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# The impact of climate change experience on Palestinian university students' mental health: a cross-sectional study

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**Introduction:** The prevalence of severe and catastrophic weather incidents linked to a modified climate system may induce mental problems such as anxiety, depression, distress, and worry in people. This study aims to assess the effect of climate change on depression, anxiety and distress among Palestinian undergraduate students.

**Methods:** The study utilized a cross-sectional research design. A self-reported questionnaire, including the Climate Change Anxiety Scale, the Hospital Anxiety and Depression Scale (HADS), and the Kessler Psychological Distress scale-6 were used to gather data.

**Results:** A total of 1,338 participants were recruited, of whom 66% reported climate change experience and only 6.1% had climate change anxiety. Due to climate change experience, 50.3% of participants had anxiety, 47.5% experienced distress and 36.0% experienced depression symptoms. The multivariate analysis indicated that the likelihood to experience climate change is more pronounced among females (AOR: 0.444,  $p$ -value <0.001), participants with high family income (AOR: 0.235,  $p$ -value <0.001), and those who perceived climate as impacting their academic performance (AOR: 1.986,  $p$ -value <0.001). Also, the participants whose mood was adversely affected by climate change experience (AOR: 2.573,  $p$ -value <0.001), participants who reported serious mental health problems (AOR: 2.049,  $p$ -value <0.001) and participants experiencing depression were more exposed to climate change experience (AOR: 1.374,  $p$ -value: 0.041).

**Conclusion:** The findings indicated that undergraduate students had a low level of climate change anxiety, which may impede their motivation to engage more actively in protecting the environment and high level of depression, distress, stress and anxiety. The university's engagement in climate change through education, research, and the sharing of information on climate change incidents, mitigation and adaptation strategies is essential for improving the mental health of undergraduate students.

## KEYWORDS

climate change, depression, anxiety, climate change anxiety, undergraduate, Palestine

# 1 Introduction

Climate change constitutes a significant public issue for the 21st century (Ágoston et al., 2022). It engenders storms, wildfires, floods, heat waves, and droughts. Also, it may increase temperatures, cause glacier melt, elevate sea levels, and ultimately make certain regions uninhabitable (World Health Organization, 2018). The World Health Organization (WHO) (2018) warns that global warming jeopardizes human lives, health, and economic stability, and it can affect both the physical and mental health of the population directly (Cianconi et al., 2020). For instance, poor mental health related to climate change is associated with anxiety, suicide, post-traumatic stress disorder (PTSD), depression, substance abuse, and domestic violence (Morganstein and Ursano, 2020; Hayes et al., 2018; Cianconi et al., 2020; Charlson et al., 2021).

Moreover, climate change indirectly affects mental health by disrupting healthcare and educational activities, resulting in financial and employment losses, hindering economic growth, necessitating migration and relocation, and escalating hostility and conflict (Costello et al., 2009). Ojala et al. (2012) assert that change in planet weather, its future consequences, uncertainty, and the suffering of others may adversely affect the mental and emotional well-being of young people. Hickman et al. (2021) assert that extreme weather conditions and insufficient governmental involvement may adversely affect the mental health and well-being of young adults worldwide.

The psychological effects of climate hazards are expected to be complex and diverse as individuals attempt to manage a combination of acute and chronic stressors (Taylor, 2020). Research indicates that climate distress is prevalent among those aged 16 to 24 (Lawrance et al., 2022a, 2022b). Schwaab reported that 42% of surveyed German undergraduates indicated experiencing depression, 50% experienced anxiety, 27% faced stress, and 58% expressed significant worry over climate change. The predominant mental health concept linked to climate change awareness is “eco-anxiety” or “climate anxiety” (Ojala, 2012; Clayton and Karazsia, 2020; Hickman et al., 2021; Ma et al., 2022) which is defined as a chronic worry of ecological catastrophe (Clayton et al., 2017). It presents as unpleasant emotions and behavior (Clayton and Karazsia, 2020) and induces sadness, impotence, anxiety, and depression (Budziszewska and Jonsson, 2021). Research revealed that 74% of British young adults had concerns over the impact of climate change on their future, and 63% felt anxious about its consequences (UNICEF, 2013). Another study indicated that 70% of young persons expressed anxiety over global warming, with 35% categorizing their anxiety as severe (Climate Change in the American Mind, 2021). Hickman et al. (2021) found that 59% of young people expressed ‘very’ high levels of concern regarding climate change, with over 60% experiencing fear, anxiety, and depression, while half reported feelings of guilt, helplessness, rage, and powerlessness. Additionally, one cross-sectional study including participants from China, India, Japan, and the U.S. indicated that climate change anxiety was much higher among the Chinese and Indian populations than among their Japanese and American counterparts (Tam et al., 2023). The authors concluded that Japan and the United States have a lower vulnerability to climate hazards and possess a greater capacity for adaptation to these effects than China and India. A further survey indicated that 60% of Malaysian youth experienced climate change anxiety, with 70% reporting “Very” or “Extremely” elevated levels of anxiety over climate change (Mohd Mahudin et al., 2023).

The severity of climate disasters, female gender, younger age, low socioeconomic status, limited education, loss or injury of a loved one, minority or ethnic identity, immigrant status, indigenous heritage, family instability, pre-existing mental health diseases and inadequate social support all elevate the risk of these mental illnesses (White et al., 2023; McCowan, 2020; Crimmins et al., 2016). Acute meteorological disasters, coupled with insufficient health and support services, disproportionately impact low- and middle-income countries (McCowan, 2020). Consequently, teaching, knowledge creation, research advancements, technological innovations, service provision, public discussion, and outreach initiatives may assist governments and universities in tackling climate change and promoting environmental sustainability (McCowan, 2020). Universities are essential in teaching and involving students in climate change issues (Leal Filho et al., 2023).

While research on adult and climate change is expanding, studies focused on university students continue to grow (Leal Filho et al., 2018). Furthermore, existing studies on the mental health impacts of climate change predominantly originate from industrialized nations, which limits the relevance of findings to those in less affluent countries who are more vulnerable to climate change (Cooper and Wheeler, 2017).

The impact of climate change on the mental health of youth or university students in Palestine remains unstudied. Palestine’s unique climate, influenced by its position on the eastern Mediterranean coast, bordering the Sinai Peninsula and the Jordanian desert, features both sub-freezing winter temperatures and hot summers, with temperatures frequently exceeding 30 degrees Celsius (86 degrees Fahrenheit) in July and August (Said and Alsamamra, 2019). Furthermore, recent climatic shifts in Palestine include more frequent droughts, decreased rainfall, higher average temperatures, lower winter temperatures, a greater likelihood of extreme summer heat, and increased summer minimum and maximum temperatures (Hallaq and Daas, 2024). This study aimed to assess the prevalence of climate change experience and climate change anxiety among Palestinian undergraduate students. Furthermore, it aimed to assess the association between climate change experience and sociodemographic factors, as well as depression, stress, and anxiety among undergraduate students in Palestine.

## 2 Methods and materials

### 2.1 Study design and sampling

This cross-sectional study examined climate change anxiety and its relationship to sociodemographic characteristics, depression, stress, and anxiety among Palestinian undergraduates in the West Bank, where 14 universities provide bachelor degrees. Research was done from September to October 2024. The study sampled 1,015 students using a 0.05 significance level, 95% confidence, and 0.02 accuracy. We expected a 30% non-response rate. So, the final sample size was 1,320. Israeli military blockades of Palestinian cities and travel restrictions in the West Bank made it difficult to recruit students who engaged with online learning during the war. As a result, convenience sampling, a non-probability method that selects individuals from the target population based on their accessibility (Stratton, 2021), was used to recruit the participants. Data was gathered using an anonymous online self-administered survey. The researchers provided students with an introduction via Google Forms. The questionnaire was sent through Facebook student groups, social media, emails, and WhatsApp, and 1,338 undergraduates were recruited.

## 2.2 Tools and measures

In this study, participants were asked to answer a self-reported questionnaire, and it consisted of 4 sections. The first section included socio-demographic data and climate variables (e.g., age, gender, marital status, family monthly income, faculty, year of study, place of residence, governorate of living (North governorate included Nablus, Jenin, Qalqilia, Tulkarim, Tubas, and Salfeet cities; middle governorate included Ramallah, East Jerusalem and Jericho cities; and south governorate included Hebron and Bethlehem cities; and temperature of place of residency). For the experience of climate change, participants were asked if they have been affected by climate change events such as extreme temperature changes, increased or lowered temperatures, droughts, rising sea levels, storms, floods, wildfires, and changes in precipitation. If they replied yes, they were asked to write the main type of climate change that affected them. Additionally, they were asked if their study, mood, and self-control of their behaviors were affected negatively by climate changes.

The second section included climate change anxiety by using the Climate Change Anxiety Scale (Clayton and Karazsia, 2020). It is composed of 13 items rated on a five-point Likert-type scale from 1 = “never” to 5 = “almost always,” with two factors measuring, cognitive-emotional (items 1–8) and functional (items 9–13) impairment due to climate change. The internal consistency coefficient (Cronbach’s  $\alpha$ ) was 0.94. Additionally, the third section included the Hospital Anxiety and Depression Scale (HADS), which is a 14-item scale and was used to assess the presence of anxiety and depression. The HADS creates two scales to distinguish the two states: HADS–A for anxiety (seven questions) and HADS–D for depression (seven questions). On a 4-point severity scale, items are rated, and each question is scored between 0 (no impairment) and 3 (severe impairment) with three denoting the highest anxiety or depression level. A case is considered conclusive if the score on either scale is greater than or equal to 11. A score of 0–7 is considered normal, 8–10 indicates mild depression, 11–14 indicates moderate depression and a score of 15–21 is equal to severe depression. The internal consistency coefficient (Cronbach’s  $\alpha$ ) was 0.72. The final section included the Kessler Psychological Distress scale-6 (K6) (Kessler et al., 2002). The K6 served as a screening tool for mental health problems and assessed the degree of their impact, making it suitable for assessing mood disorders. Items assess feelings of nervous, hopeless, restless, jumpy, sadness, and worthless. Each item of the K6 is assessed using a 5-point Likert-type intensity scale: None of the time (0); A little of the time (1); Some of the time (2); Most of the time (3); and All of the time (4). The K6 items are rated from 0 to 4, with the final score being the aggregate of these responses, ranging from 0 to 24. A score of 13 or above suggests a likelihood of severe mental illness. A score under 13 suggests that a severe mental illness is unlikely. The internal consistency coefficient (Cronbach’s  $\alpha$ ) was 0.83.

A committee of four mental health experts reviewed the scale’s contents to ensure that the tool was culturally appropriate and no changes were made. The scale was first translated into Arabic by the research team and then back-translated to English by a licensed translator. At the pilot stage, we administered the tool to 25 undergraduate students to test for language clarity for both the original English questionnaire and the back-translated version were examined to ensure that the translation was accurate.

## 2.3 Data analysis

The data were analyzed by using SPSS version 25 (IBM Corp., Chicago, IL, United States). The descriptive analysis for all study variables is reported as frequencies and percentages. A chi-square test was used to investigate the associations between climate change experience and study variables. A multivariate regression analysis was carried out, and the results are presented as adjusted odd ratios (AOR) with a 95% confidence range. The adjusted model included all potential study confounders as well as factors associated with climate change anxiety that had a  $p$ -value of less than 0.05 in the bivariate analysis.

## 2.4 Ethical consideration

All methods in this study were performed under the Declaration of Helsinki. The study was approved by the Al Quds University Research Ethical Committee (Ref No: 404/REC/2024). This online survey was anonymous. Written information about the aim of the study and how the data would be used was provided at the beginning of the study. Upon filling out the questionnaire, students provided informed consent for participation in this study.

## 3 Results

### 3.1 Socio-demographic characteristics of the study population

Table 1 indicates that the current study recruited 1,338 participants. The majority participants were female (69.4%), residing in urban areas (47.4%), unmarried (88.3%), enrolled in health sciences faculties (47.2%), and located in southern Palestine (50.7%). Furthermore, 66% of the participants reported experiencing climate change personally, whereas 80% of them reported experiencing extreme temperature change (increase or decrease in temperature), 15% experienced droughts, and 5% experienced floods.

### 3.2 The prevalence of climate change anxiety, depression, and anxiety symptoms

Figure 1 revealed that only 6.1% had climate change anxiety, 4.8% encountered cognitive problems, and 9.9% faced functional problems. Furthermore, 39.4% experienced distress, 48.5% experienced anxiety, and 31.2% experienced depression symptoms.

### 3.3 The association between climate change experience and sociodemographic

The chi-square test was used to assess the statistical significance of the difference in climate change experience based on respondent characteristics. Table 2 shows significant associations between climate change experience and age, place of residency, family monthly income, faculties, and year of study ( $p$ -value < 0.05).

TABLE 1 Socio-demographic characteristics of the study population ( $N = 1,338$ ).

		F	%
Gender	Male	409	30.6%
	Female	929	69.4%
Place of residency	City	634	47.4%
	Village	605	45.2%
	Refugee camp	99	7.4%
Family monthly income (US dollar)	No income	174	13.0%
	<270	82	6.1%
	270–540	288	21.5%
	541–1,080	391	29.2%
	1,081–1,620	213	15.9%
	>1,620	190	14.2%
Marital status	Single	1,181	88.3%
	Not single	157	11.7%
Faculties	Science faculties	381	28.5
	Faculties of art (Humanities)	326	24.4
	Health sciences faculties	631	47.2
Year of study	1st	272	20.3%
	2nd	276	20.6%
	3rd	391	29.2%
	4th	339	25.3%
	5th–6th	60	4.5%
Governorate of living	North	348	26.0%
	Middle	312	23.3%
	South	678	50.7%
Climate change experience	Yes	885	66%
	No	453	40%

### 3.4 The association between climate change experience and other independent variables

Table 3 reveals that climate change experience was associated with 50.3% of participants' anxiety, 47.5% of their distress, and 36.0% of their depression symptoms. Also, it demonstrates significant associations between climate change experience and academic achievement (57.4%), mood (86.7%), self-control of behavior (59.7%), Kessler Psychological Distress Scale (47.5%), and anxiety (36.0%) ( $p$ -value < 0.001). No significant associations were found between climate change experience and climate change anxiety and temperature.

### 3.5 Multivariate logistic regression for determinants of climate change experience

In Table 4, the multivariate regression analysis revealed that females reported more climate change experience than men (AOR: 0.444,  $p$ -value < 0.001), and participants with a higher family income

reported more experience to climate change compared to those with a low income (AOR: 0.235,  $p$ -value < 0.001). Also, the participants who reported that the climate affected their academic achievement were nearly twice as likely to be affected by climate change experience compared to those who said no (AOR: 1.986,  $p$ -value < 0.001). Further, the participants who reported that their mood is negatively affected by climate change were nearly two times more to experience climate change compared to those who did not (AOR: 2.573,  $p$ -value < 0.001). Furthermore, participants who reported their self-control behavior was affected by climate change were more likely to be exposed to climate change compared to those who said no (AOR: 1.362,  $p$ -value = 0.041). In addition, the participants who reported serious mental illness were twice as likely to be exposed to climate change compared to those who were unlikely to have mental illness (AOR: 2.049,  $p$ -value < 0.001), and participants who reported depression were more likely to be exposed to climate change.

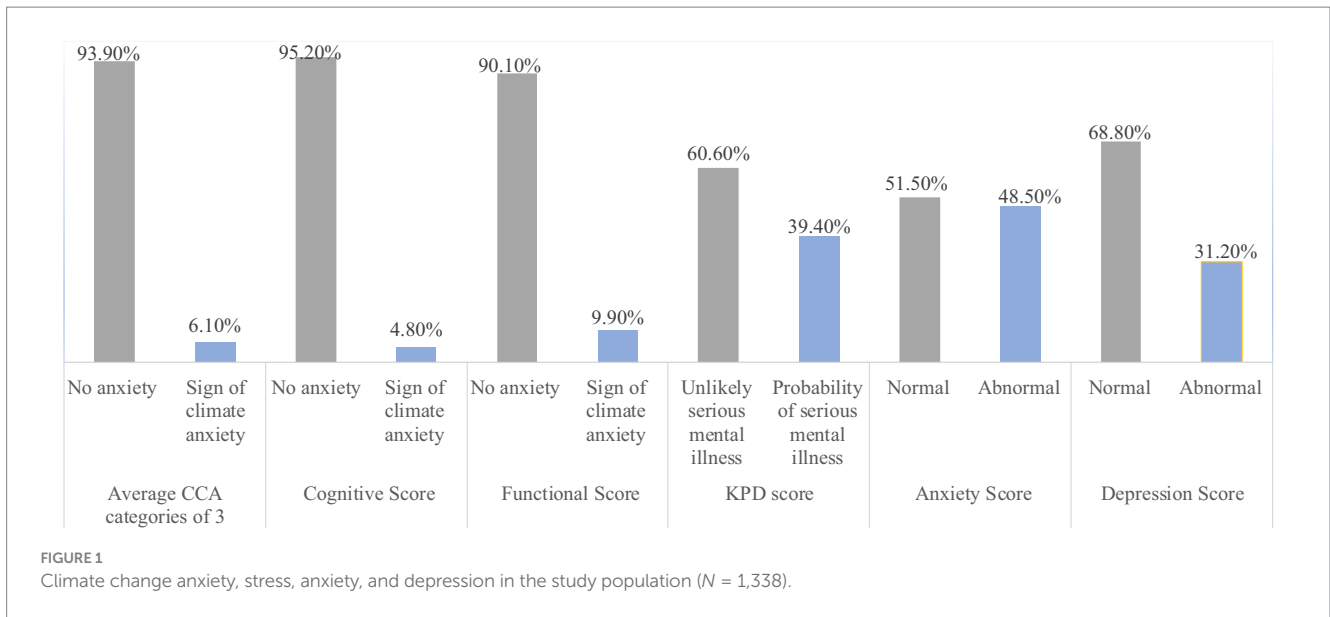
## 4 Discussion

The purpose of this study was to assess the prevalence of climate anxiety and climate change experience and its association with other factors. The finding showed that there was a low level of climate change anxiety and many factors that may predict vulnerability to climate change experience, including being female, having a high family income, experiencing negative effects of climate on academic achievement, mood, and self-control, as well as reporting serious mental illness and depression.

### 4.1 Prevalence of climate change anxiety

According to the current study, 6.1% of participants had climate anxiety. This finding is considered low when compared to literature reviews. According to Schwaab et al., 88% of German university students believe the climate is changing, 60% think about it regularly or very often, and 60% are very or extremely concerned. Climate change concerns had grown, with 85% of respondents saying they were more worried than five years ago, 75% than three years ago, and 33% than last year. Stewart et al. (2023) found that 24.7 to 52% of university students in the United States felt anxious about the climate. According to the UK survey, 16–24-year-olds are more concerned about climate change than COVID-19 (Lawrance et al., 2022a, 2022b). Another survey showed that 59% of young people were “very” or “extremely” anxious about climate change, with more than 60% suffering fear, anxiety, and depression (Hickman et al., 2021). These findings are significant because research has linked climate action to climate-related anxiety (Stanley et al., 2021; Curll et al., 2022; Hepp et al., 2023; Latkin et al., 2022; Ogunbode et al., 2022; Sangervo et al., 2022; Thomson and Roach, 2023; Verplanken et al., 2020; Schwaab et al., 2022). One study revealed that greater levels of climate-related anxiety were associated with pro-environmental actions in 24 of 32 countries and climate demonstrations in 12 countries (Ogunbode et al., 2022). People who are anxious about climate change are more likely to take action to protect the environment and future generations (Qin et al., 2024).

Other research, however, has found that people who feel extremely anxious are less likely to act. Young people may believe they are incapable of environmental protection. As a result, they are more



**TABLE 2** Association between climate change experience and sociodemographic variables (N = 1,338).

		Climate change experience				Chi-square
		No N = 453		Yes N = 885		p-value
		Count	%	Count	%	
Gender	Male	197	43.5%	212	24.0%	<0.001
	Female	256	56.5%	673	76.0%	
Place of residency	City	255	56.3%	379	42.8%	<0.001
	Village	165	36.4%	440	49.7%	
	Refugee camp	33	7.3%	66	7.5%	
Family monthly income (US dollars)	No income	108	23.8%	66	7.5%	<0.001
	<270	25	5.5%	57	6.4%	
	270–540	85	18.8%	203	22.9%	
	541–1,080	108	23.8%	283	32.0%	
	1,081–1,620	70	15.5%	143	16.2%	
	>1,620	57	12.6%	133	15.0%	
Marital status	Single	394	87.0%	787	88.9%	0.29
	Not single	59	13.0%	98	11.1%	
Faculties	Science Faculties	166	36.6%	215	24.3%	<0.001
	Faculties of art (Humanities)	100	22.1%	226	25.5%	
	Health sciences faculties	187	41.3%	444	50.2%	
Year of study	1st	103	22.7%	169	19.1%	<0.001
	2nd	70	15.5%	206	23.3%	
	3rd	163	36.0%	228	25.8%	
	4th	94	20.8%	245	27.7%	
	5th–6th	23	5.1%	37	4.2%	
Governorate of living	North	112	24.7%	236	26.7%	0.66
	Middle	104	23.0%	208	23.5%	
	South	237	52.3%	441	49.8%	

TABLE 3 The association between climate change experience and other study independent variables.

		Climate change experience				p value
		No		Yes		
		N	N %	N	N %	
Temperature °C	≤20	44	9.7%	95	10.7%	0.62
	21–29	328	72.4%	618	69.8%	
	≥30	81	17.9%	172	19.4%	
Academic achievement	Yes	184	40.6%	508	57.4%	<0.001
	No	269	59.4%	377	42.6%	
Mood negatively	Yes	300	66.2%	767	86.7%	<0.001
	No	153	33.8%	118	13.3%	
Self-control behavior	Yes	198	43.7%	528	59.7%	<0.001
	No	255	56.3%	357	40.3%	
Score climate anxiety CCA	No anxiety	428	94.5%	828	93.6%	0.51
	Sign of climate anxiety	25	5.5%	57	6.4%	
Score cognitive climate anxiety	No anxiety	429	94.7%	845	95.5%	0.52
	Sign of climate anxiety	24	5.3%	40	4.5%	
Score functional anxiety climate	No anxiety	418	92.3%	788	89.0%	0.06
	Sign of climate anxiety	35	7.7%	97	11.0%	
Kessler Psychological Distress Scale	Unlikely	346	76.4%	465	52.5%	<0.001
	Serious mental illness	107	23.6%	420	47.5%	
HADs Depression scale	Normal	249	55.0%	440	49.7%	0.067
	Abnormal	204	45.0%	445	50.3%	
HADs Anxiety scale	Normal	354	78.1%	566	64.0%	<0.001
	Abnormal	99	21.9%	319	36.0%	

indifferent and pessimistic about protecting the environment since they feel organizations or the government should act. As a result, nervous people may avoid or disregard climate change (Clayton, 2020; Clayton and Karazsia, 2020; Stanley et al., 2021). Stewart et al. (2023) found that psychological detachment from climate change can reduce stress and anxiety. Thus, climate change anxiety may promote environmental protection but also “paralyze” certain people who doubt their ability to make a difference (Innocenti et al., 2023).

A potential explanation for the participants’ low climate anxiety in the present study is that these students may prioritize more urgent issues, such as the continuing conflict in Palestine and the surrounding region. The Israeli military has governed the West Bank and Gaza Strip since 1967. The continuous political situation and war adversely impact healthcare systems and educational institutions, including universities, displacing people from their residences and impeding their access to vital medical and mental health treatments (Brennan et al., 2022). Furthermore, the Israeli military operation in the West Bank before the start of political conflict and war in the Gaza Strip on October 7th, as well as what happened afterwards, may have intensified the undergraduates’ concerns about their safety and future. A recent survey revealed that 65.9% of Palestinian undergraduates experienced depression, while 60.9% suffered from anxiety as a result of the ongoing conflict and war in Palestine since October 2023 (Ahmead et al., 2024). These incidents may impact students’ mental health and life priorities, potentially leading them to prioritize safety above concerns about climate change. Another possible explanation is that many young people are unaware of climate change due to a lack of

discussion in Palestinian universities, media, and social networks. This lack of information may reduce climate change awareness and anxiety. Ediz and Yanik (2023) concluded that climate change activists are more anxious about our planet’s future than non-activists. Therefore, when people become more aware of climate change, their anxiety levels increase. As a result, the participants’ low level of climate change anxiety could encourage Palestinian health, education, and environmental policymakers to take steps to raise public awareness about climate change.

## 4.2 Climate change experience and participants’ sociodemographic variables

The findings revealed that females were more vulnerable to climate change experience than men, which was consistent with previous studies (Zavala et al., 2024; Stone et al., 2022; Chique et al., 2021). According to Habtezion (2017), economic inequality renders women more vulnerable to climate change since they are impoverished, undereducated, and underrepresented in social, political, and familial decision-making. Women are also at a disadvantage in dealing with the negative consequences of climate change as a result of poverty, social and economic marginalization, and political persecution. Stone et al. (2022) asserted that women’s responsibilities to provide care for others increases during extreme weather events or periods of climate-induced food scarcity. Moreover, although women exhibit heightened responsibility, they possess a deeper connection to land, place, and traditions, hence

TABLE 4 Multivariate logistic regression for determinants of climate change experience.

		Significance	AOR	95% C.I. for EXP(B)	
				Lower	Upper
Gender	Male	0.000	0.444	0.332	0.592
	Female	reference			
Family monthly income (US dollars)	No income	0.000	0.235	0.143	0.386
	<0270	0.075	0.564	0.301	1.058
	270–540	0.352	0.806	0.512	1.269
	541–1,080	0.911	1.024	0.671	1.563
	1,081–1,620	0.822	0.948	0.594	1.511
	>1,620		Reference		
Academic achievement	Yes/No	0.000	1.986	1.479	2.665
Mood negatively	Yes/No	0.000	2.573	1.863	3.554
Self-control behavior	Yes/No	0.041	1.362	1.013	1.832
KPD score	Serious mental illness/unlikely	0.000	2.049	1.534	2.738
HADs Depression Scale	Abnormal/Normal	0.041	1.374	1.013	1.863

AOR, Adjusted Odds Ratio; CI, confidence interval.

exacerbating emotional challenges when these affiliations are jeopardized by climate change. Other research, however, found no correlation between gender and climate change (Ediz and Yanik, 2023). This finding suggests that there should be climate change awareness programs that target female students. These programs should help female students understand the risks, impacts, and vulnerabilities of climate change, and they should also motivate students to take action by participating in climate change initiatives and helping to plan and implement programs that raise public and student awareness of the issue.

Interestingly, in the current study, people with higher income reported being more vulnerable to climate change experience than those with lower incomes. In contrast, the literature research revealed that climate change will have the largest economic impact on the poorest people (Maqbool et al., 2023; Oanh and Ha, 2023; Cevik and Jalles, 2022). Mendelsohn et al. (2006) indicated that low-income countries are warmer, closer to the equator, and more agriculturally oriented, making them more vulnerable to weather extremes and climate change. People with more discretionary resources and higher incomes are more likely to choose the optimal adaptation option despite financial restrictions. Their ability to invest in climate change adaptation measures, including air conditioning, reduces their vulnerability to climate change. One possible explanation is that lower-income groups are becoming more environmentally conscious in terms of energy use, food waste creation, and disposal, as well as more inclined to turn off unnecessary equipment, which may minimize their vulnerability to climate change. Therefore, our research may highlight the imperative of increasing awareness among students from high income homes about the consequences of climate change and reducing the use of unnecessary technology. This may indicate the need to provide these students with guidance on implementing adaptive measures related to their consumption patterns and financial and social resources, such as minimizing the use of technology, vehicles, air travel, and central air conditioning, transitioning to renewable energy, and improving the energy efficiency of household appliances (Nielsen et al., 2021). Also, more

research is needed to understand the association between family income and climate change susceptibility, risk, impacts, and adaptive capacity.

### 4.3 Climate change experience and participants' academic performance

The current study found that climate change experience is twice as likely to affect students who report it affects their academic performance. Other studies have demonstrated comparable findings (Burke et al., 2018; Weston, 2018; Muraguri, 2022). Muraguri (2022) revealed that climate change leads to increased class absences, thereby decreasing university students' GPAs. Also, floods and droughts can lead to university closures and class disruptions, while weather conditions and air pollution may indirectly elevate the incidence of sick days. Moreover, high temperatures and worsened weather events may induce experiences of hunger and thirst, diverting the attention of youth (Al Hussaini, 2023). Consequently, universities ought to provide undergraduate students with counseling to assist them in managing the impacts of climate change on their academic performance.

### 4.4 Climate change experience, self-control, depression, and anxiety

Moreover, the present study found that people who felt climate change experience influenced their self-control were three times as likely to have been exposed to it. Young people in warmer areas with less seasonal fluctuation and a harsh, unpredictable environment have quicker life strategies, a greater present orientation, and worse self-control (Van Lange et al., 2017). Also, self-control was shown to be inversely associated with irritability, depression, and anxiety among university students, whereas, on the other hand, self-control is associated with irritation and

aggressiveness (Pratt and Cullen, 2000, p. 952). For example, Pratt and Cullen (2000) indicated that poor self-control is a strong predictor of criminal behavior, while Strömbäck et al. found that individuals with higher levels of self-control, had better environmental well-being. Therefore, the study's findings might inform future mental health therapies for university students affected by climate change, such as improving awareness of their psychological problems and implementing targeted self-control interventions, particularly those targeting impulsivities.

Additionally, in the current study, participants indicating a low mood were three times more likely to experience climate change, and participants suffering from depression were more prone to have experienced climate change. These results align with previous studies. A global survey revealed that 45% of individuals aged 16–25 asserted that emotions associated with climate change affected their daily lives and functioning, while 39% indicated experiencing depression (Hickman et al., 2021). Ballew et al. (2024) reported that climate change elicited emotions of depression or anxiety in 16% of participants. These negative emotions associated with climate change adversely affect students' mental health (Stanley et al., 2021). Furthermore, our research found that climate change experience was twice as likely to affect participants susceptible to serious mental disorders, and it showed that the symptomatic burden of climate change experience was significant because climate change experience was associated with 50.3% anxiety, 47.5% distress, and 36.0% depression among participants. These findings are higher than prior studies (Schwaab et al., 2022). This could be because climate change may increase the probability of disasters, which would likely lead to depression, PTSD, and adjusting problems. Additionally, climate change and global warming may cause population migration, which would result in acculturation stress (Padhy et al., 2015). A study in Australia found that mental illness increased the risk of hospitalization during heat waves (Nitschke et al., 2011); therefore, future climate change initiatives should focus on expanding access to mental health services and treatments as well as developing ways to slow the problem's progression.

#### 4.5 Limitations of the study

The study has limitations. Convenience sampling and cross-sectional designs reduce the ability to establish causal relationships between climate change and psychological impacts and compromise the representativeness of the sample as well as the generalizability of the results. Considering that recruitment occurred via platforms like Google Docs and WhatsApp during the wartime and conflict in Palestine, it is likely that undergraduate students in affected areas lack access to or the opportunity to utilize this technology to participate in the study. This situation may affect the representativeness of the sample. Additionally, when employing self-reported questionnaires, reporting bias is more common. Additionally, the current study only looks at anxiety and depression, not the other negative feelings associated with climate change, such as anger, discomfort, irritation, ignorance, despair, and indifference. Despite these limitations, the findings of this current study highlight the effects of climate change on the psychological well-being of university students residing in conflict-affected areas. This research offers a significant addition to the present literature, since

it is a new study to examine the impact of climate experience on the mental health of youth in war-torn countries.

#### 4.6 Implication for practice effects of climate change on human health

This study may highlight the importance of climate change education within university's curriculum and research. Universities may formulate and enhance curricula to disseminate knowledge on climate change, including mitigation and adaptation measure. In addition, they may raise students' awareness of the mental health impacts of climate change and the need of reducing their use of fossil fuels, increasing the efficiency of their home appliances, and switching to renewable energy sources. Further, the need of taking action against climate change can be better understood if students are actively involved in environmental and climate change initiatives. Students, especially females, those with low self-control, those with a history of mental problems, and those from wealthy homes, may benefit from increased education on the psychological aspects of climate change. Beyond focusing just on physical illnesses, universities have a critical role to play in providing psychological counseling and interventions for students going through difficult circumstances, such as anxiety, depression, and stress, and in expanding access to mental health services and treatments inside their clinics.

Additional research is needed on the impact of eco-emotions and awareness on the mental health of young adults, as well as students' psychological responses to climate change. Also, more research is needed to better understand the relationship between family income and climate change vulnerability, risk, impacts, and adaptive capacity. Finally, to fill the identified gaps in the literature, future research should focus on women's experiences with climate change.

### 5 Conclusion

The findings indicated that undergraduate students had a low level of climate change anxiety, which may impede their motivation to engage more actively in protecting the environment. The university's engagement in climate change through education, research, and the sharing of information on climate change incidents, mitigation and adaptation strategies is essential for improving the mental health of undergraduate students.

#### Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

#### Ethics statement

The studies involving humans were approved by Al Quds University Research Ethical Committee (RefNo: 404/REC/2024). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.



## Author contributions

MA: Conceptualization, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing. NE: Data curation, Formal analysis, Writing – review & editing. EM: Data curation, Validation, Writing – review & editing. RāZ: Data curation, Validation, Writing – review & editing. IN: Data curation, Validation, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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