decision-making, and as a baseline for future investigations.

1. **Detailed description of the proposed research**
2. **Working hypotheses**
3. Negative emotions toward CC are positively associated with both pro-environmental behavior and climate anxiety
4. Positive emotions toward CC are positively associated with pro-environmental behavior and negatively associated with climate anxiety
5. Efficacy beliefs are positively associated with pro-environmental behavior and negatively associated with climate anxiety
6. Efficacy beliefs moderate the relationship between negative emotions and climate anxiety: when the level of efficacy beliefs is higher, the association between negative emotions and climate anxiety is reduced.
7. Collective efficacy has a greater association with collective pro-environmental behavior compared to self-efficacy, and self-efficacy has a greater association with private sphere behavior [than collective efficacy???]
8. Engagement in pro-environmental behavior enhances efficacy beliefs, which in turn leads to intention to participate in further pro-environmental behavior.
9. Action-based intervention (individual and collective) will be more effective in enhancing self-efficacy than knowledge-based intervention.
10. **Research design and methods**

The research project will take place in Israel among young adults (aged 18-35). This focus is motivated by recent studies that suggest that young people are particularly vulnerable to CC distress (Hickman et al., 2021; Wu et al., 2019) and the need to better understand coping strategies that can help in adaptation (Clayton, 2020; Doherty, 2018; Ojala, 2012). In order to gain a good understanding of the perceptions and emotions of different groups in Israeli society, the research participants will include both Jewish and Arabic participants. A mixed-methods approach, including qualitative and quantitative methods, will be used for data collection and analysis. This approach will enable me to identify general patterns of relations between variables along with a deeper analysis of emotional and behavioral processes (Johnson & Onwuegbuzie, 2004). The research program will include semi-structured interviews, a survey, a controlled experiment, and an investigation of educational interventions. The research will be carried out in four major stages over a four-year period. The first two stages will address the first four research hypotheses. These stages will include an interview-based study in which the ways CC is perceived and understood by young people in Israel will be explored (study 1), and a survey that will investigate the associations between all research variables (study 2). The next two stages aim to address the fifth and sixth hypotheses. These stages will include a controlled experiment (study 3) and an investigation of educational interventions (study 4). The first three stages will include participants from the general population. As the fourth part is focused on educational interventions, I will use a sample of university students. All studies will be conducted after obtaining ethical approval from the Ethics Committee of the University of Haifa. All participants will be asked to provide written, informed consent before participating.

***2.1 Study 1: In-depth exploration of young adults' perceptions of CC***

This stage will be performed during the first year of the research. This study will be based on 50 semi-structured interviews with young adults from different cultural groups in Israel. The participants will be recruited through social networks and mailing lists. The interview study will serve to enhance a deep understanding of how young adults in Israel perceive the phenomenon of CC. The interview protocol will include questions concerning participants' views on the impacts of CC, their emotional reactions to it, their pro-environmental behaviors, and their efficacy beliefs. All interviews will be recorded and transcribed. Data analysis will be based on content analysis principles (Krippendorff, 2019), and will integrate inductive and deductive coding (Charmaz 2006; Maxwell, 2005). A phenomenographic analysis process will then take place (Marton, 1981). This analysis will provide a structured description of the different ways CC is perceived by different people and may provide us with insights as to why different people approach CC in different ways. The findings will also serve to establish accurate, locally and culturally appropriate items for the survey study in stage 2.

***2.2 Study 2: Exploring the associations between emotions, reported behaviors, efficacy beliefs, and climate anxiety among young adults in Israel***

In this stage which will be performed during the second year, I will investigate the levels of climate anxiety and individual and collective efficacy beliefs in young adults in Israel, and the relationships between the research variables. The data will allow me to examine the associations between the variables in the proposed framework. I will distribute an online questionnaire in both Hebrew and Arabic to 800 participants, aged 18-35, sampled from an online panel, which the help of a survey company. Quotas will be set to ensure that the sample is representative in terms of gender, ethnic group, education, income, socioeconomic status, and place of residence. The questionnaire will largely consist of close-ended questions. A pilot study will be administered before conducting the main survey. I will use a sample of 200 participants (100 Jews and 100 Arabs) to check the validity of each of the scales, Climate anxiety scale and emotion scales will be based on validated measures (see section 2.5). The other measures will be developed based on the existing literature and will also be aligned to local perceptions and expressions, informed by the findings from the interview study conducted as the first stage of the research. The questionnaire will be developed in Hebrew and translated into Arabic. Scales that had not been previously translated into Hebrew or Arabic will be translated and back-translated by two independent translators. Cronbach’s alpha analyses will be used to test internal validity. Confirmatory factor analysis will be used to test measurement invariance between the two ethnic groups: Jews and Arabs.

**Questionnaire measures**.

*Emotions toward climate scale*. This section will include measures of positive emotions and negative emotions toward CC. A valid scale that measures positive and negative emotions toward CC was developed by the PI and will be used (see section 2.5).

*Climate anxiety*. Clayton and Karazsia's climate anxiety scale will be used to measure climate anxiety (Clayton & Karazsia, 2000). A translation of this scale and an assessment of its validity in a Hebrew-speaking sample has already been performed by the PI (see section 2.5).

*Pro-environmental behavior*. As the model proposes bi-directional relationships between behavioral and affective variables, I will include two kinds of pro-environmental behavior measures: reported previous participation in environmental activities and behavioral intentions items will be used to better distinguish the causal relationship between past activity and intended activity. In addition, behaviors will be measured at both the individual level (e.g., energy consumption and transportation choices) and the collective level (e.g., participating in collective protest). The literature in environmental psychology offers many scales of pro-environmental behavior (e.g., Stanley et al., 2021; Whitmarsh & O’Neill, 2010). Based on a literature review I will choose the items that are most relevant to the present research.

*Efficacy beliefs.* A literature review will be performed to inform the choice of survey items (e.g. Bamberg et al., 2015; Chen, 2015; Landmann, & Rohmann 2020).

*Demographic information*: Age, gender, ethnic group, occupational status, socio-economic class, and level of education. Statistical data analysis will be employed to test research hypotheses. Structural equational modeling will be used to test the proposed model, and moderate model analysis will be used to test hypothesis 4.

***2.3 Study 3: Controlled experiment to study the influence of short-term interventions on efficacy beliefs and intention to participate in pro-environmental behavior***

Study 3, which will take place in the third year of the research project, will be a controlled laboratory experiment in which I will examine the effects of short interventions on efficacy, and behavioral intentions relating to CC. The study, which will aim to test hypotheses 5 and 6 will include three experimental groups and one control group, each consisting of 250 participants (*N*=1000) sampled from an online panel, all of whom will participate in an online experiment. As with all other studies in this proposal, all participants will be in the 18-35 age group. Quotas will be set to ensure similarities in demographics between the groups. The study aims to investigate the influence of two forms of pro-environmental action: individual and collective action, and also the influence of a knowledge-based intervention. Hence the four research groups will be (1) Individual action-based intervention (2) Collective action-based intervention (3) knowledge-based intervention (4) control. After signing a consent form participants will be randomly assigned to one of the groups. The first phase of the experiment is the manipulation. All three interventions will be based on a comprehensive review of relevant interventions in the experimental literature. The review will be used to select a method that is up to date, has proven efficacy, and is feasible within the context of a single-session lab study. The knowledge-based intervention will consist of reading a text describing opportunities for acting in a pro-environmental way (e.g., Van Zomeren et al., 2010). The individual action-based intervention will involve an activity that has a direct environmental impact, such as the Work for Environmental Protection Task (WEPT; Lange & Dewitte 2022). The collective action-based intervention will consist of a collective environmental activity, such as signing a petition or suggesting an environmental campaign. The last part of the experiment will be filling out scales measuring the following variables: self-efficacy, collective efficacy, individual pro-environmental intentions, and collective pro-environmental intentions. The measures that will be developed in study 2 will be used for this part. Between-group analysis will be used to test research hypotheses 5 and 7. Mediation model analysis will be used to test research hypothesis 6.

***2.4 Study 4: Long-term educational interventions***

Integrating long-term educational interventions into the research project is important for several reasons. First, as mentioned above, according to Bandura (1982) efficacy beliefs should be considered as a process, and their influence on affective and behavioral outcomes should also be considered over the long term. Second, although collective and individual pro-environmental behaviors can be manipulated as part of a short-term experiment, the possibilities for such short-term interventions are limited, and might best focus on behaviors that require a low investment of cognitive and emotional effort. Interventions that involve long-term environmental engagement can require a greater investment of effort, enhance cognitive and emotional engagement, and yield a deeper process of involvement that can lead to more sustainable outcomes. Finally, the findings from studies of educational interventions have a higher external validity and the conclusions can yield greater practical implications, as they can be applied in higher education institutes, and also to older high school students. As higher education students are part of the age group I focus on in this research the results can have a direct influence on the development of effective educational interventions related to CC. Study 4 also aims to test hypotheses 5 and 6. As with study 3, study 4 will include three interventions: a knowledge-based intervention, an individual-action-based intervention, and a collective-action-based intervention. As this part of the research will take place as an educational intervention this study will not include a control group, and the research design will be based on pre-post comparisons, and a quasi-experimental design (Campbell & Stanley, 1963). The interventions will take place at the University of Haifa, where I am a staff member in the Department of Learning and Instructional Sciences. The interventions will last 9 weeks. All participants will be University BA students and will receive monetary compensation for participating. The overall number of participants will be 90: 30 in each of the groups. After signing a consent form participants will be randomly assigned to one of the groups.

*Data collection and analysis.* Triangulation from three sources of data will be used in study 4: pre-post close-ended questionnaires, reflective reports, and interviews. (1) A close-ended questionnaire will be distributed to all participants before and after participation. Both questionnaires will include measures of emotions toward CC, self-efficacy, collective efficacy, and climate anxiety. The pre-intervention questionnaire will also include questions on participants’ previous engagement with pro-environmental activity (individual and collective), and the post-intervention questionnaire will include a behavioral intention scale. The measures will be based on those used in study 2 and (2) A reflective report will be filled in during the intervention period (week 5), and again in the last week (week 9). In this reflection, participants will report on their perceptions regarding the intervention, and its influence on their perceptions of CC in an open question. (3) Semi-structured interviews will be conducted with five participants in each group after the intervention ends in order to have a deeper understanding of how they perceived the intervention and its influence on their efficacy, emotions toward CC, and behavioral intentions. All qualitative data will be analyzed using content analysis. Quantitative data will be statistically analyzed using a repeated measures model to test hypothesis 6,

*Educational interventions.* The intervention will begin with a text reading that provides general information on CC, human activity that influences GHG emissions, and possible mitigation and adaptation actions. Participants in the information-based intervention condition will be asked to watch videos and read articles that deal with CC, and to write a summary that could be used to teach CC issues to other university students and k12 students. Participants in the individual-action condition will be asked to participate in a program that aims to produce change in private-sphere pro-environmental behavior. The program will be based on choosing a behavior to focus on, receiving information and tips, and reporting on individual progress through a diary. Participants in the collective-action condition will be split into groups of four students. Each group will be asked to choose a local environmental issue that relates to CC, and jointly design a campaign and educational program to be implemented on the campus.

***2.4 Preliminary results***

I have already conducted several studies that will contribute to aspects of the proposed research. In studies on university students Mintz et al. (2014), and Mintz and Tal (2018) highlighted the importance of collaborative action and active engagement in environmental and sustainability issues in enhancing students’ perceived competence in dealing with sustainability issues, and their motivation to promote sustainable development. Research conducted in a citizen science community supported the importance of active engagement in environmental issues in promoting emotional engagement (Kaplan Mintz, Arazy, and Malkinson, 2022). The importance of positive affect as a coping strategy in stressful times was investigated in a recent study that focused on the importance of contact with nature during the first COVID-19 (Kaplan Mintz, Ayalon, Eshet, & Nathan, 2021). Recently, I conducted preliminary research on the way young Israelis feel about CC and validated some of the research scales. The study included 9 interviews with young adults and a questionnaire that was distributed to 300 participants. An interesting initial result was that interviewees expressed both high levels of negative emotions such as anger, and of positive emotions such as hope. Further research will be needed to investigate this trend and see whether and how it related to efficacy beliefs. The questionnaire included a Hebrew version of the Climate Anxiety Scale (Clayton & Karazsia, 2020), NEP scale (Dunlap et al., 2000), climate attitudes scale (van Valkengoed et al., 2021), HADS scale of anxiety and depression (Zigmond & Snatith, 1983), and two scales of emotions toward CC (positive and negative). Cronbach’s alpha was calculated to test the internal reliability of two subscales of the Climate Anxiety Scale and correlational tests were performed to study convergent validity. Both the Climate Anxiety Scale and the two emotional responses toward CC scales have good internal reliability and convergent validity, and therefore I will be able to use them in the proposed research.

***2.6 Available resources***

I am highly qualified and experienced in all the research methods that will be used in the project: interviews (Kaplan Mintz, Tal & Ayalon 2021; Kaplan Mintz et al., 2022), surveys (Kaplan Mintz et al., 2019; Kaplan Mintz et al., 2022), experiments (Kaplan Mintz et al., 2021), and investigations of longitudinal educational interventions (Mintz et al., 2014; Mintz & Tal, 2018). Furthermore, I am part of an international, multi-lab research project investigating climate action through multiple experimental interventions on CC perceptions (Many Labs, 2022). I am a faculty member at the University of Haifa and at Shamir Research Institute, where there is an excellent infrastructure for conducting the proposed research in terms of computing resources, research support, and a pool of skilled graduate students who can be employed as research assistants. In addition, support has already been offered by the Director of Innovation and Sustainability at the University in recruiting students for study 4 (see attached supporting letter). As part of the research requires Arabic-speaking knowledge, one of the research assistants that will be employed in the research project will be Arabic.

***2.7 Expected results and pitfalls***

The comprehensive approach of the proposed research, which explores the bi-directional relationships between behavioral and emotional responses to CC, and the role of efficacy beliefs in these relations, is innovative and timely. Specifically, it will contribute to the understanding of the ways the two kinds of efficacy beliefs—self-efficacy and collective efficacy—are developed through active engagement in environmental action, and how they influence behavior and emotions related to CC. Its innovative integration of psychological and educational models will enhance our understanding of effective interventions and provide us with information about the development of efficacy beliefs related to CC. This understanding will inform the design of effective, science-based educational interventions. Finally, the research will provide important information on climate emotions, climate anxiety, and efficacy beliefs in young people in Israel. As awareness of CC is rising in Israel, and as actual incidents of extreme weather are becoming more common, such an understanding will be important in shaping policy decision-making and as a baseline for future investigations.

An additional and more general contribution of the proposed research is to support the development of environmental psychology in Israel—a field that is receiving growing interest worldwide. Hundreds of scholars focus their efforts on aiming to understand human-environment relations, and many articles and books are published every year. National and international psychology associations such as APA and IAAP acknowledge the significant role of psychological research in addressing pressing social and environmental issues and initiate professional communities such as APA division 34 in APA (APA, n.d.), and division 4 in IAAP (IAAP, n.d.). APA has also initiated a climate change task force (APA 2020; 2022). In Israel, the field of environmental psychology is in its infancy. Little research has thus far addressed human-environment interaction, and very few scholars are active in this field. The proposed research will help to address this gap between Israel and other countries and develop this important field of study.

I anticipate three main obstacles to the research and have plans to mitigate them. First, study 1 presents a challenge in recruiting participants from diverse backgrounds and communities for the interviews. I will address this obstacle by recruiting two research assistants from diverse backgrounds who will help in reaching different groups and building trust with them. Second, study 4 presents a challenge in recruiting 90 students from the university. Enhancing sustainable goals is a leading strategy at the University of Haifa today, and several organizational departments are involved in enhancing research and education on sustainability issues in general, and climate change in particular. I will therefore ask for the assistance of these departments in advertising the project and recruiting students. Support has already been offered by the Director of Innovation and Sustainability at the University (see attached supporting letter). Finally, study 4 presents another challenge in keeping participants engaged throughout the 6-week intervention period. I will address this obstacle by providing students with a weekly reminder about the project, and a support meeting with the researcher once every two weeks.

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**Hebrew Publications**

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