PREOCUPAÇÃO E EMOÇÕES COM AS MUDANÇAS CLIMÁTICAS E SAÚDE MENTAL DE ESTUDANTES ANTES E DEPOIS DE UM EVENTO CLIMÁTICO EXTREMO NO RIO GRANDE DO SUL-BRASIL

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CONCERN AND EMOTIONS ABOUT CLIMATE CHANGE AND MENTAL HEALTH OF STUDENTS BEFORE AND AFTER AN EXTREME WEATHER EVENT IN RIO GRANDE DO SUL-BRAZIL

PREOCUPAÇÃO E EMOÇÕES COM AS MUDANÇAS CLIMÁTICAS E SAÚDE MENTAL DE ESTUDANTES ANTES E DEPOIS DE UM EVENTO CLIMÁTICO EXTREMO NO RIO GRANDE DO SUL-BRASIL

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ABSTRACT

The objective of this study was to verify and test the association between concern and negative emotions about climate change and depression, anxiety, and stress in students in Rio Grande, Brazil, before and after the 2024 extreme climate event. This is a quantitative study, with before and after measurements, with a single group. The questions measured the outcome: “Are you concerned about climate change?” and “Do you have negative emotions about climate change or thoughts and feelings that bad things could happen to the planet because of climate change?” The DASS-21 measured mental health. Adjusted analyses were conducted using linear regression, with results presented in beta coefficient and 95% CI. We observed an increasing concern (p=0.004) and negative emotions about the climate (p=0.019), depression (p=0.047), anxiety (p=0.043), and stress (p=0.010) symptoms from pre- to post-event. The depression score increased significantly in those who were concerned about climate change before and after the event (b=4.64, 95%CI=1.91; 7.38; p=0.006), as did depression and anxiety scores in those with negative emotions about the climate (b=5.11, 95%CI=1.59; 8.62; p=0.015; (b=4.43, 95%CI=1.28; 7.78; p=0.028, respectively). It is concluded that the students assessed increased their concern and negative emotions about the climate and deteriorated mental health after an extreme event.

Keywords: Flood; Posttraumatic stress disorder; Ecoanxiety; Adolescent.

RESUMO

O objetivo do estudo foi verificar e testar a associação entre preocupação e emoções negativas com as mudanças climáticas e os sintomas de depressão, ansiedade e estresse em escolares do município de Rio Grande-RS, antes e após ocorrência do evento climático extremo de 2024. Trata-se de estudo quantitativo, com medidas antes e depois. O desfecho foi medido pelas questões "você se preocupa com as mudanças climáticas?" e "você tem emoções negativas em relação às mudanças climáticas ou pensamento e sensação de que coisas ruins podem acontecer com o planeta por causa das mudanças do clima?". Análises bivariadas foram conduzidas pelos testes de McNemar e Wilcoxon e a ajustada por regressão linear com resultados apresentados em coeficiente beta e IC95%, a significância aceita foi 5%. Houve aumento da preocupação (p=0,004) e emoções negativas com o clima (p=0,019), sintomas de depressão (p=0,047), ansiedade (p=0,043) e estresse (p=0,010) do pré para o pós-evento. O escore de depressão aumentou significativamente naqueles que tinham preocupação com as mudanças climáticas antes e após evento (b=4.64, 95%CI=1.91; 7.38; p=0,006), assim como os de depressão e ansiedade naqueles com emoções negativas com o clima (b=5.11, 95%CI=1.59; 8.62; p=0,015; (b=4.43, 95%CI=1.28; 7.78; p=0,028, respectivamente). Conclui-se que os estudantes avaliados aumentaram sua preocupação e emoções negativas com o clima assim como pioraram a saúde mental após evento extremo.

Palavras-chave: Enchente; Transtorno de estresse pós-traumático; Ecoansiedade; Adolescente.

INTRODUCTION

Human activities, especially greenhouse gas emissions resulting from unsustainable energy, inadequate use, and changes in soil, lifestyle, consumption patterns and human production have caused global warming, which is reflected in the climate changes experienced worldwide[1]. Such changes contribute directly to humanitarian emergencies caused by extreme events such as heat waves, forest fires, tropical cyclones, hurricanes, and floods[2]. These events are increasingly frequent and intense worldwide, severely threatening people's health[2].

As an example of this, at least 14 extreme events were experienced in the state of Rio Grande do Sul, Brazil, in less than a year, such as the passage of cyclones and significant floods[3], the last of which occurred between late April and early May 2024 and was the largest among them, with record rainfall volumes and unprecedented floods[4], as a consequence of the El-Niño[5].

This flood led to a state of public calamity. Essential services were interrupted and there was speculation regarding basic survival items. In one of the most affected municipalities, around 2,000 people were in a situation of environmental refugees until May 6, 2024[6]. Events of this magnitude have generated fear in the population and increased several health problems, including mental and psychological health issues treated in the literature as ecoanxiety[7,8].

Ecoanxiety was initially described by Albrecht et al.[9] and adopted by the American Psychology Association[10] as a chronic fear of suffering an environmental cataclysm, which occurs when observing the impact of apparently irrevocable extreme events, generating a concern associated with the future of oneself and the next generations. Moreover, this problem can cause chronic fear of environmental catastrophe, a mix of negative emotions such as concern and sadness[11].

A recent systematic review has shown that younger generations, women, and more impoverished countries in the global south are more affected by mental health problems from concerns about climate change[12]. A study conducted with young people from several countries around the world, including Brazil, found that 59% of participants were very much or extremely concerned about climate change, and more than 50% reported sadness, anxiety, irritation, and helplessness before such changes, besides feeling helpless and guilty[13]. Additionally, around 45% also reported that climate change negatively affected their daily lives, besides having negative thoughts about climate change, reporting that they think the future is scary[13].

Regarding Brazilian children and adolescents, a qualitative study by Chou et al.[14] showed that children and adolescents with a profile that was aware of and engaged with climate change were those who most perceived climate change as imminent and as needing self-protection, the need to act urgently for what is not yet lost, negative emotions, and feeling pressured to act in some way vis-à-vis such changes.

The evidence described above highlights the importance of verifying the effects of exposure to extreme events, such as the floods experienced in Rio Grande do Sul, on the mental health of children and adolescents. However, studies with Brazilian adolescents that assess ecoanxiety and its possible acute impacts on the manifestation of mental health symptoms after an extreme climate event are scarce. Therefore, this study aims to verify the changes in concerns and negative emotions about climate change and in depression, anxiety, and stress symptoms in students from a municipality in the extreme south of Rio Grande do Sul after the extreme climate event that occurred between late April and early May 2024 in Rio Grande do Sul, Brazil. Additionally, we analyzed whether the concern about climate change and the negative emotions related to it impacted the possible changes in the mental health symptoms of these students.

METHODS

Rio Grande has 191,900 inhabitants and is 313 kilometers away from the capital of Rio Grande do Sul (Porto Alegre)[15]. The municipality is peninsular, bathed by Lagoa dos Patos and the Atlantic Ocean. The flood that occurred in Rio Grande between late April and early May was caused by heavy rainfall and Lake Guaíba's water runoff, which bathes Porto Alegre, to Lagoa dos Patos, which bathes several municipalities in the state, including Rio Grande, where it reached significantly high levels, flooding most of the city, such as the riverside regions, which involve a significant part of the municipality's territory due to its peninsula characteristics. The school involved in the study is located in the Casino neighborhood, a beach resort that was not directly affected by the flood but had the Barra jetties channel. In this place, the waters of the lagoon drain into the ocean.*Study design*

This quantitative, analytical study was conducted with before and after measurements on a single group. It is nested in a longitudinal project that started collecting data with adolescents from 10 state schools in Rio Grande do Sul in April 2024, which was interrupted the following month due to the weather conditions and floods that affected the state. Data collection resumed after suspended classes, making it possible to evaluate the same group of students at different times.

Population and sample

The sample included students of both genders in their final elementary school years, regularly enrolled and attending classes in one of the 10 schools selected for the longitudinal project in the city's urban area. In the first stage of the study, 45 adolescents comprised the total sample, while only two were not found for the study follow-up due to absence from classes during two weeks of active search at the school in the second stage. Non-responders were students aged

13-14, seventh and eighth graders, white and brown, and residing in urban areas. The response rate for the study was 95.5%.

Ethical aspects

The Federal University of Rio Grande Research Ethics Committee approved the study, which was registered under Opinion N° 6.703.297, CAAE:77513224.5.0000.5324. All participants presented an Informed Consent Form signed by a legal guardian and agreed to participate through the Informed Assent Form.

Inclusion and exclusion criteria

The study included students regularly enrolled in the selected school aged 12-16. Students with some cognitive impairment or who did not answer the questionnaire questions involving the variables of this study were excluded.

Data collection

The first data collection stage occurred in April 2024 (April 22-26), before the floods in the state and municipality. Data collection resumed after the period of suspended classes, and the same participants were again sought to respond to the research instruments in June and July of the same year (June 24-July 3). A team of trained researchers conducted the collection, and the data were collected through tablets using the Research Electronic Data Capture (RedCap) platform, with the responses self-reported by the participants.

Study variables

Demographic and economic variables were collected from self-reported information on gender (male, female), age (in years), skin color or ethnicity (White, Black, Yellow, Brown, or

Indigenous), and socioeconomic stratum measured from the questionnaire of the Brazilian Association of Research Companies (ABEP)[16], where students were identified as being from strata A, B (including strata B1 and B2) and C (including strata C1 and C2).

Concern about climate change was assessed through a question adapted from the study by Chou et al.[14], where students were asked the following question: "*Are you concerned about climate change?*" with a dichotomous answer (yes or no) as the option. Those who responded positively to the question were deemed to be concerned. Furthermore, students were asked whether they had negative emotions regarding climate change or thoughts and feelings that bad things could happen to the planet because of climate change and whether they found interesting information about the climate on their own on the internet, social networks[14], also with a dichotomous answer (yes or no). Regarding these questions and according to the students' responses at both times, a categorical variable was created in which they were distributed into four groups: No-No (negative responses at both times); No-Yes (positive response only at the second time); Yes-No (positive response only at the first time) and Yes-Yes (positive responses at both times).

Anxiety, depression, and stress symptoms, and the overall mental health score, were measured using the Depression, Anxiety, and Stress Scale for Adolescents[17], a study that validated and adapted the Depression, Anxiety, and Stress Scale (DASS-21) – short form, for Brazilian adolescents. Each of the 21 items on the scale has response options on a Likert scale ranging from zero (no symptoms) to three (worst symptoms), and the score is generated by adding the questions together and multiplying by two[18]. The higher the score, the worse the mental health problems. Cronbach's alpha for the scale was 0.91 before the flood and 0.95 for the post-flood period.

To assess whether students were affected by the flood in the municipality, two new specific questions were included in the second phase of the survey, namely: *"Were you and the people who*

live with you directly affected by the flood (did water enter the house or did you lose property due to the floods)?; and, *"Were any relatives who do not live with you or friends affected by the flood (water entered their house or they lost property due to the floods)?"* Both questions had a dichotomous answer option (yes or no).

Statistical analysis

Data from the RedCap platform were exported to the Stata statistical package (version 14.2), where statistical analyses were conducted. Descriptive results are shown as means and standard deviations for continuous variables and absolute and relative frequencies for categorical variables. Comparisons between measurements before and after the floods were performed using the McNemar test for categorical variables and the paired t-test for continuous variables.

Changes and factors associated with mental health symptoms (depression, anxiety, stress, and total DASS-21 score) were assessed using random-effect linear regressions. For each outcome analyzed, the time variable (pre-post), gender, the variables of concerns and negative emotions about climate change, and having been impacted by floods were included as possible predictors. Interaction terms between time and the other variables in the model were created to identify possible moderations of these variables in the changes in mental health symptom scores before and after the extreme climate event. Additionally, a new linear regression models with random effects were performed to test the interactions between time and perceived concern about climate change and negative emotions about climate change before and after the extreme climate event. Regression coefficients (b) with 95% confidence intervals (95%CI) were used as effect measures. Standard errors and 95%CI of the regression coefficients were obtained using the bootstrap resampling method with one thousand random samples and a 4-digit random seed (1234). The significance level adopted in this study was $p<0.05$ for two-tailed tests for all analyses performed.

RESULTS

The study included 45 students, mostly female (53.7%) and white (55.8%), aged 12-16. Most students were ninth-graders (40%), and 52.8% were from socioeconomic stratum B (Table S1). In total, 61.9% of the students reported being directly/indirectly affected by the floods, and 83.7% reported having found interesting information about the climate on the internet and social networks.

****TABLE S1****

Figure 1 shows the percentage of students who reported concerns and negative emotions about climate change (Figure 1A) and the mean score of mental health symptoms (Figure 1B) before and after the extreme weather event. There was a significant increase in the percentage of students who were concerned about climate change (35.6% vs. 67.4%) and the percentage of students who reported having negative emotions about climate change or thinking and feeling that bad things could happen to the planet because of climate change (44.4% vs. 69.8%). Regarding mental health variables (Figure 1B), the bivariate analysis identified an increase in depression, anxiety, and stress scores and, consequently, in the overall DASS-21 scores.

****FIGURES 1A and 1B****

Table 2 presents the changes and factors associated with mental health symptom scores after the extreme weather event. A significant increase was observed in the scores of depression (b=2.68, 95%CI=0.76; 4.60, p=0.006), anxiety (b=2.85, 95%CI=0.83; 4.88, p=0.006), and stress (b=2.51, 95%CI=0.48; 4.54, p=0.015) symptoms, and in the overall DASS-21 score (b=4.19, 95%CI=1.53; 6.85, p=0.002).

Female students had on average, higher scores than males in all mental health symptoms analyzed, with regression coefficients ranging from 4.10 (95%CI =0.27; 7.92, p=0.036) for depressive symptoms to 8.89 (95%CI =2.60; 15.17, p=0.006) for the total DASS-21 score. Interaction analyses showed that the increase in symptoms of anxiety, stress, and overall DASS-21 scores after the extreme weather event occurred more markedly in female students.

****TABLE 1****

Figure 2 (A to D) shows the changes in mental health symptoms per the perceived concern about climate change before and after the extreme weather event. For all conditions evaluated, students with concerns before and after the event (Yes-Yes) had significant symptom elevations. However, significant interactions were seen only for depressive symptoms between the Yes-Yes group (b=4.64, 95%CI=1.91; 7.38) and the No-Yes (b=0.81, 95%CI =-1.33; 2.95, p-interaction= 0.006) and Yes-No (b=-0.12, 95%CI =-3.72; 3.47, p-interaction=0.031) groups.

****FIGURE 2****

Figure 3 (A to D) shows the changes in mental health symptoms per the occurrence of negative emotions resulting from climate change before and after the extreme climate event. For all symptoms assessed, students with negative emotions before and after the event (Yes-Yes) and only after the event (No-Yes) showed significant increases in scores. However, significant interactions were seen for depressive symptoms between the Yes-Yes group (b=5.11, 95%CI=1.59; 8.62) and the No-No group (b=0.76, 95%CI =-1.96; 3.48, p-interaction=0.015), for anxiety symptoms between the Yes-Yes group (b=4.43, 95%CI=1.28; 7.78) and the No-No group (b=0.75, 95%CI =-1.59; 3.10, p-interaction= 0.028) and overall DASS-21 scores between the Yes-Yes group (b=6.76, 95%CI=2.12; 11.40) and the No-No group (b=1.37, 95%CI =-1.63; 4.38, p-interaction= 0.022).

****FIGURE 3****

DISCUSSION

The results show a significant increase in concern about climate change and negative emotions or thoughts and feelings that bad things could happen to the planet because of these changes, anxiety, depression, and stress symptoms, and overall mental health scores, especially among girls. They also showed an increase in symptoms of depression among students who were concerned about climate change before the flood and continued to be concerned after the extreme weather event and among those who were not concerned and became concerned. They also evidenced a significant increase in symptoms of depression, anxiety, and general mental health in those with negative emotions about climate change before and after the floods.

The increase in concern and negative emotions and thoughts related to climate change observed in this study reflects what is seen globally, where a large percentage of young people, even those older than those assessed (16-25 years old), are very much or extremely concerned about climate change, feel that climate change has negatively affected their daily lives, and have negative thoughts about climate change[13]. In Brazil, 29% of young people were very much concerned, and 38% were extremely concerned about climate change[13].

Some of the impacts of extreme climate events are harmful consequences for the mental health of the individuals affected by them[13,19], and even children and adolescents with an unconscious profile about climate threats fear the proximity to nature and natural threats that may occur after these events[14]. Thus, it seems essential to understand the subjectivities and experiences of these individuals to create an effective communication strategy to promote climate education and help them manage their anxiety and distress regarding climate change[14].

The elevated depressive and anxiety symptoms among students concerned about climate change and with negative emotions and thoughts about such changes before and after the extreme climate event reflect what is highlighted in the literature, where the more concern, negative feelings, and emotions young people have about this type of event, the greater the prevalence of these symptoms and other mental disorders[13,19]. In Tanzania, young people aged 18 to 23 who suffer most from climate change had more symptoms of depression[19], and those who were more concerned about these changes also had more mental health problems in general[19]. As for the fact that girls had the most pronounced growth in mental health problems, this situation reflects the Brazilian outlook where they are more affected by common mental disorders[20] while showing more mental health issues resulting from concerns about climate change[12,19]. Most of the students (around 60%) were indirectly impacted by the extreme event, and even so, mental health problems were troubling. The consequences could have been even worse had they been directly affected.

Extreme weather events of different types cause and intensify symptoms that can lead to negative emotions[21-24]. such as sadness and guilt[21], depression, anger, violence[23], anxiety disorders, and post-traumatic stress[24], besides negatively affecting well-being and quality of life[25], these mental health problems observed after disasters result in many immediate adverse consequences on psychological well-being[10]. However, classic studies in the field related to the psychiatric implications of the direct experience of emergencies and disasters indicate growing stress levels in the first year after their occurrence, depending on the type of victim's exposure[20,27]. Based on the findings of the present study, one could hypothesize that, due to the relationship between mental health problems, especially symptoms of depression and post-traumatic stress disorders[28], most of the effects of the extreme event on the mental health of students may be due to this type of disorder.

The neighborhood where the school involved in the study is located was not affected by the flood, and the flooding in the city may not be a direct cause of the increase in reported concern about climate change, negative emotions, and thoughts related to it, besides the growing mental health problems. However, it is speculated that information from social media may have increased perceptions and tensions related to the climate, as it is assumed that students followed everything that was happening in Rio Grande do Sul, given that more than 80% of them reported looking for interesting information about the subject on the internet and social networks, which possibly increased uncertainty about everything that was to come in the municipality of Rio Grande, where the waters began to rise, invading the city practically a week after other regions of the state. Thus, the hypothesis is raised that these uncertainties may also have negatively affected the mental health of students, their emotions, and concerns about climate change and ecoanxiety.

Even though a large proportion of young people have sought information about the climate on the internet and social media, depending on the type of humanitarian crisis and the moment after its occurrence, access to reliable and quality information can be complex, especially considering fake news, enhanced by easy access to artificial intelligence, and popularized in scientific discussion spaces due to the COVID-19 pandemic[29-31]. Although one article points out that most individuals experience media exposure with neutrality[32], others show that this exposure may be associated with symptoms of post-traumatic stress in more vulnerable or younger populations, especially if the consumption of fake news is considered[33-36].

The study had some limitations that may have interfered with the interpretation of the findings, such as the adopted design, which was very fragile concerning internal and external validity, and the small sample size that reduced the power of the statistical analyses. However, it is one of the few conducted in the country evaluating the theme, and that regarding time allowed for

an almost simultaneous evaluation with the extreme event, which occurred with the students, considering that the initial collection occurred in the week before the start of the floods. The data collection was interrupted due to the suspension of classes in state schools because of the state of public calamity. It returned almost simultaneously when the waters reached normal levels due to their flow into the ocean. The importance of future longitudinal studies and more robust research designs is highlighted to better understand this relationship between concern and emotions about climate change and mental health problems.

The findings showed almost in real time that the students significantly increased their concern about climate change, negative emotions, and thoughts about it, besides evidencing mental health problems from the beginning to the end of the floods in Rio Grande do Sul and the city of Rio Grande, especially girls. The fact that students had significantly increased depressive and general mental health symptoms contributed to the higher concern about the climate and negative emotions and thoughts related to climate change, more significant for those who were concerned before the extreme event and remained so or for those who were not and became concerned about climate change after the event. These findings point to an acute elevation in mental health problems among the students evaluated. As a result, there was an increased concern about climate change and the negative emotions that are related to it, thus highlighting the relevance of public health actions, including the school environment, to prepare and support young people when they experience this type of increasingly frequent climate condition.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

LQC, MPS, and BPA idealized the study; LQC led the writing, contributed to the statistical analyses. BPA, SOS, and SCES participated in the conception and drafting of the manuscript, critically reviewed it, contributed to the progress of the study. DAP, JVTS, CSOJ, and CLCF participated in the data collection, and drafting of the manuscript, critically reviewed, SCD, MPS, will participate in the drafting of the manuscript, its conception, critically review and lead the statistical analyzes. All authors have read and approved the final version submitted and take public responsibility for all aspects of the work.

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Figure 1. Perceptions about climate change (A) and mental health symptoms (B) before and after the extreme climate event.

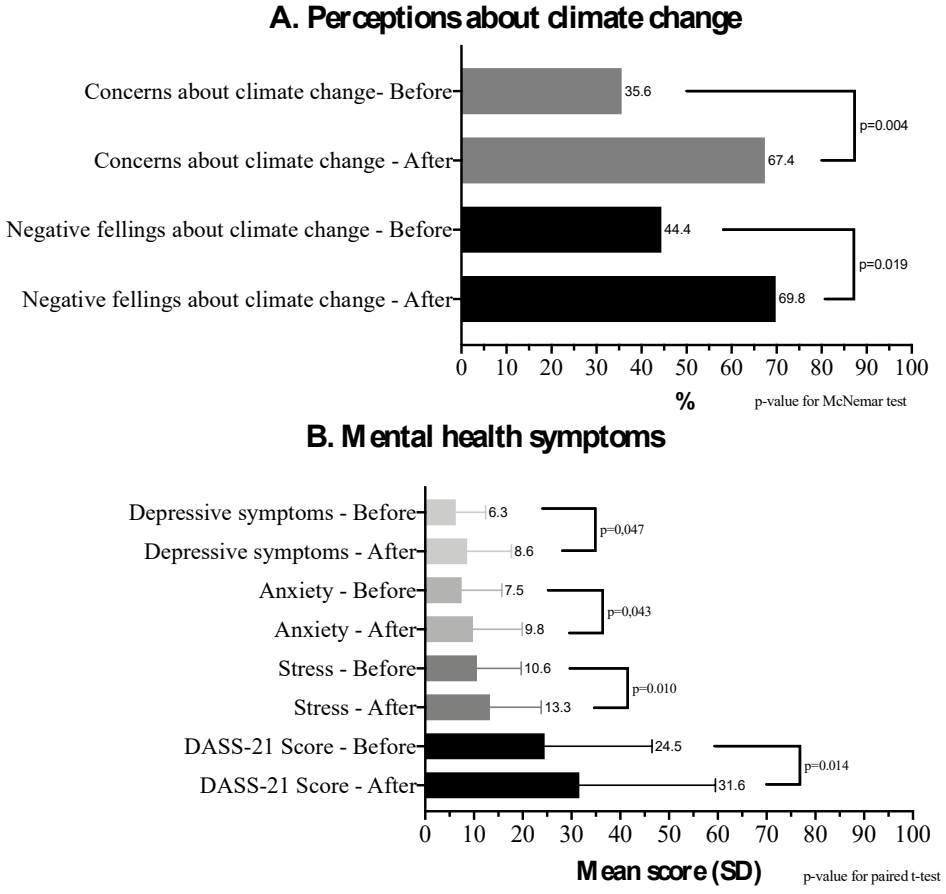
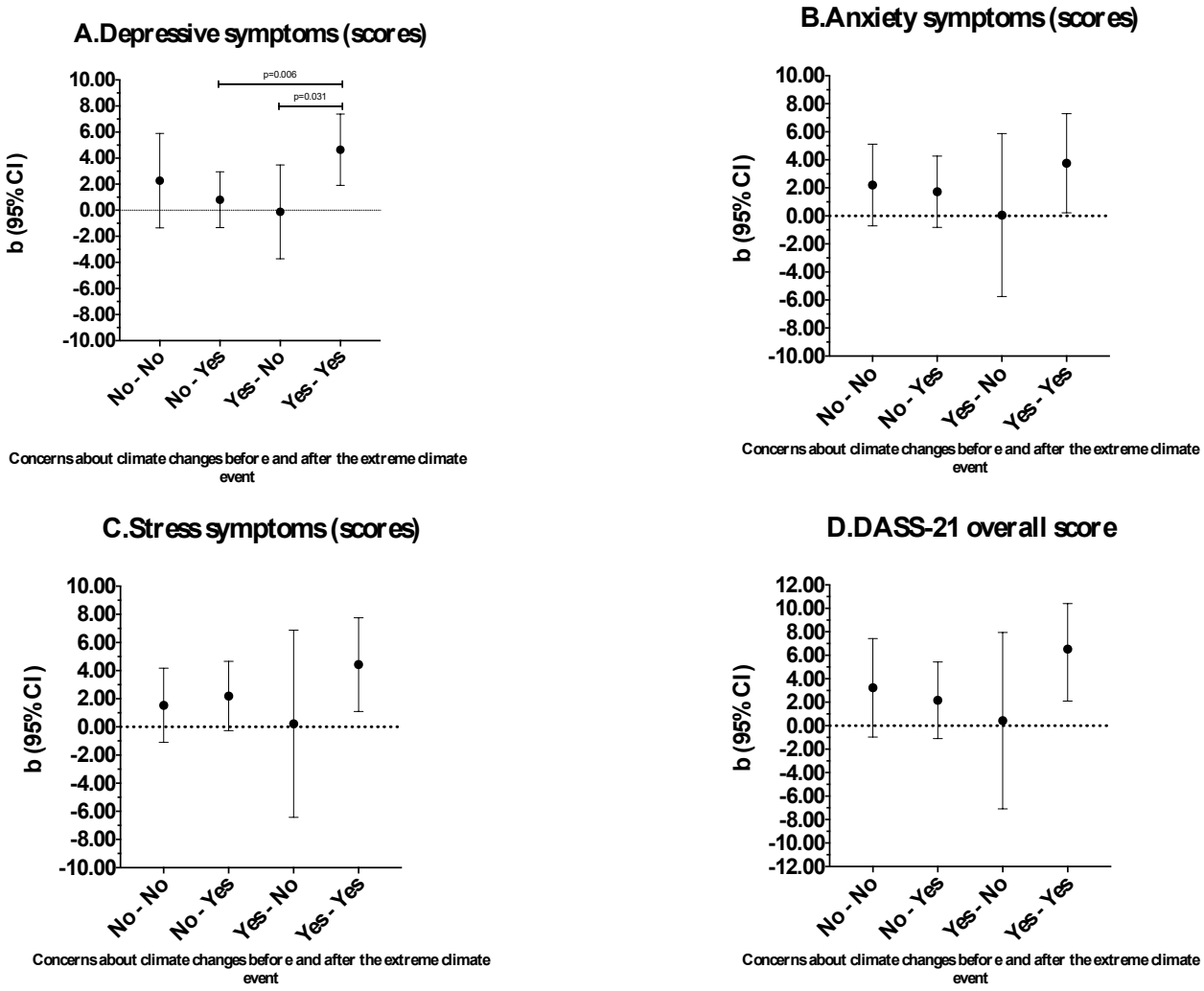


Table 1. Changes and factors associated with mental health symptoms after an extreme climate event.

	Depressive symptoms		Anxiety		Stress		DASS-21 Overall score	
	B (95%CI)	**P**	**B (95%CI)**	**P**	**b (95%CI)**	**p**	**b (95%CI)**	**p**
Time	**2.68 (0.76; 4.60)**	**0.006**	**2.85 (0.83; 4.88)**	**0.006**	**2.51 (0.48; 4.54)**	**0.015**	**4.19 (1.53; 6.85)**	**0.002**
Gender (Female)	**4.10 (0.27; 7.92)**	**0.036**	**6.54 (1.94; 11.13)**	**0.005**	**7.11 (2.19; 12.04)**	**0.005**	**8.89 (2.60; 15.17)**	**0.006**
Concerns about climate change (Yes)	-2.20 (-4.91; 0.51)	0.112	-2.33 (-5.31; 0.64)	0.125	-0.06 (-3.29; 3.17)	0.971	-2.68 (-6.60;1.23)	0.180
Negative feelings about climate change (Yes)	1.80 (-0.69; 4.29)	0.156	1.04 (-1.64; 3.72)	0.447	1.12 (-1.35; 3.60)	0.373	1.77 (-1.48; 5.02)	0.285
Being impacted by the floods (Yes)	1.91 (-1.87; 5.68)	0.322	2.74 (-1.35; 6.83)	0.190	3.64 (-1.03; 8.31)	0.127	4.11 (-1.72; 9.94)	0.167
Interactions	**B (95%CI)**	**P (interaction)**	**B (95%CI)**	**p (interaction)**	**b (95%CI)**	**p (interaction)**	**b (95%CI)**	**p (interaction)**
Time vs. Gender								
Male	1.48 (0-.53; 3.49)	0.116	**0.82 (-1.64; 3.30)**	**0.006**	**0.44 (-1.91; 2.70)**	**0.008**	**1.61 (-1.39; 4.61)**	**0.015**
Female	3.63 (1.01; 6.25)		**4.52 (2.00; 7.04)**		**4.20 (1.55; 6.84)**		**6.29 (2.74; 9.83)**	
Time vs. Concerns about climate change								
No	3.15 (0.38; 5.91)	0.274	3.29 (0.65; 5.92)	0.289	2.24 (-0.15; 4.63)	0.772	4.62 (1.11;8.12)	0.369
Yes	2.03 (0.03; 4.03)		2.18 (0.13; 4.21)		2.52 (0.60; 4.44)		3.42 (0.79; 6.04)	
Time vs. Negative feelings about climate change								

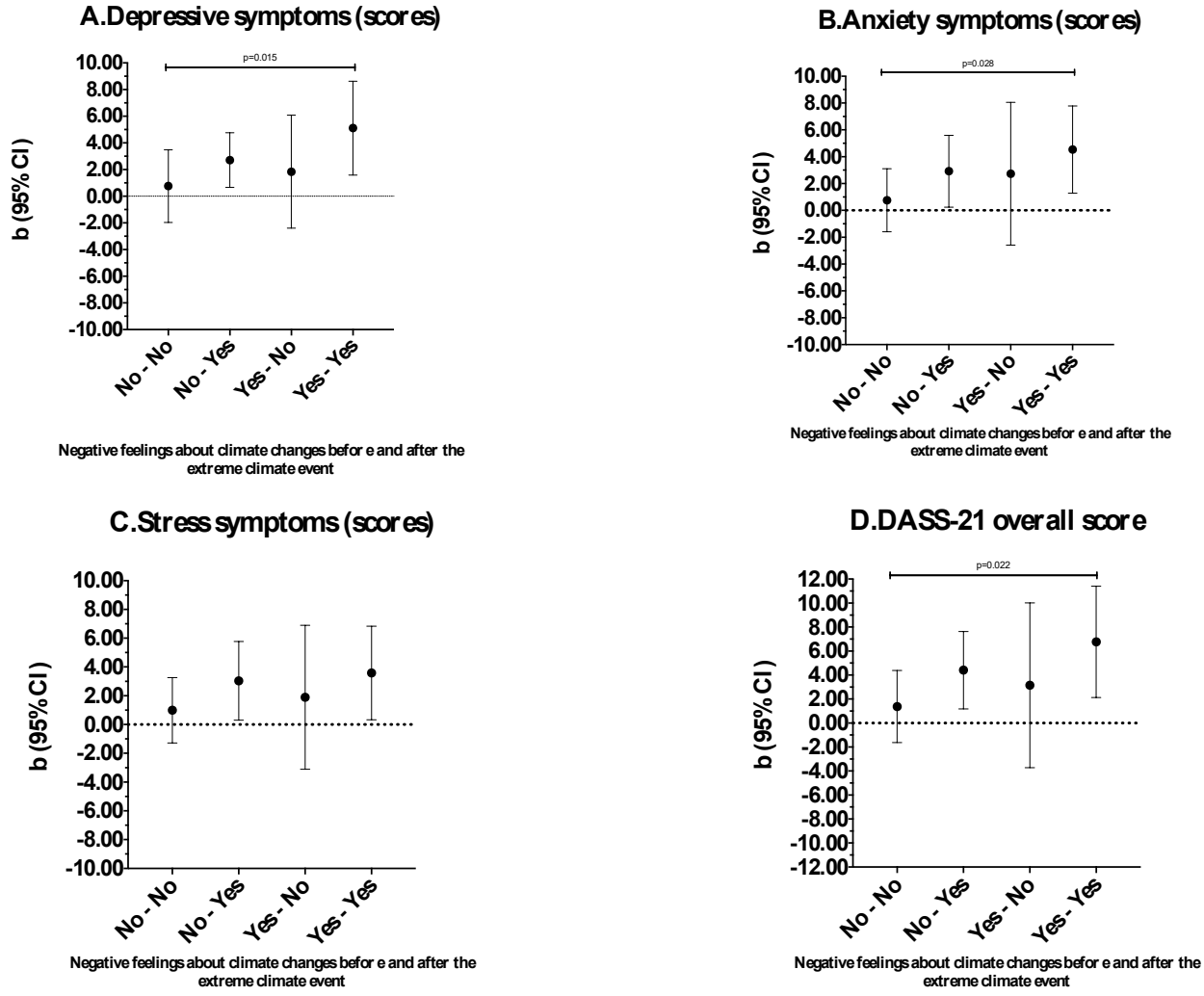
No	1.57 (-0.48; 3.62)	0.068	2.01 (-0.24; 4.26)	0.181	1.74 (-0.41; 3.87)	0.151	2.89 (0.11; 5.67)	0.089
Yes	3.22 (1.13; 5.32)		3.20 (1.15; 5.25)		2.86 (0.80; 4.92)		4.76 (2.06; 7.45)	
Time vs. Affected by the floods								
No	1.71 (-0.17; 3.60)	0.170	1.77 (-0.39; 3.93)	0.176	1.06 (-1.18; 3.31)	0.067	2.42 (-0.21; 5.05)	0.094
Yes	3.30 (0.87; 5.72)		3.53 (0.99; 6.06)		3.41 (0.91; 5.91)		5.31 (1.83; 8.78)	

Figure 2. Interaction between time (before and after) and concerns about climate change in mental health symptoms.



*Adjusted by gender, negative feelings about climate changes, and being impacted by the floods.

Figure 3. Interaction between time (before and after) and negative feelings about climate change mental health symptoms.



*Adjusted by gender, negative concerns about climate changes, and being impacted by the floods.

Table S1. Sample characteristics (n=45).

Variables	N	%
Gender (Female)	24	53.7
Age (years)		
12	5	11.4
13	14	31.8
14	17	38.6
15	4	9.1
16	4	9.1
Skin color		
White	24	55.8
Black/Brown	17	39.5
Yellow	2	4.7
School Grade (High School)		
7º	11	24.4
8º	16	35.6
9º	18	40.0
Economic status		
A	8	22.2
B	19	52.8
C	9	25.0
Affected by the floods (Yes) (n=42)	26	61.9

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