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ORIGINAL

Mental health in educational communities following a natural disaster in Chile

Salud mental en comunidades educativas a partir de un desastre natural en Chile

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ABSTRACT

Introduction: schoolchildren are estimated to be among the most vulnerable to the negative effects of natural disasters. One of the most common consequences is post-traumatic stress disorder (PTSD). This study evaluated PTSD symptoms in schoolchildren affected by an earthquake and tsunami in Chile.
Method: a total of 325 schoolchildren aged 10 to 15 years (52,6 % female and 47,4 % male) participated 12 months after the natural disaster. Of this population, 167 schoolchildren were exposed to the earthquake and tsunami, and 158 children served as a comparison group, as they lived more than 360 km from the epicenter.
Results: the groups showed statistically significant differences in the proportion of schoolchildren with PTSD ($p < 0,05$): 13,9 % in the non-exposed group and 29,9 % in the group exposed to the natural disaster. The association between group membership and PTSD was also statistically significant ($x2(1,325) = 12,08$, $p < 0,001$, $V = 0,19$) at 12 months.
Conclusions: schoolchildren exposed to the earthquake presented greater PTSD symptoms than the comparison group. Therefore, symptom severity could be determined by the level of earthquake exposure. The study findings propose an understanding of the processes that contribute to addressing mental health in school education.

Keywords: Natural Disaster; Educational Communities; Mental Health; Schoolchildren.

RESUMEN

Introducción: se estima que los escolares se encuentran entre las personas más vulnerables a los efectos negativos de los desastres naturales. Siendo una de las mayores consecuencias, la sintomatología de Trastorno de Estrés postraumático (TEPT). Este estudio evaluó la sintomatología de TEPT en escolares afectados por un terremoto y tsunami en Chile.
Método: participó un total de 325 escolares de 10 a 15 años (52,6 % mujeres y 47,4 % hombre), 12 meses después de ocurrido el desastre natural. De esta población, 167 escolares estuvieron expuestos al terremoto y tsunami y 158 niños como grupo de comparación ya que residían a más de 360 Kms. del epicentro.
Resultados: los grupos presentaron diferencias estadísticamente significativas en la proporción de escolares con TEPT ($p< 0,05$), 13,9 % en el grupo de no expuestos y 29,9 % en el grupo de expuestos al desastre natural. La asociación entre pertenencia a grupo y TEPT es también estadísticamente significativa ($x2(1,325) = 12,08$, $p< 0,001$, $V = 0,19$) a los 12 meses.
Conclusiones: los escolares expuestos al terremoto presentaron mayor sintomatología de TEPT que el grupo de comparación. Por lo tanto, la severidad de los síntomas podría darse a partir del nivel de exposición al terremoto. Los hallazgos del estudio proponen la comprensión de los procesos que contribuyen a abordar la salud mental en la educación escolar.

Palabras clave: Desastre Natural; Comunidades Educativas; Salud Mental; Escolares.

INTRODUCTION

Natural disasters are uncontrollable, unexpected, and intense events that put the physical and psychological well-being of those exposed at risk,[1] causing various effects on well-being,[2] including impacts on mental health, mortality, morbidity, and financial status, among others.[3]

One of the areas most severely affected by natural disasters, such as earthquakes, floods, and forest fires, is education, as the least damaged educational centers sometimes have to function as temporary shelters, preventing students from returning to their regular activities. Therefore, schoolchildren are among the most vulnerable to the adverse effects of disasters.[4]

The emotional responses of children and adolescents to these disasters tend to vary widely, ranging from those that initially serve an adaptive function or cause minimal and short-lived disturbances,[5] to those of a more psychopathological nature, including post-traumatic stress, either in the form of a disorder (PTSD) or symptoms (PTS).[6]

According to the American Psychiatric Association[7], PTSD is a psychiatric disorder that can occur after experiencing, witnessing, or being exposed to events that threaten one's own life or the lives of others, as well as extreme exposure to details of the traumatic event. The emotional reaction experienced involves an intense response of fear, hopelessness, or horror, expressed in children through unstructured or agitated behavior. Symptoms include re-experiencing the traumatic event, avoidance of stimuli associated with the trauma, hyperarousal, and persistent negative changes in cognition and mood.[8]

Research has shown that disruptions to daily life, such as moving house, changing schools or communities, separation from friends, and altered leisure activities, among others, contribute to increased symptoms of post-traumatic stress;[9] the severity of symptoms in schoolchildren is related to factors such as the level of exposure to the event, injuries, loss of loved ones, and the level of parental support.[10] Another factor that influences severity is gender, with a higher prevalence of PTSD in women.[11,12] About age, there are differences, as while most studies suggest that younger age is a factor associated with higher PTSD,[13] other studies show a higher prevalence of PTSD in older schoolchildren.[14]

In the school-age population, the prevalence of PTSD in response to natural disasters has varied dramatically due to methodological aspects, the impact of the disasters, and individual and environmental characteristics, among other factors.[15] The figures reveal that it ranges from 2,5 % to 60 %.[16]

Considering the frequency of natural disasters in Chile, the objective of this study is to describe PTSD in the school population affected by an earthquake measuring 8,8 on the Richter scale, followed by a tsunami, in central/southern Chile, which was classified as one of the eight largest ever recorded in the world.[17]

METHOD

Design

This study used a quantitative, non-experimental, descriptive, and correlational research design. The data were collected simultaneously, making this a cross-sectional study.

Participants

The total sample consisted of 325 children (52,6 % female and 47,4 % male) aged 10 to 15 years (M = 12,7, SD = 1,51). The first subsample included 167 schoolchildren, evaluated 12 months after the natural disaster (56,3 % female and 43,7 % male), from two educational establishments affected by the earthquake and tsunami in south-central Chile in February 2010. The second subsample consisted of 158 schoolchildren (48,7 % female and 51,3 % male) who lived more than 360 km from the epicenter and were used as a comparison group for greater methodological rigor.

Instruments

Post-traumatic symptoms

The Child Post-Traumatic Stress Disorder Symptom Scale (CPSS) by Foa et al.[18] was used, which was developed to assess the presence and severity of PTSD symptoms in children and adolescents aged 8 to 18 years with a known history of trauma. The scale is based on the DSM-IV diagnostic criteria for PTSD and consists of 17 Likert-type items referring to the frequency of symptoms of this disorder, ranging from 0 (never) to 4 (9 times or more), with a total score ranging from 0 to 68 points. The psychometric properties indicate adequate internal consistency (α = 0,89) and temporal stability (r = 0,84). It was validated in Chile by Bustos et al.[19], obtaining appropriate internal consistency values, similar to those of the original instrument (α = 0,91) and a 90,7 % discrimination capacity of the scale concerning the presence/absence of PTSD established by clinical

criteria. The cut-off score is 24 points. The scale obtained adequate internal consistency in the present study, α = 0,87.

Exposure to traumatic events

The Hurricane-Related Traumatic Experiences (HURTE)[20] adapted for other natural disasters, was used to assess exposure to the event. It consists of 17 items with two response options (yes/no), of which 1 item refers to the direct perception of a threat to the child's own life, six items relate to specific events observable during the event that largely reflect life-threatening experiences, and 10 items refer to the post-disaster period, mainly reflecting disruptive experiences and losses.

A sociodemographic questionnaire was used to obtain data such as gender, age, grade, and who they live with, among others.

Procedure

First, the National Emergency Office of the Chilean Ministry of the Interior (ONEMI) was contacted to obtain a record of the areas most affected by the earthquake and tsunami. This entity provided information on the status of educational centers after the quake and contact details. Given the objective of this research, two of the schools most severely affected by the natural disaster were selected as a sample of the group affected by the earthquake and tsunami. For greater methodological rigor, a comparison group was chosen, consisting of two educational centers with socioeconomic characteristics similar to those in the affected area, which had less exposure to the earthquake, as they were located more than 360 km from the epicenter.

Once the schools were chosen, interviews were requested with the principals to provide information about the purpose of the research and explain the evaluation strategies, ethical safeguards, time requirements, and presentation of the instruments. After the study was approved, parents/caregivers were informed, and their consent was requested. The participation of the schoolchildren was voluntary, and they signed a consent form. Their identities were handled with discretion, and the confidentiality of the data provided was guaranteed. The data were only analyzed as a whole.

A committee of the Faculty of Psychology at the Complutense University of Madrid, Spain, reviewed and approved the study in accordance with the ethical principles for psychological research established by the American Psychological Association (APA).

Data analysis

Statistical data processing was performed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Exploratory factor analysis was performed using FACTOR version 9.02, and confirmatory factor analysis was performed using LISREL 8.8. Pearson's product-moment correlation coefficient was used to analyze the relationship between PTSD and subscales.

RESULTS

Table 1 shows statistically significant differences between the two groups. The sample with PTSD ($p < 0,05$) was 29,9 % in the group with the highest exposure and 13,9 % in the group with the lowest exposure. The association between group membership and PTSD was also statistically significant ($x2$ (1, 325) = 12,08, $p < 0,001$, V = 0,19).

Table 1. Prevalence of PTSD at 12 months in the groups not affected and affected by the earthquake. (Cut-off score = 24 points)

			Less exposure	Greater exposure	Total
TEPT	No	Count	136	117	253
		% within groups	86,1	70,1	77,8
		Corrected residue	3,5	-3,5	
	Sí	Recount	22	50	72
		% within groups	13,9	29,9	22,2
		Corrected residue	-3,5	3,5	
Total		Recount	158	167	325
		% within groups	100,0	100,0	100,0

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The differences in means between the two groups were analyzed in total PTSD and each of its three components: Re-experiencing, Avoidance, and Hypervigilance. The results are presented in table 2 Levene's statistic showed the homogeneity of the variances of the two groups in the four variables (p>0,05). Student's t-tests were performed with equal variances and degrees of freedom = 323. Since Shapiro-Wilks normality tests showed evidence of non-normality (positive asymmetry in both groups, more pronounced in the group with higher exposure), non-parametric tests were also performed using the Mann-Whitney U test.

Table 2. Descriptive statistics and significance of differences between the groups with higher and lower exposure in TEPT and its components

	Group	Average	DT	T	Eta square	Z de U-M-W
TEPT Total	Lower exposure	22,32	12,03	7,76***	0,16	7,56***
	Lower exposure	12,57	10,53			
Re-experimentation	Lower exposure	6,92	4,46	5,69***	0,09	5,54***
	Lower exposure	4,35	3,63			
Avoidance	Lower exposure	7,15	5,07	5,28***	0,08	5,64***
	Lower exposure	4,35	4,43			
Hypervigilance	Lower exposure	8,25	4,49	9,45***	0,22	8,68***
	Lower exposure	3,87	3,83			

Analysis of variance was performed by group and sex to examine possible differences between sexes and interaction effects. Differences by age were not examined, as the age range is limited and the correlation between age and the four PTSD variables is almost nil and not statistically significant. Table 3 presents the descriptive statistics of the analysis of variance by sex group. The size of each group is shown in parentheses.

Table 3. Descriptive statistics of the analysis of variance by sex group

		Total		Reexp.		Evitación		Hipervigilancia	
Sexo	Grupo	M	D T	M	D T	M	D T	M	D T
Hombre	Mayor exposición (73)	19,32	10,46	5,68	4,18	6,56	4,50	7,07	4,10
	Menor exposición (81)	13,30	10,76	4,63	3,59	4,73	4,62	3,94	3,93
	Total (154)	16,15	11,10	5,13	3,91	5,60	4,64	5,42	4,30
Mujer	Mayor exposición (94)	24,66	12,68	7,88	4,45	7,61	5,46	9,17	4,58
	Menor exposición (77)	11,81	10,28	4,05	3,67	3,96	4,22	3,79	3,75
	Total (171)	18,87	13,28	6,16	4,53	5,96	5,25	6,75	4,99
Total	Mayor exposición (167)	22,32	12,02	6,92	4,45	7,15	5,07	8,25	4,49
	Menor exposición (158)	12,57	10,53	4,35	3,63	4,35	4,43	3,87	3,83
	Total (325)	17,58	12,32	5,67	4,27	5,79	4,97	6,12	4,72

In the PTSD-Total scores, Levene's tests for homogeneity of variances showed equality (p = 0,19). No statistically significant effects of gender were found (F (1, 321) = 2,39, p = 0,12, partial square eta = 0,007). The group effect was statistically significant (F (1, 321) = 57,33, p< 0,001, partial square eta = 0,15). The interaction effect by group was statistically significant (F (1, 321) = 7,52, p = 0,006, partial square eta = 0,023), although with a small effect size. The difference due to the interaction can be seen in that, in the unaffected group, the difference between men and women is not statistically significant (p = 0,403). Still, it is in the affected group (p = 0,002), in which women score higher. This difference can be seen in figure 1.

In the Re-experiment scores (figure 2), Levene's tests for homogeneity of variances showed equality (p = 0,36). No statistically significant effects of gender were found (F (1, 321) = 3,29, p = 0,07, partial square eta = 0,01). The group effect was statistically significant (F (1, 321) = 29,93, p< 0,001, partial square eta = 0,085). The interaction effect of sex by group was statistically significant (F (1, 321) = 9,66, p = 0,006, partial square eta = 0,029), although with a small effect size. The difference due to the interaction can be seen in that, in the unaffected group, the difference between men and women is not statistically significant (p = 0,366). Still, it is in the affected group (p = 0,001), in which women score higher.

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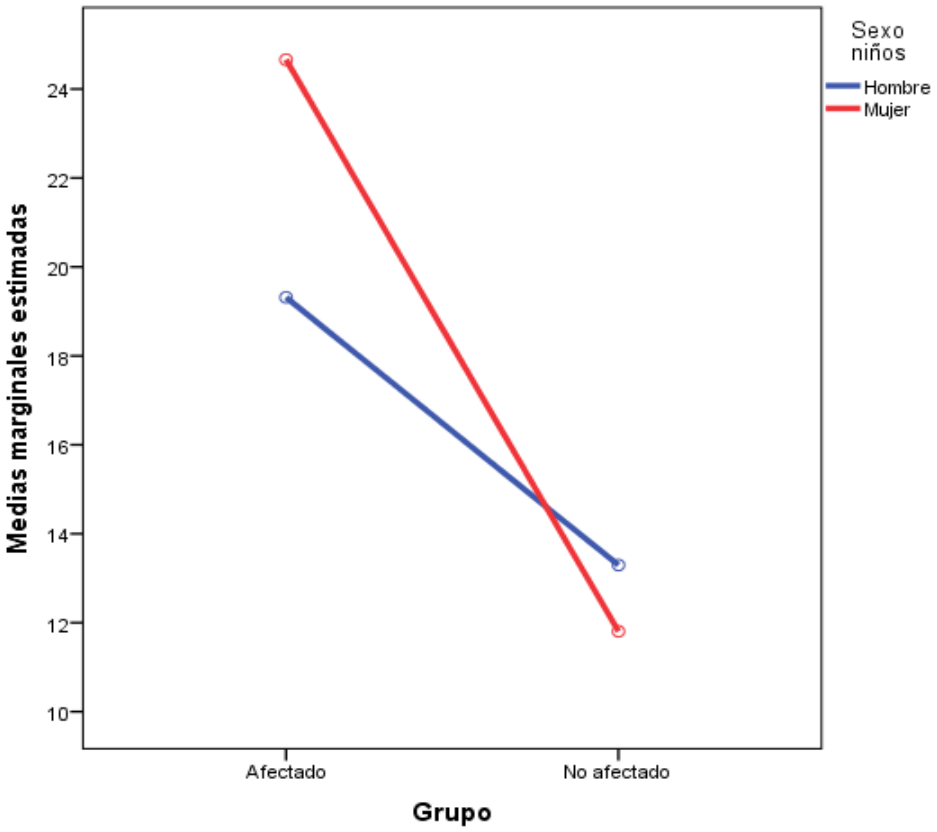

Figure 1. PTSD-Total. Differences by gender in affected and unaffected groups

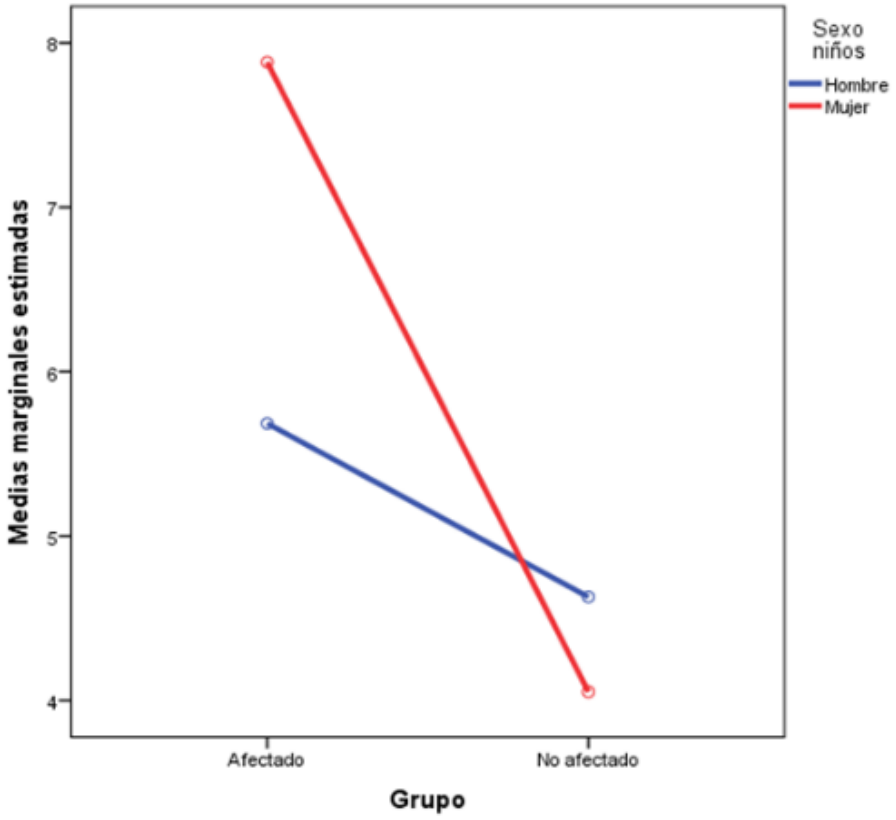

Figure 2. Symptoms of re-experiencing

Figure 3 shows the avoidance scores. Levene's tests for homogeneity of variances showed equality (p = 0,33). No statistically significant effects of gender were found (F (1, 321) = 0,69, p = 0,79, partial square eta =

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0,000). The group effect was statistically significant (F (1, 321) = 26,60, p< 0,001, partial square eta = 0,077). The interaction effect of gender by group was not statistically significant (F (1, 321) = 2,91, p = 0,089, partial square eta = 0,009), so the group effect can be considered similar in both genders.

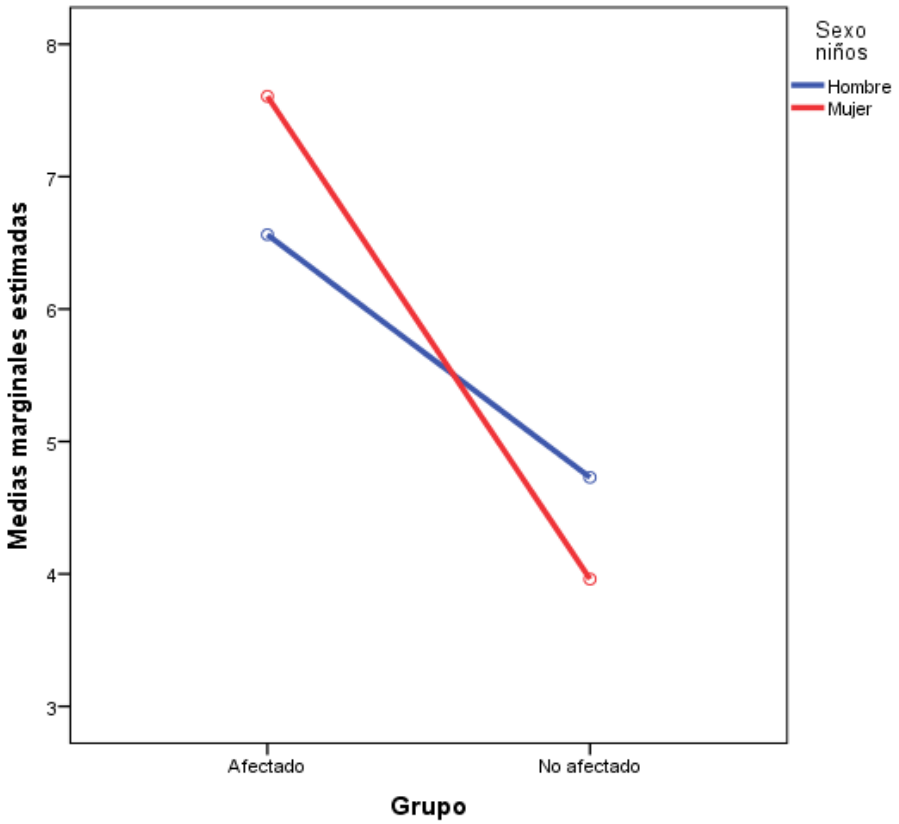

Figure 3. Avoidance symptoms

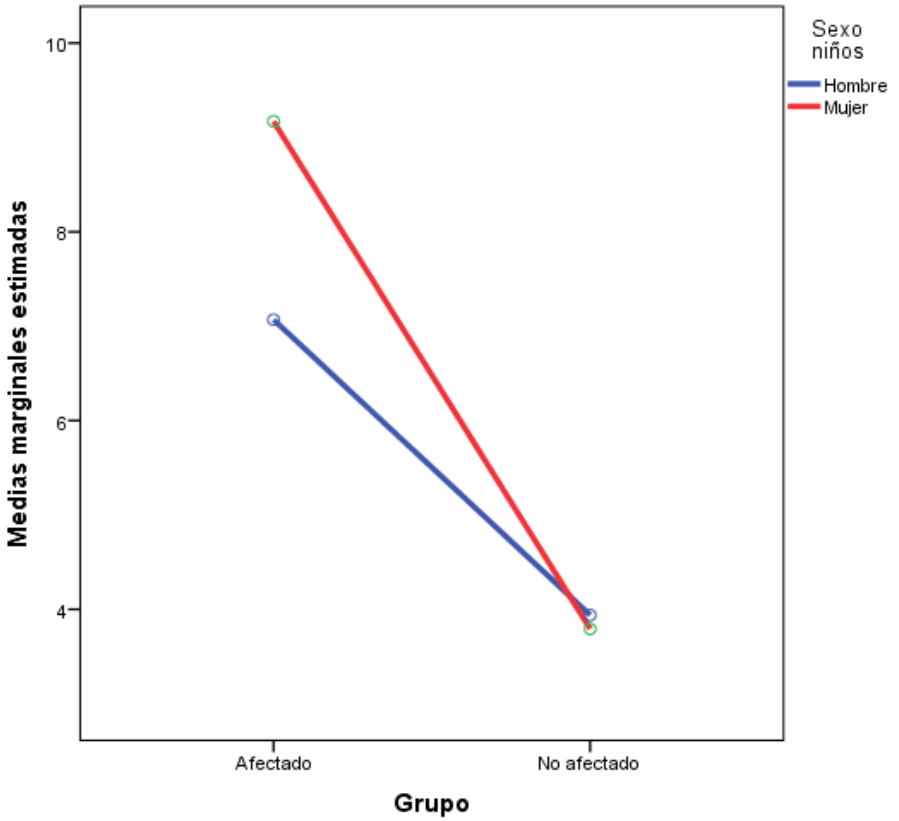

Figure 4. Symptoms of hyperarousal

In the activation or hypervigilance scores (figure 4), Levene's tests for homogeneity of variances showed equality (p = 0,28). Statistically significant effects of sex were found, with a tiny effect size (F (1, 321) = 4,52, p = 0,034, partial square eta = 0,014). The group effect was statistically significant (F (1, 321) = 85,67, p< 0,001, partial square eta = 0,21). The interaction effect of sex by group was statistically significant (F (1, 321) = 5,97, p = 0,016, partial square eta = 0,02), although with a small effect size. The difference due to the interaction can be seen in that, in the unaffected group, the difference between men and women is not statistically significant (p = 0,824). Still, it is in the affected group (p = 0,001), in which women score higher.

Table 4 shows Pearson's correlation coefficients for exposure. In general, the correlation matrix suggests statistically significant relationships across all study variables, with Pearson coefficients ranging from 0,37 to 0,49. The highest correlations are found between exposure and total PTSD. On the other hand, the lowest correlations are found between exposure and avoidance, with correlations of 0,37.

Table 4. Pearson correlations between exposure and PTSD symptom groups

TEPT	Exhibition
Re-experimentation	0,46**
Avoidance	0,37**
Hypervigilance	0,46**
TEPT Total	0,49**

Note: N=325. PTSD = Post-traumatic stress disorder. (**) The correlation is significant at the 0,01 level (2 tails).

DISCUSSION

Natural disasters have a considerable psychological impact on schoolchildren. For this reason, the present study aimed to describe PTSD in schoolchildren affected by a natural disaster in Chile. The results confirm findings from other studies and may contribute to understanding the severity of symptoms based on the level of exposure to the traumatic event.[21,22]

On the other hand,[23] the group used as a comparison group, which had less exposure to the earthquake (living more than 360 km from the epicenter), had low percentages of PTSD (13,9 %), with statistically significant differences between the groups. Therefore, in addition to methodological rigor, the comparison group provided information on factors that appear to be related to a greater effect of the disaster, such as exposure and proximity to the event, degree of destructibility, perception of threat, and losses caused by the disaster. [24] It is essential to consider that the comparison group could not be completely unrelated to the event, due to the characteristics and intensity of the natural disaster, an earthquake of such magnitude that it was felt throughout the country and its surroundings. In addition, the comparison group was also exposed to information provided by the media and social networks for a prolonged period, as well as possible links with some people from the severely affected area, which would explain the percentage of PTSD symptoms in this comparison group.

Compared to similar disasters and studies conducted at equivalent times after the event, the percentage shown in this study is identical to that of the same age population in locations affected by earthquakes.[25] Differences in the disasters and the assessment methods used make it difficult to compare these results with data obtained in previous studies. However, due to their greater threat and destructiveness, the locations affected by earthquakes and tsunamis show higher prevalences than those affected only by earthquakes.

In line with previous research [26,21,27], the prevalence of probable PTSD was higher in women. Regarding PTSD symptom groups, re-experiencing, avoidance, and hyperarousal had similar scores across the three symptom groups, with a slight increase in hyperarousal, which is consistent with other studies.[28]

The results obtained show that greater exposure to the event and the associated disruptive experiences generate greater PTSD. The relationship with the experience of intense fear and danger is consistent with research indicating that the experience of terror is fundamental in the development of subsequent PTSD.[29]

This study has some limitations. The selection of participants was intentional. Therefore, the generalization of these results should be approached with caution. Data collection occurred 12 months after the earthquake, so the results could have been different if the instruments had been applied before or after that period. In addition, some of the variables involved in the models presented were not evaluated, including caregiver response and coping, beliefs about competence, and social support, among others, so it is only possible to indicate some relationships. Furthermore, only a self-report test was used to assess PTSD, which is therefore susceptible to response bias.

CONCLUSIONS

The study's results support the importance of addressing mental health in schoolchildren, implementing preventive programs, and designing intervention strategies that contribute to addressing the consequences of a natural disaster in this population, including the educational community.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Mariela Andrades.
Data curation: Mariela Andrades.
Formal analysis: Mariela Andrades, Felipe E. García.
Research: Mariela Andrades.
Methodology: Mariela Andrades, Felipe E. García.
Project management: Mariela Andrades.
Resources: Mariela Andrades.
Software: Mariela Andrades, Felipe E. García.

Supervision: Mariela Andrades.
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