Salud, Ciencia y Tecnología. 2025; 5:1927
doi: 10.56294/saludcyt20251927

ORIGINAL

Posttraumatic growth in schoolchildren after a natural disaster in Chile

Crecimiento Postraumático en escolares después de un desastre natural en Chile

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Cite as: Andrades M. Posttraumatic growth in schoolchildren after a natural disaster in Chile. Salud, Ciencia y Tecnología. 2025; 5:1927. https://doi.org/10.56294/saludcyt20251927

Submitted: 08-01-2025 **Revised:** 02-04-2025 **Accepted:** 09-07-2025 **Published:** 10-07-2025

Editor: Prof. Dr. William Castillo-González

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ABSTRACT

Introduction: this study evaluated Posttraumatic Growth 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/tsunami, and 158 children served as a comparison group, as they lived more than 360 km from the epicenter.
Results: the group exposed to the earthquake/tsunami had higher Posttraumatic Growth scores than the unexposed group. The sex-by-group interaction effect was statistically significant. Regarding rumination, higher rumination scores were found in the group of participants exposed to the earthquake/tsunami compared to the unexposed group. Deliberate rumination was higher in the group affected by the natural disaster.
Conclusions: shoolchildren exposed to the earthquake/tsunami showed greater Posttraumatic Growth than the comparison group. The study's findings offer insight into the processes that contribute to addressing mental health in school education affected by a natural disaster in Chile.

Keywords: Posttraumatic Growth; Schoolchildren; Natural Disaster; Mental Health.

RESUMEN

Introducción: este estudio evaluó el Crecimiento Postraumático en escolares afectados por un terremoto y un 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/tsunami y 158 niños como grupo de comparación ya que residían a más de 360 Kms. del epicentro.
Resultados: el grupo expuesto al terremoto/tsunami presentó puntuaciones más altas de Crecimiento Postraumático que el grupo no expuesto. El efecto de interacción sexo por grupo resultó estadísticamente significativo. Respecto a la rumiación, puntuaciones más altas de rumiación se encontraron en el grupo de participantes expuestos al terremoto/tsunami en comparación con el grupo no expuesto. La rumiación deliberada fue mayor en el grupo afectado por el desastre natural.
Conclusiones: los escolares expuestos al terremoto/tsunami presentaron mayor Crecimiento Postraumático que el grupo de comparación. Los hallazgos del estudio proponen la comprensión de los procesos que contribuyen a abordar la salud mental en la educación escolar afectada por un desastre natural en Chile.

Palabras clave: Crecimiento Postraumático; Escolares; Desastre natural; Salud mental.

INTRODUCTION

Natural disasters are large-scale, catastrophic events that have increased in frequency and severity in recent years. Converging evidence indicates that the mental health consequences of disasters are extensive and often associated with trauma and disruption of personal and socioeconomic factors in people's lives.[1]

One of the sectors most significantly affected by natural disasters, such as earthquakes, floods, and forest fires, is the education sector. In many cases, schools that suffer minor damage are set up as temporary shelters for victims, which interrupts the normal functioning of academic activities. This situation hinders the continuity of the educational process and exposes students to greater vulnerability to the adverse consequences of these events.[2]

The emotional responses of schoolchildren to disasters can range from successful recovery and minimal and short-lived alterations,[3] to the appearance of psychopathological responses and chronic mental health symptoms in schoolchildren, even four or more years after a natural disaster.[4,5] Among these responses are Posttraumatic Stress Disorder,[6]symptoms of depression and anxiety, emotional distress and sleep disorders, being a population especially vulnerable to suffer adverse outcomes.[7,8]

However, the literature has also documented the presence of important coping and adaptation resources in children and adolescents exposed to traumatic situations, even in contexts of high adversity.[9] In some instances, this resilient capacity not only allows for mitigating the adverse effects of the traumatic event, but can also lead to processes of positive personal transformation, expressed in significant learning and a more favorable reconstruction of the perception of themselves and their environment. This process has been conceptualized as Post Traumatic Growth (PTC).[10]

Although PTC has been investigated mainly in the adult population,[11] studies have reported that PTC can occur in childhood.[12] In this sense, the presence of some level of PTC has been identified as early as six years old, after exposure to potentially traumatic events.[13] Among these potentially traumatic events for the child population are natural disasters.[14,15,16]

The factors that determine whether a traumatic experience can give rise to CPT are diverse and complex.[17] Among them, the perceived severity of the event. According to Tedeschi and Calhoun,[18] from the perception of seriousness of the event to which people are exposed, both posttraumatic symptomatology and PTC will develop, depending on the psychological processes involved, among them, the type of rumination experienced.[19]

Rumination has been identified as a central aspect, understood as the presence of repetitive thoughts that may significantly influence the processing of the traumatic event. Calhoun and Tedeschi[20] distinguish between two forms of rumination following a traumatic event: intrusive rumination and deliberate rumination. Intrusive rumination is characterized by the involuntary and persistent intrusion of unwanted thoughts related to the event. Deliberate rumination is a more intentional and reflective process aimed at understanding and coping with the event, which may facilitate a cognitive re-evaluation of the event and contribute to more adaptive coping. Evidence has shown that both intrusive and deliberate rumination tend to be activated when a person perceives an event as stressful, which may contribute to the development of PTC.[21,22] Intrusive rumination, in particular, has shown a strong association with posttraumatic symptomatology,[21] while deliberate rumination has been related to PTC.[22]

In children and adolescents, studies have found that both forms of rumination play a central role in the development of CPT.[23,24] In a longitudinal study of CPT in school-aged children exposed to Hurricane Katrina, both intrusive and deliberate rumination were associated with higher CPT scores. Specifically, deliberate rumination was related to higher CPT scores 1 year after the hurricane, while intrusive rumination was associated with higher CPT scores 2 years after the hurricane.[25] This research supports theories of CPT that postulate growth is derived from cognitive processing, focused on creating meaning, through positive and adaptive rumination, in which a new internal narrative is formed.[26]

Given the high exposure of Chile to large magnitude natural events and the importance of the effects on the mental health of schoolchildren, the present study aimed to describe CPT and identify the ruminative styles that are related to CPT in children and adolescents exposed to the earthquake of magnitude 8,8 on the Richter scale, followed by a tsunami, which occurred in the central-southern part of the country in 2010, an event ranked among the eight most intense earthquakes recorded worldwide, which provides a particularly relevant context for the analysis of the psychosocial impact on the school population.[27]

METHOD

Design

The present study used a quantitative, non-experimental, descriptive and correlational research design. The data were collected in a single time cut, 12 months after an earthquake and tsunami in the city of Constitución (Chile), which corresponds to a cross-sectional study.

Participants

The total number of participants was 325 children and adolescents (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 located in the epicenter of the earthquake and tsunami that occurred in central-southern 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, who were used as a comparison group for greater methodological rigor.

Instruments

Post-traumatic growth: Was measured with the PTGI-C-R scale. (28,29) It consists of 10 items that are answered using a Likert scale, ranging from 0 (no change) to 3 points (very much). In its Chilean version (29), its construct validity was evaluated, finding two correlated factors and an internal consistency of 0,84 for the total scale. In the present study, an internal consistency of α = 0,94 was obtained.

Rumination was measured through the Rumination Scale for Children[13,23] a five-item scale that assesses intrusive and deliberate rumination. A Likert-type scale from 0 ("I do not think about this") to 3 points ("I think about this a lot") is used. It has been applied in child populations affected by natural disasters; its translation has been shown to have content validity.[23] In the present study, an α = 0,94 was obtained for deliberate rumination and .71 for intrusive rumination.

Severity of exposure to a traumatic event: it was measured through the Exposure to Traumatic Events Questionnaire.[23,30] It consists of 17 dichotomous (yes/no) items, of which one item refers to the direct perception of threat to the child's own life, six items are related to specific threatening events that could be observed in the earthquake (e.g., breaking doors and windows), and ten items about disruptive experiences and losses after the disaster (e.g., moving house). The instrument collects specific exposure-related experiences, and the simple sum of these experiences is an indicator of exposure severity. It has been used in a study with earthquake-exposed children and showed a strong correlation with post-traumatic stress symptoms (r = 0,49). In the present study, an α = 0,80 was obtained.

Sociodemographic questionnaire: to obtain data such as sex, age, course, with whom they live, among others.

Procedure

Initially, contact was established with the National Emergency Office of the Chilean Ministry of the Interior (ONEMI) to identify the areas most severely affected by the earthquake and tsunami. This institution provided information on the structural condition of the educational establishments after the disaster, as well as the contact information necessary to address them. Considering the study's objectives, two severely impacted schools, representative of the population exposed to the event, were intentionally selected.

To incorporate a comparison group and strengthen the internal validity of the design, two educational establishments with equivalent socioeconomic characteristics were selected, located more than 360 kilometers from the epicenter, which implied significantly lower exposure to the earthquake and tsunami.

Once the participating schools were identified, interviews were conducted with the directors, during which the purpose of the study, evaluation procedures, ethical criteria involved, estimated duration of participation, and instruments to be used were presented. Subsequently, parents or caregivers were informed, and informed consent was obtained accordingly.

The selection of courses was randomly made from among the schools that agreed to participate. The questionnaires were administered face-to-face to groups of children and adolescents in their classrooms by psychologists and undergraduate and graduate students, accompanied by the corresponding teacher.

The research protocol was evaluated and approved by the ethics committee of the Faculty of Psychology at the Universidad Complutense de Madrid. The study was conducted by the ethical guidelines proposed by the American Psychological Association (APA)[31] for research involving human participants.

Student participation was voluntary, as the signing of an informed consent form mediated it. The confidentiality of the information was strictly safeguarded, ensuring the anonymity of the participants and the analysis of the data exclusively in aggregate form.

Data analysis

The statistical analysis of the data was performed using the Statistical Package for the Social Sciences (SPSS), version 22.0. For the exploratory factor analyses, the FACTOR software, version 9.02, was used, while the confirmatory factor analyses were carried out using the LISREL program, version 8.8.

RESULTS

Table 1 presents the descriptive statistics and the results of the contrasts for the groups affected by the

earthquake and tsunami (n = 167) and not affected (n = 158).

Levene's test highlighted the heterogeneity of variances between the groups, so a Student's t-test for heterogeneous variances with corrected degrees of freedom was used in all three cases. The degrees of freedom for each contrast are presented in parentheses. Since the assumption of normality was not met in any of the groups, the results were also analyzed with the nonparametric Mann-Whitney U test, the results of which are also presented in the table 1.

Table 1. Descriptive statistics and contrast results for earthquake-affected group

	Group	Mean	SD	t (gl)	Eta squared	Z U-MW
Growth Posttraumatic	Affected	29,59	6,03	10,92*** (289,33)	0,270	9,13***
	Not affected	20,90	8,11			

Notes: *** p< 0,001

In table 2, differences were analyzed simultaneously by group and sex, in order to explore possible interaction effects.

In CPT scores, Levene's contrasts for homogeneity of variances did not show equality ($p< 0,01$). No statistically significant sex effects were found (F (1, 321) = 0,69, p = 0,59, partial eta squared = 0,001). The group effect was statistically significant (F (1, 321) = 118,33, $p< 0,001$, eta partial square = 0,27). The sex by group interaction effect was statistically significant with a small effect size (F (1, 321) = 6,11, p = 0,014, eta partial square = 0,02).

Table 2. Concurrent differences by group and sex

		Posttraumatic growth (CPT)	
Sex	**Group**	**Mean**	**SD**
Male	Affected (73)	28,26	6,53
	Not affected (81)	21,64	8,19
	Total (154)	24,78	8,13
Female	Affected (94)	30,63	5,41
	Not affected (77)	20,12	8,00
	Total (171)	25,89	8,49
Total	Affected (167)	29,59	6,03
	Not affected (158)	20,90	8,11
	Total	25,37	8,33

This interaction effect, which can be seen in figure 1, shows that in the unaffected group there were no statistically significant differences between men and women (p = 0,17) and in the affected group (p = 0,03), with the mean scores of women being higher.

Table 3 presents the descriptive statistics and the results of the statistical contrasts between the affected (n = 167) and unaffected (n = 158) groups in terms of rumination, total scores, and the two components: intrusive rumination and deliberate rumination. Levene's test highlighted the heterogeneity of variances between the groups in the scores of the three variables; therefore, Student's t-test for heterogeneous variances with corrected degrees of freedom was used in all three cases. Table 3 shows the degrees of freedom for each contrast in parentheses. Since the assumption of normality was not met in any of the groups, the results were also analyzed with the nonparametric Mann-Whitney U test.

The results show that the experience of having lived through the earthquake influences the symptomatology of deliberate rumination at 12 months, explaining 0,31% of the variance in the dependent variable, which is equivalent to the total variance in rumination, where having been affected by the natural disaster also explains 0,31 % of the dependent variable.

Table 4 shows the descriptive statistics of total rumination, intrusive rumination and deliberate rumination by group and sex.

Table 5 shows the Pearson correlation coefficients for exposure. In general, the correlation matrix suggests statistically significant relationships in all the variables of the study, with Pearson's coefficients ranging from 0,41 to 0,60. The highest correlations are found between exposure and total rumination with a correlation of 0,60. On the other hand, the lowest correlations are found between exposure and spiritual CPT with correlations of 0,41.

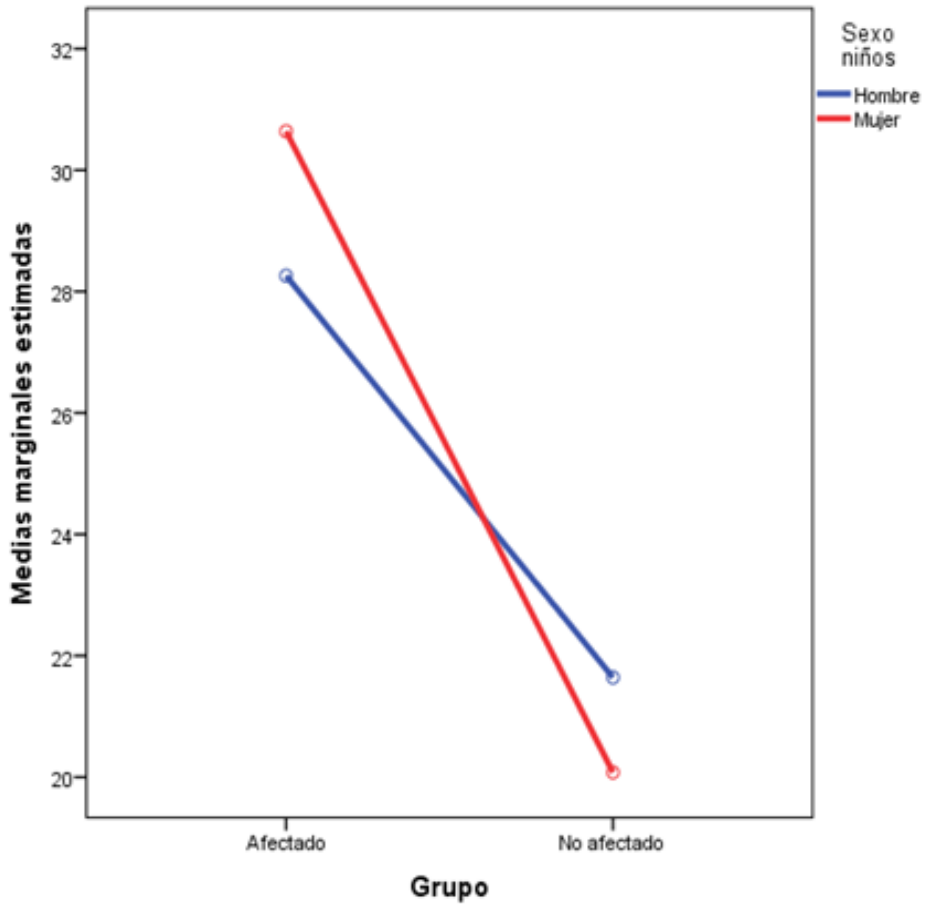

Figure 1. CPT in affected and unaffected group, according to sex

Table 3. Descriptive statistics and contrast of the differences between affected and unaffected in rumination

	Group	Mean	SD	T(gl)	Eta squared	Z U-MW
Rumination Total	Affected	6,26	3,20	12,34*** (310,66)	0,314	10,38***
	Not affected	2,36	2,47			
Rumination Intrusive	Affected	1,66	1,74	7,08*** (268,83)	0,131	6,59***
	Not affected	0,55	1,01			
Deliberate Rumination	Affected	4,60	2,25	12,31*** (316,31)	0,310	10,17***
	Not affected	1,81	1,83			

Note: $P < 0,001$

Table 4. Descriptive statistics of rumination scores by group and sex

Group	Sex children	Mean	SD	N
Affected	Male	5,84	3,11	73
	Female	6,60	3,24	94
	Total	6,26	3,20	167
Not affected	Male	2,60	2,59	81
	Female	2,16	2,37	77
	Total	2,39	2,49	158
Total	Male	4,14	3,27	154
	Female	4,60	3,63	171
	Total	4,38	3,47	325

Table 5. Pearson correlations between exposure, Posttraumatic Growth (PTC) and rumination

	Exposure
CPT Total	0,54**
Deliberate rumination	0,54**
Intrusive rumination	0,47**
Total rumination	0,60**

Note: *N=325*. CPT=Post-traumatic growth.
**. Correlation is significant at the 0,01 level (2-tailed).

DISCUSSION

Natural disasters have a considerable psychological impact on schoolchildren; for this reason, the present study aimed to describe CPT in schoolchildren affected by a natural disaster in Chile. The results confirm the findings of other research and may contribute to an understanding of the severity of symptoms based on the level of exposure to the traumatic event.

The results of the study show that CPT scores in children and adolescents affected by an earthquake and tsunami (M = 29,59) are comparable to those in other research conducted with school populations affected by the same type of natural disaster.[32,33]

Regarding the severity of the event, the results show that the mean CPT scores in the earthquake-affected group were higher than the scores of the unaffected group at 12 months. The results confirmed that the highest PTGI-C-R scores were in the group with the highest exposure, which corroborates that CPT can occur in children and adolescents who have lived through a traumatic situation, and not because of any change in life. Therefore, CPT could not be explained by simply normative changes originating from maturation.[34]

Regarding the sex of the participants, statistically significant differences were found in the group of those affected by the earthquake concerning the CPT, where women achieved higher mean scores than men. The literature suggests that these sex differences are still under análisis.[32] Although the possible causes of these differences between men and women have not yet been determined, coping styles used by women together with ruminations with a tendency toward constructive themes, such as a greater appreciation of the importance of social connections,[18] could contributeto a higher CPT.[19] It could contribute to greater CPT in women.

The results indicate that the experience of having lived through the earthquake/tsunami influenced rumination scores in the participants. Regarding the comparison by group, those affected by the earthquake/tsunami presented higher mean scores of deliberate rumination than the group not affected by the earthquake. That is, the group affected by the earthquake/tsunami presented higher scores than the unaffected group in intrusive rumination and deliberate rumination. Similarly, the results of this research align with those obtained in other studies, 33 which demonstrate a significant relationship between deliberate and intrusive rumination and CPT. Thus, rumination is relevant in the understanding of CPT.

Studies indicate that intrusive rumination occurring immediately after trauma could serve as a promoter of deliberate rumination. In this way, deliberate rumination enables changes in core beliefs and catalyzes growth as a mechanism to decrease the emotional distress that accompanies the initial intrusive rumination.[35]

The literature on child and adolescent CPT in Chile is scarce; therefore, this research provides valuable empirical evidence in a geographical and cultural context that is little explored, and it also stands out for its methodological rigor by incorporating a comparison group.

Regarding the limitations of the study, the selection of participants was intentional; therefore, the generalization of these results should be approached with caution. Data collection was conducted 12 months after the earthquake, so the results could have been different if the instruments had been applied before or after that time. Additionally, some variables implied in the models presented were not evaluated, including caregiver response, coping, competence beliefs, and social support, among others. Therefore, it is only possible to indicate some relationships.

Future research in the child population should incorporate other variables that contribute to a better understanding of the mechanisms affecting well-being and CPT. Among them are fundamental beliefs, social sharing of experience with others, beliefs of competence, positive evaluations of their ability to cope and adapt to stress or trauma.

CONCLUSIONS

The present study contributes to establishing predictors of CPT, as discovering the psychological processes that lead to CPT in children and adolescents affected by natural disasters is relevant to their profile.

The results of the study allow supporting the relevance of addressing mental health in schoolchildren affected by natural disasters, as well as implementing preventive psychoeducational programs and intervention strategies, oriented to the search for meanings associated with the event, promoting a type of cognitive

processing and coping strategies oriented to stimulate a more voluntary and constructive thinking that promote post-traumatic growth and mental health in the school population.

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FUNDING

The authors did not receive funding for the development of the present research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

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