



Article

Promoting Climate Change Awareness with High School Students for a Sustainable Community

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Abstract: Climate change is the biggest threat facing humanity, and understanding and addressing climate change represent important goals in creating a sustainable community. As several studies have underlined, in order to enhance eco-friendly behaviors, it is pivotal to understand people's emotional reactions to climate change and develop actions that build a planetary sense of community. In this context, the present pilot study aims to propose a new psychological environmental intervention program seeking to increase students' awareness of climate change and related emotions and to promote students' empowerment. It was carried out in Italy, from January to April 2022, involved 25 high school students, and was conducted by environmental scientists and community psychologists who were experts in affective education and empowerment. The program was composed of two different modules: the first module focused on sustainable development and climate change's effects on the environment and health as well as positive and negative emotions related to climate change; and the second was a participatory laboratory on actions that can be taken to protect the environment. An assessment of the intervention showed its efficacy in terms of the students' competences as environmental citizens, their comprehension of emotions related to climate change, and the development of climate change projects. Given the small sample size and the pre-experimental nature of our contribution, future studies on a larger scale and with a control group are needed to confirm our preliminary results.

Keywords: climate change awareness; empowerment; educational program; socioaffective education



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1. Introduction

One of the most urgent challenges affecting our world and its inhabitants is dealing with climate change. According to the Encyclopedia Britannica, climate change can be defined as the “periodic modification of Earth’s climate brought about as a result of changes in the atmosphere as well as interactions between the atmosphere and various other geologic, chemical, biological, and geographic factors within the Earth system” (p.168) [1]. The concentration of carbon dioxide in the atmosphere has reached an all-time high of 417 parts per million, and the average temperature of the Earth has risen 1.0–1.1 degrees Celsius since the industrialization period (1850–1900). According to repeated and numerous reports of the Intergovernmental Panel on Climate Change (IPCC) [2,3] the increasing atmospheric concentration of carbon dioxide and other greenhouse gases is caused primarily by the combustion of fossil fuels. The world’s current policy scenario is associated with a 2.8 °C increase by 2050 according to the 2021 Emissions Gap Report. Recent studies by the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA) revealed that 2010 to 2019 was the hottest decade since records started being kept [4]. Moreover, the analysis also showed that in 2019, the ocean

temperatures were the highest they have ever been, making 2019 the second-hottest year in NOAA's 140-year climate record, just behind 2016.

Climate change is a global problem with severe implications ranging from the distribution of goods to environmental, social, economic, and political issues. Although initiatives regarding global warming are very urgent, several studies have revealed a lack of public engagement in combating climate change [5]

Of particular importance is the design of educational initiatives to prepare young people in addressing environmental challenges [6–8]. Climate change education is key to addressing global warming; in the last few years, we have seen a rise in educational programs [9–12]. Though the goal of environmental education is to promote social change (UNESCO, 1978) [13], many secondary science educators limit their climate change interventions to an explanation of climate science [14].

Literature Review

A recent systematic review on effective climate change education strategies [14] showed that most of the climate change programs analyzed were focused on improving people's climate change knowledge (82%), and only 39% were designed to change attitudes and 35% to change behaviors related to climate change. Moreover, a recent analysis of climate change education programs has revealed that they focus mostly on knowledge/skill development and less on action [15]. Educational programs need to further foster civic engagement in response to climate change. There is an ongoing debate about which climate change educational strategies can stimulate young people's climate-related behavior [16]. The strategies identified by Monroe and colleagues that increased the efficacy of climate change education programs were to make climate change information personally relevant and meaningful for learners and to design educational activities that engage learners. Several researchers underline that ecological educational programs need to consider the psychological dimensions of global warming. Traditionally, climate change issues have been analyzed through the lens of physical science, politics, and technology. In recent years, it has become evident that the lens of psychology can also hold a critical role in aiding individuals, organizations, and communities in understanding and adjusting to the impacts of climate change as well as promoting climate action. Inner dimensions, in fact, influence how people respond to global warming issues [5].

Psychologists have begun to address the climate change topic [17–24]. In the last few years, psychological research has provided new insights on the following: mental health and climate change [25], engaging in mitigation and adaptation [26,27], attitudes towards climate change [28], and factors driving sustainable consumption behavior [29]. However, further research is needed in this field, as the recent 2022 APA report on climate change points out [30]. An environmentally sustainable community and the adoption and implementation of effective climate policies, as well as the success of adaptation initiatives, rely on what people think and believe about climate change and how to deal with it. Psychologists have a crucial role in several relevant processes, such as the following: understanding people's attitudes regarding climate change and how they are related to changes in their behavior; providing a better understanding of and adapting to the consequences of climate change; aiding people in distinguishing accurate information about climate change from misinformation and disinformation; helping people adapt their lifestyles to fit into and respect the environment; and supporting individuals to prepare for climate change's impact by enhancing their psychological and social resilience and lessening or preventing their distress [31–38]. Psychologists are well positioned to help people engage in collective decision making and actions regarding the climate crisis [30,39,40]. They can contribute in the fight against the climate crisis by developing effective forms of education about the climate crisis and by shaping successful communication initiatives on environmental challenges [6,7,41]. Francescato has underlined that people need to develop a planetary sense of community to tackle this huge global problem, using specific community psychology methodologies, such as socio-affective education, movie scripts and other projective techniques, empowerment

training, and multidimensional organizational approaches [42]. Francescato and Tomai [43] have also showed that building a sustainable community that promotes suitable living requires a major theoretical shift in our ecological paradigms.

Several researchers underline the relevance of the psychological dimensions of global warming since people may perceive climate change as psychologically distant, a potential future threat [44,45], and the global nature of the climate crisis tends to make people feel impotent [5]. Several studies point out that, when emotions are unacknowledged or unprocessed, this can inhibit people's climate change engagement [46]. Davidson and Kecinski [47] have highlighted how one's emotions play a central role in one's social response to climate change. Several studies have shown that the perception of climate risk is influenced by negative affectivity [5]. Other studies focusing on climate change adaptation behaviors have revealed that negative affectivity was identified as one of the largest predictors of engaging in climate-friendly behaviors [48]. Several emotions have been associated to climate change, ranging from anxiety [49], grief, fear [50], guilt [51], hope, and hopelessness [52–54]. When these emotions are unaddressed or unprocessed, they can lead to emotional paralysis or forms of denial, which can hinder one's participation in climate action both at the individual and collective levels. Emotional reflexivity on feelings people have on environmental issues is a powerful step to increasing their participation in addressing climate change [46]. Some studies have emphasized that people's experiences of emotions in regards to global warming influence their climate judgment and actions. It is important to acknowledge, articulate, and work through the emotional dimensions of climate change in a safe or contained way [55].

Through emotional reflexivity on climate change, people can acknowledge, explore, and articulate the affective dimensions of climate change. People can reflect on how they feel about global warming, how these emotions influence their knowledge, and what actions they can take. According to Norgaard [50], emotional reflexivity could encourage climate change participation. Hamilton's recent study [46] shows that reflexivity by itself is not enough to develop and maintain active engagement if the context does not offer chances to turn intentions into action.

Despite being one of the most important challenges, public engagement with global warming remains low [5,56]. As the 2022APA report states, psychology can play an important role in enhancing the education on climate change. We need new insights from psychology to identify the best educational practices that promote climate change adaptation and mitigation, with sustainable communities taking the psychological dimension into consideration [30].

2. The Present Study

2.1. Objectives

In this context, we aimed to promote the development of conscious environmental sustainability and pro-environmental behaviors and lifestyles for a sustainable community in a group of high school students, while considering the emotions climate change can bring about, as theorists of socio-affective education and community psychology have advocated [42]. Taking into account the indications of Hamilton's research [46], our program was not only focused on emotional reflexivity, but also offered the students chances to turn their pro-environmental intentions into action in a school context.

Considering recent literature, we also wanted to explore how the emotions evoked by climate change are related to participating in environmental movements.

In order to achieve these general objectives, we developed a pilot intervention program called Future Generation. It specifically aimed to accomplish the following:

1. Promote the culture of active citizenship and civic participation among students;
2. Promote environmental awareness;
3. Stimulate emotional reflexivity on climate change;
4. Understand which emotions are prevalent in relation to environmental awareness and their association with one's intention to be involved in ecological movements;

5. Encourage the development of conscious environmental sustainability, pro-environmental behaviors, and environmentally sustainable lifestyles;
6. Develop ecological projects in the school community, creating a more sustainable community.

Taking into consideration these objectives, in our research, we investigated if participating in the Future Generation project increased the participants' environmental knowledge, their environmental involvement as citizens, and empowerment. We aimed, through exercises and group discussions, to encourage students to reflect on and become more aware of their emotions on climate change. Through qualitative and quantitative data, we investigated which emotions were evoked by environmental issues and their association with the students' intention to participate in ecological movements. Youth-led climate change initiatives were promoted to encourage the development of pro-environmental behaviors and environmentally sustainable lifestyles. Students were encouraged to identify opportunities to foster pro-environmental behaviors in their school and act as agents of change for their school community developing ecological projects. The successful development of ecological projects involving their school can help create a more sustainable school community.

2.2. Participants

Twenty-five high school students participated to the Future Generation training and workshop program. The students' mean age was 16.12 years ($SD = 0.33$, range = 16–17); 36% of them were girls and 64% were boys. They attended a large public school, Liceo Newton, located in Rome, Italy.

2.3. Design and Procedures

The Future Generation project was carried out from January 2022 to April 2022 (Table 1). It was developed not only by psychologists but involved multiple professionals in its procedure. The project, indeed, included a multidisciplinary training course and a workshop intended for the students. The multidisciplinary training course was mainly carried out in person and was composed of five meetings lasting two hours every week. It was followed by a participatory workshop on environmental citizenship on a fortnightly basis in the school. The school staff was informed about the implementation of the Future Generation program and updated on the progress of the project.

The training course focused on presenting climate change and its effects on the environment, health, and sustainable development (focusing on the importance of balancing economic growth, environmental protection, and social development). Positive and negative emotions related to climate change were explored through a questionnaire and other techniques after the course. The course involved experts in environmental issues and psychologists skilled in socio-affective education and empowering methodologies. The training was accomplished outside the official school program.

The multidisciplinary training course followed different steps:

1. Trainers introduced themselves and shared how they became environmental activists. This first phase served to create a climate of trust and curiosity, which is crucial for stimulating student interest in climate change;
2. The environmental expert explained the key concepts of climate change and illustrated various aspects of the ongoing environmental crisis;
3. The psychologist facilitated the identification and recognition of negative and positive emotions aroused by climate change, with individual, pair, and small-group exercises.

The students involved in the program did not have specific knowledge or prior experience related to the topic of climate change.

Table 1. Program: phases, duration, and activities.

Phase	Duration	Activities
Multidisciplinary training students	5 meetings (from January 2022 to February 2022)	1. Creation of a climate of trust and curiosity to stimulate students' interest in climate change; 2. Explanation from experts about the key concepts of climate change and illustration of the ongoing environmental crisis; 3. Exercise to facilitate students' identification and recognition of negative and positive emotions aroused by climate change.
Group discussions to promote emotional reflexivity	1 meeting (March 2022)	1. Discussions after exposure to data on climate change; 2. Subdivision of students into small groups; 3. Writing of movie scripts; 4. Presentation in the plenary of the movie scripts by narrating them or dramatizing relevant scenes; 5. Reflection on the movies, the content in regards to climate changes, issues, and strengths that emerged from the storylines as well as on the emotions felt.
Assessment of students' positive and negative emotions	1 meeting (March 2022)	Completing a self-report questionnaire.
Participatory workshop on environmental citizenship and presentation of students Projects	3 meetings (from March 2022 to April 2022)	Development from students of concrete actions for the promotion of a culture of environmental protection.

Emotional reflexivity was promoted through group discussions after the students' exposure to data on climate change and by writing movie scripts, a community psychology technique. This technique helped students address climate change issues creatively and further explore their emotions towards climate change. Students were divided into three small groups for this activity (one group of girls and two groups of boys). Each group created a movie script on climate change, supervised by two community psychologists. To do this activity, the students had to choose a movie genre (e.g., documentary, science fiction, comedy, etc.) and come up with a title, a plot, main characters, and an ending. They were asked to present their movie script by narrating it or by dramatizing particularly relevant scenes. The plot of the movie on climate change was then written on a large sheet of paper and hung up for all to see. Following the creative phase and the presentation of the results through narration or dramatization, the groups were invited to reflect together on the movies, their content in regards to climate change, issues and strengths that emerged from the storylines, and the emotions that were evoked.

The second part of the Future Generation program consisted of a participatory workshop that enabled students to identify means of promoting a pro-sustainability approach and mentality within the school community. This part was based on the initiative of the trained students and involved the realization of concrete actions/projects to be implemented within or outside the school for the promotion of a culture of environmental safeguarding.

2.4. Instruments

A self-report questionnaire was administered to students. It included a section on demographic questions, and a section on the emotions evoked by climate change and the students' willingness to participate in environmental organizations. Students were asked to reply on a 10-point Likert scale (from one to ten).

The following measures were used before and after the intervention. A 13-item multiple-choice test was conducted regarding their knowledge of environmental issues. The multiple-choice test was based on information contained in the lectures on climate change given by the ecological expert. Each item was marked as correct or incorrect, thus the total possible score on this measure was 13.

- (a). An empowerment scale [57] was developed in Italy and composed of three sub-scales as follows: (1) One's perceived capacity to set objectives and reach them

- (ten items); (2) perceived resilience in difficult situations and hopefulness (nine items); and (3) political interest (five items). Students were asked to reply on a six-point Likert scale (from one to six). An item example is “I can always solve difficult problems if I try hard enough”.
- (b). The total empowerment score was calculated by adding up the scores on the three subscales, after reversing the second scale’s score and then dividing it by 24. The internal consistency was satisfactory (pre-test: Cronbach’s $\alpha = 0.74$; post-test: Cronbach’s $\alpha = 0.80$).
- (c). Two areas of the Environmental Citizenship Questionnaire [58] were explored. The first area (Part a) was “Activities as Environmental Citizens” (ECQA1): past and present actions that are undertaken as environmental citizens. In this area, a total of six items on a four-point Likert scale (from one to four) were included. An example item is “Have you ever been involved in activities of any of the following organizations, clubs, or groups outside school? (a) An environmental action group in activities”. The second area (Part b) was related to “Competences of Environmental Citizens” (ECQBQ2: 11 items), an example item of which is “At school, to what extent have you learned about the following topics? (A) How to contribute to the prevention of environmental problems?”. Moreover, “Conceptions for Environmental Citizenship” (ECQBQ3: 12 items) included questions such as “How important are the following behaviors for being a good environmental citizen? (a) Voting in every national election”. For “Skills of Environmental Citizens” (ECQBQ4: 6 items), an example item is “How well do you think you would do the following activities, now, as a student? (a) Discuss a newspaper article about an environmental conflict”. For “Attitudes of Environmental Citizens” (ECQBQ5: 8 items), an example item is “The following statements are related to our relationship to the environment: (a) We need stricter laws and regulations to protect the environment”. For “Values of Environmental Citizens” (ECQBQ6: 15 items), an item example is “How important for you are the following statements? (a) Prevent environmental pollution”. For each dimension, the score was the mean of the relative items. The internal consistency ranged from 0.70 (for the ECQB4) to 0.87 (for the ECQBQ3) for the pre-test and from 0.65 (for the ECQB4) and 0.87 (for the ECQBQ6) for the post-test.

2.5. Data Analysis

We evaluated the efficacy of the pilot intervention Future Generation program through different modalities: through qualitative data, such as proposed climate change actions/projects, and through pre/post measures of environmental knowledge, empowerment, and environmental citizenship. We analyzed the qualitative and quantitative data on how they feel climate change emotionally.

As far as the most quantitative part was concerned, after checking for normality (skewness and kurtosis), we used a paired sample *t*-test to compare the study’s variables (i.e., empowerment, environmental citizenship, and knowledge on environmental issues) pre- and post intervention. Via Pearson correlation coefficients, we measured the correlations between, on one side, the students’ intentions to participate to environmental movements and their willingness to fight for the environment, and, on the other side, their emotions.

3. Results

3.1. Qualitative Part

The movie scripts on climate change were analysed using the content analysis [59] through which thirteen variables were extrapolated from the narratives, and every variable had some indicators:

(1) Title: 1-Positive; 2-Negative; 3-Neutral; (2) Genre: 1-Science; 2-Fiction; 3-Comedy; 4-Drama; 5-Realism/Documentary; 6 Yellow/Thriller/Crime; 7-Horror/Splatter; 8-Romantic/Sentimental/Eros; 9-Historical; (3) Main Characters: 1-Individual; 2-Couple; 3-Group;

(4) Attitude towards problems: 1-Renunciation; 2-Fatalism; 3-Delegation; 4-Commitment; (5) Mode of players to face events: 1-Active; 2-Passive;. (6) Solution: 1-Magical; 2-Realistic; 3-Not present; (7) Attitude towards the future (FINAL): 1-Optimistic; 2-Pessimistic; 3-Neutral; (8) Ability to use resources and to exercise control (empowerment): 1-High; 2-Middle; 3-Low; (9) Presence of forms of social support: 1-Yes; 2-No; (10) Type of forms of social support: 1-Information; 2-Economic; 3-Emotional; (11) Presence of violence: 1-Yes; 2-No; (12) Type of violence: 1-self-destructive; 2-directed toward others; and (13) Presence of other social issues.

Two trained judges independently rated the content of each movie script record; the interjudge agreement was 87%. The main results are summarized in Table 2.

Table 2. Movie Content Analysis.

Content Analysis Variables:	Movie Script 1: Time is Running Out	Movie Script 2: Francisco Salvador	Movie Script 3: Who Killed the World
Type of title	Negative	Positive	Negative
Genre	Fiction	Dramatic	Parody documentary
Main Characters	Greta and friends	Francisco and green activists	Narrator
Attitude towards Problems	Commitment	Commitment	Delegation
Mode to face events	Active	Active	Passive
Solution	Magic	Realistic	Not present
Attitude toward future	Optimistic	Partially Optimistic	Pessimistic
Empowerment	High	Medium	Low
Social support	Absent	No	No
Violence	Absent	Yes	No
Social Issues	Absent	Yes	Yes

3.2. Results from Movie Scripts

1. The first movie script (from the girls' group) focused on a group of activists who with Greta saved the planet. It was called "Five paladins helping Greta". The attitude towards problems is characterized by commitment, and the players face the events actively: "5 girls to help her in Greta in intent to save a devastated world". The final solution is partially magical (the protagonists used a time machine to control how the world was affected by pollution). The final outcome is optimistic: "Greta and the paladins return to the future in a radiant world". The girls are empowered and are able to use resources for their cause.
2. The second movie script (from the first male group) focused on a group of activists that fight against the Mafia to keep the Sicilian Sea clean. The attitude towards climate change is characterized by commitment, and the players face events actively: "Sicilian activists organize a protest in the square". The solution is realistic: the mafia members get arrested. The ending is only partially optimistic: "The Sicilian Sea is saved from pollution", but during the battle against the Mafia, all the Sicilians activists die except Francisco. There is a medium control of the use of resources. Francisco, for example, uses his position in the police army to arrest the criminals. In this movie, there is a presence of violence (almost all the green activists get killed), and it focuses also on the Mafia, which is a dramatic social issue in Italy.
3. The last movie (the second male group) is a very sarcastic documentary on ecological issues. The title is negative: "Who killed the world". The genre is a parody documentary. Overall, in this sarcastic movie script, humor is used to downgrade the protagonists of the ecological movement and politicians. In the movie, for example, the movement of FFF is described in a derogatory manner "Fraidei for fiuciur". The protagonist is the expert-narrator of the ecological events. The movie script describes a social problem: the distrust of politicians/politics. The movie ends with a very clear sentence that shows this profound distrust: "No to inculation".

3.3. Projects

The success and impact of the Future Generation project was also evaluated by the final ecological projects carried out by the students who participated in the training course, supervised by community psychologists.

Students were divided into two subgroups and developed two final projects to be promoted in their school.

A first group of participants planned a school circular economy project involving the two main locations of the school (the center and a branch). Twice a year, students will organize a market for recyclable products with objects brought by students that are no longer used, to give them a second life and prevent them from ending up in landfills when they are still usable. Every student attending the school can buy these used objects for a symbolic price. The money collected will be invested in the purchase of smog-eating paint for the creation of a mural on the wall at the school entrance as well as plants and flowers to enrich the schoolyard.

A second group of participants developed a video to be included on the school website, which conveyed the message that people who are committed to the environment can make a difference. Students collected in the video interviews with experts and students who participated in the training course and highlighted what young people can do to change their lifestyle and promote environmental citizenship. The intent of the video project was, on one hand, to raise awareness of issues related to environmental care and, on the other, to promote the possibility of doing something concrete together as young people in a network with the help of the associations active in the area. In the video, the students presented main ecological themes and interviewed people involved in environmental activism, as well as schoolmates who are working hard to promote environmental projects at school. The video posted on the high school website will be presented to the school community at the beginning of the new academic year.

3.4. Quantitative Part

Table 3 reports the descriptive statistics for empowerment (i.e., EMPO), the dimensions of the “Competences of Environmental Citizens” (i.e., ECQA1, ECQB2, ECQB3, ECQB4, ECQB5, ECQB6), and the students’ level of knowledge on environmental issues (i.e., QUIZ) pre-intervention and post intervention.

Table 3. Descriptive statistics of EMPO, ECQ, and QUIZ and pre/post comparisons for differences (paired *t*-test; N = 25).

Variable.	Mean		Standard Deviation		Range (Min–Max)		Asymmetry		Kurtosis		t	p	CI 95%
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post			
EMPO	3.97	3.78	0.49	0.52	3.1–4.8	3–4.8	0.04	0.49	−0.71	−0.79	2.8	0.010	[0.05–0.32]
ECQA1	1.25	1.5	0.43	0.69	1–2.83	1–3.5	2.58	1.77	7.75	2.38	−2.16	0.041	[−0.52–0.01]
ECQB2	1.95	2.44	0.41	0.60	1.09–3	1.18–3.55	0.34	0.03	0.50	−0.08	−3.28	0.003	[−0.79–0.18]
ECQB3	2.93	2.81	0.54	0.49	1.83–3.75	1.92–3.67	−0.23	−0.05	−0.83	−0.86	1.41	0.172	[−0.06–0.30]
ECQB4	2.31	2.45	0.54	0.49	1–3.33	1.5–3.5	−0.31	−0.29	0.25	−0.03	−0.96	0.348	[−0.46–0.17]
ECQB5	3.33	3.33	0.50	0.49	2.25–4	2–4	−0.51	−0.88	−0.74	0.71	−0.09	0.930	[−0.13–0.12]
ECQB6	3.24	3.17	0.31	0.49	2.67–3.87	1.93–4	0.16	−0.70	−0.61	1.13	0.93	0.362	[−0.09–0.23]
QUIZ	5.48	5.64	2.10	1.68	1–10	3–9	0.41	0.17	0.50	−0.71	−0.43	0.668	[−0.92–0.60]

Note. Given the normality for the distribution of ECQA1 was not satisfied, we integrated the paired sample *t*-test with the Wilcoxon nonparametric test. The results of the Wilcoxon test confirmed the results of the *t*-test, by showing a significant difference before and after the intervention ($Z = -2.11$, $sign = 0.035$).

The results of the paired *t*-test showed that the level of total empowerment was slightly higher before the intervention. On the contrary, ECQA1 and ECQB2 significantly increased from pre- to post intervention. No further statistically significant differences emerged.

In Table 4, the descriptive statistics of the emotions evoked by climate change issues and of the students’ intention to participate in environmental movements are reported.

Additionally, in this table, there are also the correlation coefficients between the students' emotions and their intention to participate in environmental movements.

Table 4. Descriptive statistics of emotions and intention to participate in environmental movements and Pearson's correlation coefficients (N = 25).

Variable	Mean	Standard Deviation	Range (Min–Max)	Asymmetry	Kurtosis	r (with Intention to Participate)
Disbelief	4.28	2.79	1–9	0.30	−1.11	0.47 *
Anxiety	5.64	2.83	1–10	−0.12	−1.10	0.75 **
Concern	6.40	2.65	1–10	−0.63	−0.37	0.70 **
Desperation	4.32	2.82	1–9	0.20	−1.36	0.86 **
Hostility	3.92	3.05	1–9	0.47	−1.28	0.79 **
Powerlessness	7.56	2.68	1–11	−0.90	0.35	0.24
Anger	5.16	3.30	1–10	−0.19	−1.59	0.83 **
Frustration	4.88	3.03	1–9	−0.16	−1.58	0.74 **
Fear	5.36	2.91	1–11	−0.06	−0.80	0.87 **
Sadness	5.72	2.67	1–10	−0.47	−0.42	0.69 **
Hope	7.84	1.79	4–11	−0.82	0.35	0.12
Excitement	4.20	2.96	1–9	0.14	−1.70	0.56 **
Indifference	4.40	2.69	1–10	0.23	−0.88	−0.40 *
Distrust	5.64	2.71	1–11	−0.23	−0.53	0.22
Pessimism	5.24	2.79	1–9	−0.46	−1.24	0.60 **
Intolerance	4.24	2.71	1–8	−0.99	−1.68	0.48 *
Positive em.	6.36	2.46	1–11	−0.51	0.59	0.22
Intention to par.	4.92	3.44	1–10	−0.13	−1.82	-

Note. ** $p < 0.01$, * $p < 0.05$.

The strongest emotions related to climate change issues were hope (M = 7.84, SD = 1.79), powerlessness (M = 7.26, SD = 2.68), and concern (M = 6.40, SD = 2.65).

Many of the emotions analyzed were significantly associated with the students' intention to participate in environmental groups. In particular, disbelief, anxiety, concern, desperation, hostility, anger, frustration, fear, sadness, excitement, pessimism, and intolerance were positively related to their intention to participate. Indifference was instead negatively associated with the students' intention to participate in environmental movements.

4. Discussion

Preparing for the impact of climate change is one of the most relevant challenges for sustainable communities; however, there is a persistent lack of public engagement on global warming issues [60]. In order to prosper and flourish, ecological policy making requires participation and cooperation [5,61]. Psychology can be a very important tool used to understand the psychological impacts of climate change on people, which offers strategies that can be more effective in enhancing pro-ecological behaviors [30]. Following the indication of the APA Task Force on Climate Change (2022), our pilot project, involving high school students, aimed to raise awareness on climate change, understand students' emotional responses to this global phenomenon, and encourage students to develop environmentally friendly projects that involve the school community.

To understand and promote climate change awareness, it is essential to examine the affective and emotional responses related to this phenomenon. As Hamilton [46] underlined, when these emotions are unacknowledged or unprocessed, they can block

the path to reducing GHG emissions and moderating humans' negative interference with global warming. Climate change engagement is based on creating personal connections with climate change; it is a dynamic process constituted by three interdependent facets: cognition, emotion affectivity, and behavior [62,63]. Climate change engagement literature accentuates the weight of these three aspects of engagement. However, generally, the emotional element is easily overlooked [64]. Several studies underline that is important for engagement approaches to understand and acknowledge the affective dimensions of climate change in order to promote individual and collective eco-friendly practices. Our pilot study tries to promote ecological civic engagement, taking into account the affective responses of students to climate change. The efficacy of our training course which aimed to promote conscious environmental sustainability and pro-environmental behaviors was evaluated through qualitative and quantitative data. The use of both approaches was important since few studies have relied on qualitative data to understand emotional arousal related to climate change [65].

Our findings reveal that through the emotional reflexivity approach, the students were able to become more aware of the emotions evoked by climate change issues. By recognizing their emotions, the participants were able to further delineate and accept them. The individuals also gained insight on how these emotions related to their possible engagement in climate change and were able to make connections between their personal emotions to those of other people in the group. As seen in Figure 1, the four most selected emotions towards climate change were hope, a sense of impotence, preoccupation, and positivity. These results are in line with previous research showing that having an emotional state of concern is quite common [66,67]. Powerlessness has also been associated with climate change [65]. Our results also confirm previous studies that prove that not only negative emotions are related to climate change, but also positive emotions, such as hope [53,68]. These findings are in part confirmed by our qualitative data: in the analysis of the movie scripts, a strong sense of hope emerged in the movie script of the group of girls, and the Sicilian movie script's ending was partially optimistic. However, in the third sarcastic movie script, a sense of powerlessness and detachment prevails which is also characterized by a low level of empowerment. On one side, the students felt mostly preoccupation and impotency in regards to climate change, since, as it emerged in the group discussions, it seems to have no solution or seems to be a colossal problem, too complex for them and an issue for politicians to solve. On the other side, feelings of hope and positive emotions prevailed. The students believed that new technology will help solve the issue, that there is a growing awareness of climate crisis, and that individuals will change their attitudes.

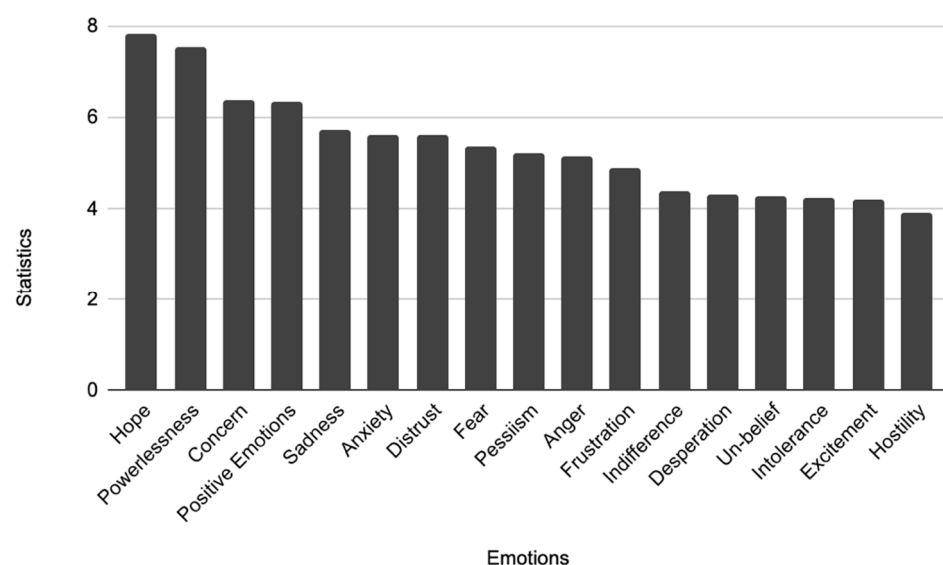


Figure 1. Emotions on Climate Change (mean response).

We also wanted to investigate the role of emotions related to climate change and individual willingness to participate in ecological movements. Our findings reveal that fear, desperation, anger, anxiety, hostility, concern, and pessimism are all strongly associated to the intention to participate in environmental movements. Our findings, therefore, confirm previous results that showed negative affectivity was the best predictor of an individual's willingness to engage in climate mitigation behaviors [69,70]. Hope and positive emotions, though among the emotions most frequently mentioned, were not significantly associated to the students' intention to participate in ecological movements. These results contrast with previous findings that revealed that hope is a significant predictor of pro-environmental behavior [71].

There were no significant differences on the pre/post tests with respect to their knowledge of environmental issues. These results were quite surprising and could be partially explained by the fact that students had no tests or interrogations on the ecological issues presented by the ecological expert and therefore did not spend time preparing for a possible exam. Future courses could include a graded final exam to further expand their knowledge on climate change. The level of total empowerment decreased after their participation in the Future Generation project. A possible explanation for this result may be that, since the training course aimed to promote environmental awareness, students who, becoming more environmentally conscious of the issues our planet is facing and how human behavior negatively affects the ecosystem, could easily feel more disempowered and hopeless compared to at the beginning of the course, when they were less aware of the increasingly complex problem of climate change. Participation in the training course significantly increased some aspects of environmental citizenship. Environmental citizenship is generally defined as the pro-environmental behavior of citizens who are active members of society that act as executors of change in both private and public sectors, locally, nationally, and globally via both individual and group efforts to prevent global warming and other related environmental issues by encouraging sustainability and therefore creating a close bond with nature. The students' participation in the Future Generation project increased their likelihood to carry out actions that are undertaken by environmental citizens (e.g., participating in ecological campaigns, ecological organizations, etc.) and their competencies as environmental citizens (knowing how to prevent and solve environmental issues, how to contribute to sustainability, etc.). These findings seem to indicate that by participating in the project, the students became more environmentally responsible. Their sense of ecological citizenship was also increased by taking an active role in transforming the environment and reducing their ecological footprint through planning ecological projects on the circular economy and spreading ecological awareness. The knowledge that the students acquired through the environmental training course was put into practice through the climate action projects which had a real and ongoing impact on their school community. Through the implementation of these projects, the students built a more sustainable school community, working together to address environmental issues.

5. Conclusions

Climate change represents the biggest threat for our planet and humanity. Climate change education has an essential role in addressing this issue and in fostering the adoption of individual and collective practices that reduce pollution and enhance pro-environmental behaviors. However, climate change education courses that focus only on informing people of the gravity of climate change issues might provoke feelings of powerlessness and lead to emotional paralysis. Pro-environmental educational courses should take in consideration people's emotional landscape related to climate change. Understanding emotions related to climate change is important, since inner-dimensions influence individual and collective responses to environmental issues. Emotions are drivers of cognitive decision-making processes. Addressing climate change while taking emotional aspects into consideration is challenging, because traditional climate change education tends to disregard emotional aspects. It is important to explore different educational strategies that take into consideration

the emotions evoked by climate change and enhance environmentally friendly attitudes and behaviors.

In this pilot project based on community psychology and affective education, we have attempted a step forward in this direction. The students were willing to participate and express their emotions related to climate change in group discussions and through movie scripts. It was important to collect the emotional information related to climate change combining different mechanisms. Overall, our pilot project seems to indicate that participating in an affective education course and reflecting on emotions related to climate change issues can contribute to students' desire to act positively for the environment, as theorists of community psychology have argued [42]. Through an affective education approach, participants during the course were able to understand and become more aware of their feelings on climate change issues. By recognizing their emotions and discussing them with members of the training group, participants were able to further reflect on their actions in response to their emotions.

A crucial aspect of our Future Generation program was the environmental projects planned by the students to fight against climate change. This part of the project allowed participants to explore the ecological topics that interested them; they worked in teams to solve problems and experienced cooperative decision making. Furthermore, by carrying out environmental projects, the students learned the importance of networking and social capital. To carry out their ecological projects, they needed to reach out to community experts and volunteers to address environmental issues in their school community. They increased their social capital by networking and interacting with people out of their usual social circles. Developing social capital skills is important since local-level initiatives for climate change can be promoted by building relationships with local authorities and community leaders.

This research suggests that an integrated approach based on traditional science, ecological education, affective education, and community psychology has the potential to make students more aware of environmental issues, understand the psychological dimensions of climate change, promote environmental citizenship, encourage climate actions, and contribute to the creation of a more sustainable community. The Future Generation program is transdisciplinary: it brings together ecological theoretical aspects, emotional/psychological aspects, and participatory practices. In this regard, some practical applications can be derived from our key findings, since this "education toolkit" can be used to promote climate change awareness and pro-environmental civic engagement in other contexts. This program is quite flexible and could also be applied in different areas, such as in work organizations and associations.

However, further studies are needed, since our pilot research had some limitations: the number of participants was relatively small, and the design was pre-experimental. Future research should involve a larger number of high school students and include a control group. Future research would benefit from cross-cultural comparisons, and longitudinal research would provide more robust evidence of the efficacy of climate change education programs based on community psychology and affective education. Our post evaluations were carried out at the end of the program. The long-term impacts of the program are unknown; therefore, it will be interesting to understand if the students' ecological behaviors persisted over time.

More research is needed to investigate when and to what extent negative emotions associated with fighting global warming might matter more than positive emotions. Future research should further explore which, among the diverse negative emotions that emerge, can better predict one's probability of engaging in positive behaviors to fight climate change in the future. Our findings show a strong association among several negative emotions related to climate change and one's intention to participate to ecological movement; however, these correlational results do not imply that these affective states will correspond to changes in ecological behaviors. Future research should investigate casual pathways from emotions related to climate change towards environmentally friendly behaviors, using other affective

intervention techniques, such as circle time and community psychology profile analyses, to compare the efficacy of the various methods in promoting ecological behaviors.

Despite its limitations, our climate change training program based on community psychology and affective education helped students to be part of climate change solutions.

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