© P. M. Latinoamericana ISSN 1688-4094 ISSN en línea 1688-4221 Ciencias Psicológicas 2016; 10 (2)
dx.doi.org/10.22235/cp.v10i2.1250

POST- TRAUMATIC STRESS AND SUBJECTIVE STRESS IN COLLEGE STUDENTS AFTER MUDSLIDE

ESTRÉS POST-TRAUMÁTICO Y ESTRÉS SUBJETIVO EN ESTUDIANTES UNIVERSITARIOS TRAS ALUVIÓN DE BARRO

Francisco Lería Dulčić

Jorge Salgado Roa

Departamento de Psicología, Universidad de Atacama. Chile

Abstract: The study is preliminary in nature and aims to describe the levels of symptoms of post-traumatic stress and subjective stress in a sample of 149 college students from Copiapó, Chile. A cross comparative's associate strategy with natural groups was used. A brief sociodemographic survey and two instruments were applied: Severity Scale Symptoms of Post-Traumatic Stress Disorder (PTSD) and Impact Event Scale Revised (EIE-R). It was observed that from the total sample the 2% have symptoms of post-traumatic stress; 85% have symptoms of medium intensity impact the event and 13.4% severe symptoms of subjective stress. Significate differences were found in the scores of the scales depending on the varying degree of emotional impact, PTSD, $F(4,144) = 17.81$, $p < .001$ and IES-R, $F(4,144) = 17.96$; $p < .001$, and grade of material loss, PTSD, $F(5,143) = 3.20$, $p < .01$ and IES-R, F (5,143) = 3,26; $p < .01$. No differences in scores by gender were found. The results suggest low prevalence of PTSD.

Key Words: *natural disaster; environmental traumatic event; post-traumatic stress; emotional distress*

Resumen: El estudio es de carácter preliminar y tiene como objetivo describir los niveles de sintomatología de estrés post-traumático y estrés subjetivo en una muestra de 149 estudiantes universitarios de Copiapó, Chile Se utilizó una estrategia asociativa de tipo comparativa transversal y un diseño de grupos naturales. Se aplicó una encuesta sociodemográfica breve y los instrumentos: Escala de Gravedad de Síntomas del Trastorno de Estrés Postraumático (TEPT) y Escala de Impacto al Evento Revisada (EIE-R). Se observó que del total de la muestra el 2% presenta síntomas de estrés postraumático; el 85% presenta síntomas de mediana intensidad de impacto al evento y el 13,4% síntomas severos de estrés subjetivo. Se presentaron diferencias significativas en los puntajes de las escalas en función de la variable grado de impacto emocional, TEPT, $F(4,144) = 17.81$, $p < .001$ y EIE-R, $F(4,144) = 17.96$; $p < .001$, y grado de pérdida material, TEPT, $F(5,143) = 3.20$, $p < .01$ y EIE-R, $F(5,143) = 3.26$; $p < .01$. No se presentan diferencias en las puntuaciones en función del sexo. Los resultados sugieren la existencia de baja prevalencia de estrés postraumático.

Palabras Clave: *desastres naturales; eventos ambientales traumáticos; estrés post-traumático; malestar emocional*

Received: 01/2016 *Reviewed: 04/2016* *Accepted: 07/2016*

Introduction

The impact of climate change on population and infrastructure and its effects are more frequently possible to be seen, and this impact, due its unpredictability, becomes a challenge for authorities. This change is caused by different elements and include various climatic parameters (temperature, frost, pressure, wind, rain, etc.). In the latter years, the term anthropogenic climate change and/or anthropic danger has been coined to point out the influence of the human variable in its origin (Oreskes, 2004; Rojas Vilches, & Martínez Reyes, 2011) and the name of socio-natural disaster given to relieve the impact these changes have on people (Villalba, 2012). The World Health Organization (WHO), in its 2008 declaration, addressed the issue of global climate change, highlighting the consideration of direct health threat (Chang, 2008, as quoted in Ochoa Zaldivar et al., 2015). Since then, the importance of disaster research has been recognized and a considerable amount of

Correspondencia: Francisco Lería D., Departamento de Psicología, Universidad de Atacama. Chile.
Correo Electrónico: francisco.leria@uda.cl

studies concerning its effects on mental health has proliferated (de la Barra, & Silva, 2010; Salcedo, 2014), together with some of its related concepts such as vulnerability, resilience and risk management (Aledi, & Sulaiman, 2014).

Stress reactions are some of the responses to disastrous events have been the subject of extensive study and it is known they have a high impact on mental health. Their effects tend to persist over time and become, most of the times, chronic, technically called post-traumatic stress. The specialized literature shows how these responses, which are a variable phenomenon and dependent on the type of traumatic event, increase significantly in cases of disaster victims, disasters and natural and/or socially induced emergencies (Leiva-Bianchi, 2011). It has been stated that the nature of these events and their sudden and intense character is associated with a number of symptomatologic stress responses and finally to mental disorders, in which the ability of daily functioning of the person is highly compromised. The psychological impact of a catastrophic event and its consequent post-traumatic stress response, tends to last over time in both direct and indirect victims (Samper, 2015); with an estimated prevalence in the world population highly variable between 4% to 70%; specifically in Chile from 4.4% to 36% (Leiva-Bianchi, 2011;. Pérez et al., 2009).

The post-traumatic stress disorder is a type of anxiety disorder characterized by the appearance of symptoms after being exposed to a stressful event and selectively displayed when the person is exposed to stimuli that resemble an aspect of the traumatic event. This autonomic arousal produces a series of difficulties such as sleep problems, irritability, concentration difficulty, hypervigilance, social and/or labor deterioration, among others (American Psychiatric Association, 2002).

Psychosocial research in disasters has been initially focused on the impact on the physical and mental health of the victims, later on the behavior of groups of people who have experienced disastrous events, in which its members find themselves overwhelmed with their habitual mechanism of dealing with or coping with (Lopez-Ibor, Christodoulou, Maj, Sartorius, & Okasha, 2005). Classic meta-analytic studies such as Rubonis and Bickman (1991), noticed that the anxious-depressive symptoms (eg. excessive consumption of alcohol) were more frequent and had a higher prevalence. Contemporary studies have emphasized other post-traumatic reactions to disaster, such as lack of control and loss of confidence (Pineda Marín, & López-López, 2010). The character of the post-traumatic response varies and has elements in common with respect to the type of disaster. For example, exposure to earthquakes is associated with high levels of post-traumatic stress disorder (PTSD), as in the earthquake of May 12, 2008 in China, Sichuan Province, where the prevalence of PTSD after 18 months was 12.2% and 40.8% for depressive symptoms (Zhiyong et al., 2012). In the Haiti earthquake of January 12, 2010, a prevalence of 36.75% was observed for PTSD; 25.98% for depressive symptoms in adult population victims (Cénat, & Derivois, 2014); and 22.25% of PTSD in minor victims (Cénat, & Derivois, 2015) after 30 months; also highlighting how professionals with previous experience in this type of situations, e.g.: volunteers and/or military personnel, get higher scores on the measurement of PTSD symptomatology (Guimaro, Santesso Caiuby, Pavão dos Santos, Lacerda, & Baxter Andreoli, 2013); a finding already present in previous scientific literature (Soto, 2013). In a sample of youngsters after 9 months the earthquake and explosion of the nuclear plant in Fukushima, Japan, on March 11, 2011, high levels of PTSD and comorbidity were observed with menstrual pain and dysmenorrhea (Matsuoka et al., 2012; Takeda, Tadakawa, Koga, Nagase, & Yaegashi, 2013). On the European continent, after the earthquake in the city of L'Aquila in Abruzzo Italy on April 6, 2009; PTSD symptoms and neuropsychological difficulties associated with retrograde memory were detected after 6 months of the event, mainly caused by the persistent fear for aftershocks (Roncone et al., 2013).

In the case of exposure to Tsunamis, such as the one in the Indian Ocean in 2004, a prevalence of PTSD between 20 and 30% was found after 6 months, highlighting the peritraumatic fear, neuroticism and low levels of social support as inducer factors of post-traumatic stress response (Hussain, Weisæth, & Heir, 2013).

Snowstorm catastrophes have also been investigated, such as the one occurred in China, Hunan Province, between January 25 and February 6, 2008, with a prevalence in young victims of 14.5% for PTSD, concluding that most prominent factors for the development of the disorder risks are: home-school distance,

low stress coping strategies, neuroticism and the presence of emotional support from their teacher (Daxing, Huifang, Shujing, & Ying, 2011). In the case of landslides and avalanches of mud and water disasters, such as the one caused by the volcanic eruption on August 12 and 13, 1985 in Armero, Colombia, depression, generalized anxiety and PTSD were the 3 most frequent diagnoses 8 months after the disaster (Lima, Santacruz, Lozano, Luna, & Pai, 1988). Autonomic hyperarousal has been recognized as the most prevalent symptom in this kind of catastrophe (Craparo, Faraci, Rotondo, & Gori, 2013). In another study in Taiwan after Typhoon and flood Morakot occurred on August 8, 2009; 25.8% of PTSD, particularly intrusive thoughts, physiological and psychological hyperarousal, and avoidance was found (Cheng-Sheng et al., 2011). One important concern is the high prevalence of PTSD (25.8%) found in this type of disaster in young victims after 3 months of a flood, caused by anxiety symptoms and intrusive type of irruptive in cognitive development (Pinchen et al., 2011).

Research has also been conducted on survivors of tornadoes, as in the case of Katrina occurred on August 20, 2005 in the United States, finding a positive relationship between direct exposure to catastrophe, symptoms of PTSD and the occurrence of asthmatic episodes (Arcaya, Lowe, Rhodes, Waters, & Subramanian, 2014).

However, post-war traumatic effects have been more than any other studied event. There are 3961 studies only on the database PunMed to January 2016. Current studies emphasize six common symptomatological factors in this type of traumatic experience: intrusive thoughts, avoidance, negative affect, anhedonia, dysphoria and anxious arousal (Konecky, Meyer, Kimbrel, & Morissette, 2015). There are other interesting areas of research in this regard, for example, the effects on civilian victims by war disaster and their vision and sense of life during the process of social reconstruction (Čorkalo, Ajdukovic, & Low, 2014).

Despite the uniqueness of these results in relation to the high prevalence of PTSD in victims of disasters, it has been shown to be highly dependent on the nature and characteristics of the traumatic event, as well as the victims who experience it. For example, the particular post-traumatic effects after a complex catastrophe like the earthquake and tsunami in Chile on February 27, 2010, showed a prevalence of PTSD much higher than expected, between 20% and 36% (Leiva-Bianchi, 2011). Finally, among the factors of risk for the appearance of PTSD after exposure to disasters are: the low educational level, sex of the victim, the premorbid presence of obsessive-compulsive traits, the presence of emotions of grief and despair, having children under 6 years old, social displacement because of material losses, lack of social support after the event, the absence of precautionary measures against the possibility of a disastrous event, and premorbid background for the development of PTSD (Chen et al., 2014; Pollice, Bianchini, Roncone, & Casacchia, 2012). Other modulating variables of post-traumatic appearance and effect are: sex, gender, education level, injury and/or death in the time of occurrence of the disastrous event (Grimm, Hulse, Preiss, & Schmidt, 2012). On the other side, there are protective common factors such as: social independence, interpersonal initiative, social responsibility and social openness (Ling-Xiang, & Cody, 2011); perceived emotional stability (Hussain, Weisæth, & Heir, 2013); and fitness (Momma et al., 2014).

According to McFarlane and Norris (2006), disasters can be classified as natural (hurricanes, earthquakes, floods), as opposed to “human” disasters which in turn can range from unintentional accidents to deliberate actions (eg. terrorism). The specialized literature has emphasized, however, that the exclusive designation natural disaster has the risk of masking the true impact of social factors on the action of nature. These factors are the first modulators of stressful experience lived by victims. According to Cova and Rincón (2010), quoting several authors, these distinctions have been questioned, pointing out that although in some disasters the triggering factor is a natural event, greatly uncontrollable, its implications and effects are derived from human action. As an example of this, the meta-analytical studies have shown that the impact on mental health in members of the victim communities of a catastrophe from less developed countries is variable (Norris, & Elrod, 2006).

The concept socio-natural disaster is currently used to integrate the variables involved in the origin of disastrous events, along with changing aspects of the traumatic experience of the victim. In addition, it seeks to

clarify “the responsibilities of the different actors and to ensure that governments, multilateral agencies and non-governmental organizations contribute to reduce risks, to avoid events, reduce impacts” (Villalba, 2012). Moreover, the study of models of intervention in disasters and emergencies reveals that the psychosocial impact of a disastrous event is linked to a large extent to the poor preparation that communities and governments have (Osorio Yepes, & Díaz Facio Lince, 2012). Hence, the definition of a sociocultural factor is essential in order to evaluate the actual effects of a disaster which can be measured by the impact they have on the society that experiences it. According to Arnold-Cathalifaud (2010), in the case of Chile and the disaster occurred of February 27, 2010, with its “earthquake and all its aftershocks together, is less than the social earthquake in the country” (p. 41), the author adds: “No one can be guilty of an earthquake or a tsunami, as they are natural phenomena, however, responsibility for a bad preparedness, by poor construction, poor design of hospitals or airports can be imputed” (p. 41). Other studies have emphasized that the impact of a catastrophe is, at first, a natural event, and then it becomes a socio-natural occurrence which shows how the State makes a series of interventions that are perceived by the population as aggravating the same natural disaster (Ugarte, & Salgado, 2014). Research on this matter confirms these claims. An example of how the human factor can be aggravating against fortuitous and/or unexpected events, is the case of the disaster which occurred in Estonia on September 28, 1994, when a passenger boat sank leaving 852 dead persons and only 137 rescued after several hours floating in adverse weather conditions. In this study, survivors were evaluated three months, one year, three years, and fourteen years after the catastrophe, and the prevalence of PTSD was 27% (Arnberg, Eriksson, Hultman, & Lundin, 2011). In the case of Chile, studies have described the prevalence and severity of PTSD symptoms in people affected by the military dictatorship that took place between 1973 and 1990, revealing a greater presence of anxiety symptoms in women and people who did not politically participate at the time of political repression, recording more symptoms of avoidant type (Moscoso, 2013).

The impact of a disaster depends not only on direct exposure to the stressful event (earthquake, landslide, fire, etc.), but also on loss, damage and feelings of threat felt by people and their immediate milieu, as well as medium and long range consequences (Felix, & Rincón, 2010). These effects tend to affect particularly at each individual and/or victims group, giving way to a special and selective effect and not to a global reaction of undifferentiated stress. For example, the aforementioned earthquake and tsunami in southern Chile (February 27) caused high stress levels in a group of workers without a decrease in job satisfaction (Jimenez, & Cubillos, 2010). Finally, there are records regarding the impact of individual treatment to disaster victims (Figueroa, Marín, & González, 2010; Zhang Feng, Xie, Xu, & Chen, 2011), as well as the effectiveness of psychosocial oriented programs aiming at the improvement of stress coping strategies (Bianchinia et al., 2013). Osorio and Díaz (2012) mention 30 models and documented experiences of psychosocial intervention in disasters in Spain and Latin America. These investigations have shown that the latency of the intervention (e. g. rescue or essential supplies), the presence of abundant material support, post-event psychosocial support spaces and special attention to high-risk groups, all play a central role in the rehabilitation of victims of disasters and emergencies (Chen et al., 2014).

On March 25, 2015 the largest rainfall disaster in 80 years in the Chilean regions of Antofagasta, Atacama and Coquimbo occurred. The event brought heavy rainfall in a short period of time followed by the overflowing of Copiapó and El Salado rivers, and landslides coming mainly from mine tailings located around the city (27 ° 21 ‘59 “S 70 ° 19 ‘59 “W). As a result, there were several interrupted or isolated routes, destroyed homes, power and fiber optics outages, among other impacts. The Government decreed a catastrophe zone and then a state of emergency, and a thousand soldiers were sent to safeguard public order and provide aid to the affected areas (“Thousand Soldiers Guard Atacama”, 2015).

The population was exposed to a series of stressful events for at least 10 days after the disaster, mainly by power outages and water shortage, full stop traffic in many areas of the city and the non-functioning of basic services. In addition, a significant rise in prices of basic goods, and attempted looting (Gutiérrez, 2015) were observed. Official data estimates more

than 28.000 victims and 31 dead people, 16 missing (according to denunciation for presumed misfortune); and 16.588 damaged (Interior Ministry's National Emergency Office, 2015). Moreover, the existence of 43% of homes with repairable damage; 23% of slight damage; 13% of moderate damage; 7% of severe damage; and 6% of non-repairable damage requiring replacement or complete housing rebuilding was detected (Ministry of Housing and Urban Development , 2015). The city found itself highly sectorized. For example, the alleys of the city, were flooded almost completely, unlike the high sectors, which suffered no damage. In addition, after some time, the city was affected by air pollution, damage to public and pedestrian routes, trash and piles of mud piled up in different parts of the city, among other effects and residues of the alluvial situation, which posed the presence of permanent stress factors that prolong the impact of the disaster in time.

Considering the above background, the questions that guide the present study are as follows; 1) What are the levels of symptoms of post-traumatic stress and subjective stress after the flood?; 2) What socio-demographic factors determine the variability of PTSD and IES-R scales?; 3) Does the degree of emotional impact and material loss determine the variability of results in PTSD and IES-R scales?

The objective was to identify post-traumatic stress symptom levels and subjective stress in university students after the mudslides an determine factors of their variability.

Materials and Methodology

Research Design

This study is an empirical research. A partnership strategy of cross-comparative type and design of natural groups were used. Variables are not manipulated and the relationships among them are analyzed by investigating the differences between two or more groups of individuals from the contrasts generated by nature and society (Ato, López, & Benavente, 2013).

Participants

An intentional non-probability or convenience sampling was used. 149 college students participated in the city of Copiapó, who were selected because they were pursuing careers that are dictated in a university campus severely affected by the flood, and that had access and normal operation problems during several months after the disaster. As for the characteristics of the sample, 19.5% were male, and 80.5% female gender; ages range was between 17 and 25 years (M = 19.71 and SD = 3.22), of which 96.6% were single. In addition, 38.3% reported being affected by the mud at different levels of severity and 16.7% reported emotional impact with different levels of intensity (see table 1).

Instruments

The following was used: *The Scale Severity of Symptoms of Post-Traumatic Stress Disorder* (PTSD; Echeburúa, Corral, Love, Zubizarreta, & Sarasua, 1997a), which corresponds to a scale of assessment of PTSD symptoms according to criteria found in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). It comes in Likert-type format (0 = *Nothing* to 3 = 5 or *more times per week*), which includes 17 questions grouped in three dimensions (intrusive re-experience, avoidance, and activation). It also has a complementary somatic manifestations subscale. It has been validated in Spain with victims of sexual assault and domestic violence, presenting high levels of reliability through its temporal stability and internal consistency (alpha of 0.89 and 0.92 respectively), which proves to be an instrument that exceeds the minimum requirements for being used in research settings, clinical and/or legal forensics included (Blasco-Ros, Sánchez-Lorente, & Martínez, 2010; Echeburúa, Corral, Amor, Sarasua, & Zubizarreta, 1997b; Echeburúa, Corral, & Amor, 2003). It was applied in Chile by Moscoso (2013) to people affected by State terrorism obtaining satisfactory Alpha coefficients in all dimensions (between 0.86 and 0.94), and an Alpha of 0.96 for the overall result, which indicates high internal consistency and a satisfactory level of reliability. The questionnaire provided an adequate discriminant validity of the diagnostic criteria for post-traumatic stress unlike other anxiety disorders.

The Impact Scale Event Revised (IES - Impact of Event Scale Weiss & Marmar, 1997); validated in Spain by Baguena et al. (2001). This is an instrument that has 22

Table 1
Sociodemographic Factors and Variables Under Study

Variables	Category	Frecuency	(%)
Gender	Male	29	19.5
	Female	120	80.5
Marital Status	Single	144	96.6
	Partner	1	0.7
	Married	4	2.7
Psychological care before the flood	Yes	11	7.4
	No	138	92.6
Degree of material loss	The mud affected my sector	92	61.7
	The mud entered my street	19	12.8
	The mud entered my front yard and/or my garage	18	12.1
	The mud entered my house	10	6.7
	The mud left my house uninhabitable	7	4.7
	The mud destroyed my house completely	3	2
Degree of emotional impact	None	124	83.2
	Loss of goods	15	10
	Loss of pets	3	2
	Life-threatening	5	3.4
	Loss of a relative	2	1.3

items and 3 subscales (Intrusion, Avoidance and Hyperarousal) of Likert type to evaluate the intensity of symptoms (from 0 = *None* to 4 = *Extremely*). It allows to measure, form the global score, the severity of emotional distress or subjective stress (Costa Requena, & Gil Moncayo, 2012). This instrument has been used in various research regarding the impact of disasters and emergencies (Arcaya et al., 2014; Brunet, St-Hilaire, Jehel, & King, 2003; Caamaño, González, & Sepúlveda, 2011; Creamer, Bell, & Failla, 2003;, Giorgi et al., 2015; Morina, Ehring, & Priebe, 2014; Warsini, Buettner, Mills, West, & Usher, 2015), including mudslides (Cheng-Sheng et al., 2011; Craparo et al., 2013); and its psychometric properties have been evaluated in China showing appropriate values (Wu, & Chan, 2004). It also presents 72% sensitivity for the detection of PTSD in relation to other similar psychometric instruments (Mouthaan, Sijbrandij, Reitsma, Gersons, & Olff, 2014). The IES-R was adapted and validated for Chilean population by Caamaño et al. (2011), concluding that it is a reliable measure of self-reporting and of adequate validity.

Sociodemographic Survey. This survey was devised by the authors to collect information such as age, sex, college career, marital status, place of residence, place where the person was during the day of the flood, degree of material loss (consisting of 6 levels, 1 = *Mud did not affect my sector*; 6 = *the mud completely destroyed my house*), and degree of emotional impact reported (5 levels, 0 = *None*; 4 = *loss / death of a relative*), all of this being of nominal and ordinal character, except the age of the individual.

Procedure

The instruments were applied three months after the mudslide, previously approved by a scientific qualified committee of the institution of the authors which approved the ethical aspects of the study. The Chairs of the different Departments of the institution granted formal permission to access the classrooms of participating students. The research collaborators presented the objectives of the study and stated the anonymous and confidential nature of the obtained data. Once this was communicated to the participants, a package containing the two scales, the socio-

demographic questionnaire, and an informed consent to be returned in a sealed envelope to ensure confidentiality of the data, was handed in. The differences were estimated using the analysis of variance (ANOVA) of a factor depending on sociodemographic variables and categories of degree of material loss and emotional impact. For the gender category, the Student *t*-test was used for independent samples. Homogeneity of variance was determined by the Levene's test, in the absence of it, the Welch test was applied (Armitaje, Berry, & Matthews, 1994). The post-hoc comparisons were made using the Tukey's test. Cohen's *d* and partial Eta squared (ηp^2) were used to measure the effect size (Cohen, 1988). Linear regressions were performed using the stepwise method.

Results

The main results of the study, which are of preliminary nature, are presented below. The analysis of the prevalence of post-traumatic stress symptoms shows that 146 participants (98%) present no symptoms of PTSD, and 3 individuals (2%) show symptoms generated by *Severity Scale Symptoms of Post-Traumatic Stress Disorder (PTSD*). According to the IES-R, 20 students (13.4%) have severe symptoms of subjective stress or emotional distress (see table 2).

At a deeper level of analysis, and following the research questions, no significant differences in mean between men (PTSD: *M* = 5.66, *SD* = 6.47; EIE-R: *M* = 28.9, *SD* = 12.5) and women (PTSD: *M* = 5.59, *SD* = 5.49; ERV-R: *M* = 29.4, *SD* = 11) were found regarding the symptoms of post-traumatic stress and subjective stress (see table 3).

Concerning the variability of symptoms of post-traumatic stress and subjective stress, the results of total scale and dimensions of the IES-R and PTSD were compared in terms of sociodemographic variables, marital status and college career, and the gradation categories of

Table 2
Prevalence of Post-traumatic Stress Disorder (PTSD) and Subjective Stress (IES-R)

Gender	PSTD		IES-R		
	Without Symptoms	With Symptoms	Mild Symptoms	Moderate Symptoms	Severe Symptoms
Male	28 (96.6%)	1 (3.4%)	0 (0%)	26 (89.7%)	3 (10.3%)
Female	118 (98.3%)	2 (1.7%)	1 (0.8%)	102 (85%)	17 (14.2%)
Total	146 (98%)	3 (2%)	1 (0.7%)	128 (85.9%)	20 (13.4%)

Table 3
Differences in PTSD and IES-R Scales, and Dimensions by Gender

PTSD/IES-R	Media *(DE)*		*t(147)*	*p*
	Femenino	Masculino		
EIS-R (Total)	29.4 (11)	28.9 (12.5)	-0.196	.845
Re-Experiencing	2.13 (1.67)	1.86 (1.18)	-0.798	.426
Avoidance	1.47 (2.15)	1.69 (2.76)	0.471	.638
Increase of activation	2 (2.42)	2.1 (3.25)	0.192	.848
PTSD (Total)	5.59 (5.49)	5.66 (6.47)	0.054	.957
Intrusion	9.38 (4.03)	8.76 (3.82)	-0.756	.451
Hiperarousal	9.14 (3.59)	9.24 (4.43)	0.126	.900
Avoidance	10.82 (4.32)	10.93 (4.95)	0.114(38.94)*	.910
Complementary Scale	3.78 (4.69)	3.24 (4.69)	-0.549(42.60)*	.586

* Welch's test is applied for unequal variances

the “degree of emotional impact” and “degree of material loss.”

As shown in table 4, no significant differences were presented in post-traumatic stress symptoms and subjective stress depending on marital status and university degree.

Homogeneity of variances is found in the categories of “degree of material loss” with respect to subjective stress (IES-R), and post-traumatic stress symptoms (PTSD) with Levene’s values of 1.70 (p = .137) and 1.41 (p = .221) respectively. Significant differences in mean IES-R and its dimensions (Re-Experiencing and Increase of activation) depending on the degree of material loss, except Avoidance, F (5, 143) = 2.166, p > .05 are presented. Moreover, it is observed that the size effect of the differences in the IES-R, and the dimension of Re-Experiencing is moderate/high (values between .10 and .14 ηp2) (Cohen, 1988). Significant differences in PTSD and all its dimensions (Intrusion, Hyperarousal and Avoidance) depending on the degree of material loss are also present, and the size effect is moderate/high (ηp^2 values between .06 and .14). The post hoc Tukey HSD test failed to differentiate the groups.

For the variable “degree of emotional impact,” there is homogeneity of variance with respect to subjective stress (IES-R), and post-traumatic stress symptoms (PTSD), with Levene’s values of 2.202 (p = .06) and 1.372 (p = .06) respectively. Significant differences in

Table 4

Differences in PTSD and IES-R, and the dimensions University career, Marital status, and Degree of Material Loss and Emotional Impact

IES-R/PTSD Dimensions	Total	Socio-demographic Variable / Categories of Impact						F	P	η_p^2
	Media (*SD*)									
		University Carrer								
		Nursing		Kinesiology		Nutrition				
IES-R		29.17(9.89)		29.7(11.32)		28.8(12.53)		0.080	.923	
PTSD		5.49 (4.58)		5.77 (5.89)		5.50 (6.32)		0.041	.960	
		Marital status								
		Single		Partner		Married				
IES-R		29.50 (11.43)		22.00 (--)		24.00 (--)		0.669	.514	
PTSD		5.60 (5.75)		3.00 (--)		6.25 (2.98)		0.130	.879	
		Degree of Material Loss								
		EBNAFS	EBEMC	EBEMA	EBEMIC	EBDMCI	EBDTMC			
IES-R		27.62(9.4)	27.53(8.3)	30.89(15.43)	33.50(7.4)	41.3(20.7)	40.3(16.0)	3.276	.008	0.10
Re-experiencing		1.83(1.34)	1.58(0.83)	2.50(1.465)	3.10(1.37)	3.43(3.64)	3.67(3.05)	3.866	.003	0.14
Avoidance		1.22(2.13)	1.21(1.51)	1.89(3.027)	2.40(2.27)	2.71(2.98)	4.33(1.52)	2.166	.061	0.04
Increase of act.		1.67(2.40)	1.63(1.89)	2.28(2.718)	4.30(3.23)	3.57(3.82)	2.33(2.30)	2.644	.026	0.04
PTSD		4.72(5.00)	4.47(3.43)	6.67(6.730)	9.80(6.05)	9.71(10.0)	10.33(6.8)	3.205	.009	0.06
Intrusion		8.72(3.40)	8.58(2.11)	9.72(4.812)	10.10(2.4)	13.7(8.40)	14.67(6.5)	3.621	.004	0.14
Hyperarousal		8.63 (3.03)	8.53(2.69)	9.50(5.032)	11.70(3.8)	13.29(7.2)	9.33(2.30)	3.359	.007	0.13
Avoidance		10.21(3.7)	10.42(4.4)	11.67(6.155)	11.70(2.9)	14.57(5.5)	16.33(7.6)	2.660	.025	0.06
		Degree of Emotional Impact								
		None	PB	PM	VP	PDF				
IES-R		27.44(8.736)	33.8(9.83)	32(5.568)	62.4(21.13)	24(2.828)		17.966	.000	0.31
Re-experiencing		1.85(1.260)	2.2(1.521)	3.33(1.528)	6.40(2.966)	2.0(1.414)		13.956	.000	0.25
Avoidance		1.19(1.953)	1.87(1.40)	2.33(3.215)	7.60(3.507)	2.00(0.00)		12.844	.000	0.24
Increase of act.		1.65(2.224)	2.13(1.88)	6.33(4.619)	8.00(3.082)	3.00(1.41)		12.351	.000	0.19
PTSD		4.69(4.562)	6.20(3.80)	12(8.544)	22(8.276)	7 (2.828)		17.814	.000	0.27
Intrusion										
Hyperarousal		8.60(3.002)	10.9(3.84)	10.33(0.57)	20.60(8.29)	7.50(0.70)		16.754	.000	0.30
Avoidance		8.49(2.800)	10.5(3.64)	12.00(3.60)	20.20(6.76)	8.50(2.12)		18.942	.000	0.32
		10.30(3.772)	12.3(3.49)	9.67(2.082)	21.60(8.87)	8.00(0.00)		10.727	.000	0.22

Note: ACT = Activation; EBNAFS = The mud did not affect my sector; EBEMC = The mud entered my street; EBEMA: The mud entered my front yard; EBEMIC: the mud entered my home; EBDMCI: the mud left my home uninhabitable EBDTMC = The mud Totally Destroyed My House; PB = loss of property; PM = Lost Pet; VP = Life in Danger and PDF = Loss of a relative

IES-R scores and all its dimensions depending on the degree of emotional impact are present. It is noted that the size of the effect is high (values between .19 and .31 ηp2) (Cohen, 1988). Significant differences in PTSD and all its dimensions depending on the degree of emotional impact are also present, and the size effect of the differences is significant as well (ηp2 values between .22 and .32).

The post hoc Tukey HSD test revealed that differences occur between the category "life-threatening" and the other four groups regarding post-traumatic stress symptoms ($p < .05$) and subjective stress ($p < .001$).

A multivariable linear regression analysis with scores on the PTSD and IES-R scales, considering age, degree of material loss and emotional impact, was performed. The variable that entered the model was the degree of emotional impact that predicts 21.3% of the variance in PTSD scores (R2 = 0.213), being significant, F (1,147) = 39.90, p = .000, β = .462, p = .000, 95% CI [.374, .549]. It also predicts 16.8% of the variance of the scores obtained in the IES-R (R^2 = .168), being also significant, F(1.147) = 29.731, p = .000, β = .410, p = .000, 95% IC [0.376, 0.805]. In both cases the contribution of the variable degree of material loss was smaller.

Discussion and Conclusions

The goal of this study was to identify levels of symptoms of post-traumatic stress and subjective stress in college students after the flood, and to determine the factors that establish their variability. The evaluated factors were of the sociodemographic and categories of emotional impact and material loss.

According to preliminary results, no significant percentages of the presence of symptoms of post-traumatic stress disorder (2%), or subjective stress (13.4%) were found, which relates to the data recorded in Chile with ranges from 4.4 % to 36% (Pérez et al., 2009; Leiva-Bianchi, 2011). Moreover, a higher percentage occurs in moderate symptoms of subjective stress (85.9%), suggesting the enduring presence of the psychological impact on both direct and indirect victims (Samper Lucerna, 2015). Also, the results confirm what Arnold-Cathalifaud (2010) said, that the psychological impact of a disaster is not limited to individuals who are directly affected.

Regarding the sociodemographic variables such as gender, marital status and university career, no differences occur on scales of post-traumatic stress and subjective stress, which makes possible to infer that most college students were single (96.6%), and that it could be related to social independence (Ling-Xiang & Cody, 2011), and perceived emotional stability (Hussain, Weisaeth, & Heir, 2013). It can also be inferred that the educational level of the participants would act as a protective factor regarding the origin and effect of stress (Grimm, Hulse, Preiss, & Schmidt, 2012).

The variability of the results obtained with the scales of post-traumatic stress symptoms and subjective stress are presented in terms of the variables "degree of emotional impact" and "degree of material loss", the first being the one that causes more variability. According to MINVU (2015), 6% of homes present not repairable damages and need to be rebuilt after the flood. Information provided by ONEMI (2015) reports a total of 31 people dead and 16 missing, facts that are related to the categories of "life-threatening" and "the mud completely destroyed my house," and that appear with greater severity in the scale of emotional impact and material loss respectively. Around 25.5% of participants were affected by the mud that entered their front yard and/or garage, while 13.4% were damaged by the mud that entered their house. 6.7% of participants reported greater emotional impact, however, they did not attribute great intensity to the loss of property. Thus, what Arnold-Cathalifaud (2010) said regarding the psychological impact and the direct experience of the event is sustained, being the latter the one that would generate high levels of PTSD and would explain the differences found in this study with the literature that contemplates significant levels of PTSD in people exposed to earthquakes (Leiva-Bianchi, 2011; Zhiyong et al., 2012; Cénatn & Derivois, 2014; Guimaro et al., 2013; Matsuoka et al., 2012; Takeda et al., 2013; Roncone et al., 2013); tsunamis (Hussain et al., 2013); snowstorms (Daxing et al., 2011); typhoon and flood (Cheng-Sheng et al., 2011); and tornadoes (Arcaya et al., 2014). Regarding the above, the severity of symptoms of post-traumatic stress and subjective stress is determined by the type of disaster. PTSD levels are greater in those affected by earthquakes (about 12.2%) in relation to those affected by

the flood, where the autonomic hyperarousal is the most prevalent symptom (Craparo et al., 2013).

Data provided by the National Institute of Statistics (INE, by its initials in Spanish) point out that the city has shown, over time high rates in the perception of social and environmental problems related to pollution, hygiene and lack of community infrastructure (INE, 2016); all factors that affect the quality of life of the inhabitants. Considering that emotional variables, such as subjective happiness, perceived stress, managing emotions, among others, have an impact on academic performance (Ferragut, & Fierro, 2012; Peña-Sarrionandia, Mikolajczak, & Gross, 2015); it would be interesting to know whether or not the presence of symptoms of subjective stress of medium intensity found in participants affected their academic performance. Finally, it is important to note that the prevalence of this study is of a preliminary type, therefore and there are other statistical analyzes such as residue testing, Chi-squared test and multivariate logistic regression, among others, pending. In addition, other sectors of the population who were affected directly and indirectly by the flood can be incorporated to the sample, in order to clarify and extend the scope of this study, which is currently under implementation by the authors under the project "Impact on subjective well-being, quality of life and worldview after one year of exposure to a socio-natural disaster (16/14 22310 code, funded by the Directorate Research at the University of Atacama).

References

Aledi, Antonio, & Sulaiman, Samia. (2014). La incuestionabilidad del riesgo. *Ambiente & Sociedade*, *17*(4), 9-16. doi:10.1590/1809-4422ASOCEx01V1742014

American Psychiatric Association. (2002). *Manual diagnóstico y estadístico de los trastornos mentales*, *DSM-IV-TR*. Barcelona: Masson.

Arcaya, M.C., Lowe, S. R., Rhodes, J. E., Waters, M. C., & Subramanian, S. (2014). Association of PTSD Symptoms with Asthma Attacks among Hurricane Katrina Survivors. *Journal of Traumatic Stress, 27*, 725–729. doi:10.1002/jts.21976

Arnberg, F.K., Eriksson, N.G., Hultman, C.M., & Lundin, T. (2011). Traumatic Bereavement, Acute Dissociation, and Posttraumatic Stress: 14 Years after the MS Estonia Disaster. *Journal of Traumatic Stress, 24*(2) 183–190. doi:10.1002/jts.20629

Arnold-Cathalifaud, M. (2010). Catástrofes naturales y sociedad. *Revista Chilena de Salud Pública, 14*(1),40-42.

Ato, M., López, J., & Benavente, A. (2013). Un sistema de clasificación de los diseños de investigación en psicología. *Anales de Psicología*, 29(3),1038-1059. doi:10.6018/analesps.29.3.178511.

Bianchinia, V., Ronconea, R., Tomassinia, A., Necozione, S., Cifone, M., Casacchiaa, M., & Pollicea, R. (2013). Cognitive Behavioral Therapy for Young People after L'Aquila Earthquake. *Clinical Practice & Epidemiology in Mental Health, 9*, 238-242. doi:10.2174/1745017901309010238

Blasco-Ros, C., Sánchez-Lorente, S., & Martínez, M. (2010). Recovery from depressive symptoms, state anxiety and post-traumatic stress disorder in women exposed to physical and psychological, but not to psychological intimate partner violence alone: A longitudinal study. *BMC Psychiatry*, *10*, 98. doi: 10.1186/1471-244X-10-98

Brunet, A., St-Hilaire, A., Jehel, L., & King, S. (2003). Validation of a French version of the impact of event scale-revised. *Canadian Journal of Psychiatry*, *48*(1), 56-61.

Caamaño, L., González, L., & Sepúlveda, M. (2011). Adaptación y validación de la versión chilena de la escala de impacto de evento-revisada (EIE-R). *Revista Médica de Chile 139*, 1163-1168. doi:10.4067/S0034-98872011000900008

Cénat, J. M., & Derivois, D. (2015). Long-term outcomes among child and adolescent survivors of the 2010 Haitian earthquake. *Depression and anxiety*, *32*(1), 57-63. doi:10.1002/da.22275

Cénat, J. M., & Derivois, D. (2014). Assessment of prevalence and determinants of posttraumatic stress disorder and depression symptoms in adults survivors of earthquake in Haiti after 30 months. *Journal of Affective Disorders, 159*, 111-117. doi:10.1016/j.jad.2014.02.025

Chen, H., Chen, Y., Au, M., Feng, L., Chen, Q., Guo, H., Li, Y., & Yang, X. (2014). The presence of post-traumatic stress disorder symptoms in earthquake survivors one month after a mudslide in southwest China. *Nursing and Health Sciences*, *16*, 39–45. doi:10.1111/nhs.12127

Cheng-Sheng, C., Chung-Ping, C., Cheng-Fang, Y., Tze-Chun, T., Pinchen, Y., Rei-Cheng,…Hsin-Su, Y. (2011). Validation of the Impact of Event Scale-Revised for adolescents experiencing the floods and mudslides. *Kaohsiung Journal of Medical Sciences, 27*, 560-565. doi:10.1016/j.kjms.2011.06.033

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Čorkalo, D.B., Ajduković, D., & Löw Stanic, A. (2014). When the world collapses: changed worldview and social reconstruction in a traumatized community. *European Journal of Psychotraumatology, 5*, 1-6. doi:10.3402/ejpt.v5.24098

Costa Requena, G., & Gil Moncayo, F. (2012). Propiedades psicométricas de la escala revisada del impacto del evento estresante (IES-R) en una muestra española de pacientes con cáncer. *Análisis y Modificación De Conducta, 33*(149). Recuperado de http://www.uhu.es/publicaciones/ojs/index.php/amc/article/view/1218

Cova, F., & Rincón, P. (2010). El Terremoto y Tsunami del 27-F y sus Efectos en la Salud Mental. *Terapia psicológica*, *28*(2), 179-185. doi:10.4067/S0718-48082010000200006

Craparo, G., Faraci, P., Rotondo, G., & Gori, A. (2013). The Impact of Event Scale – Revised: psychometric properties of the Italian version in a sample of flood victims. *Neuropsychiatric Disease and Treatment, 9*, 1427–1432. doi:10.2147/NDT.S51793

Creamer, M., Bell, R., & Failla, S. (2003). Psychometric properties of the Impact of Event Scale Revised. *Behaviour Research and Therapy, 41*, 1489–1496. doi:10.1016/j.brat.2003.07.010

Daxing, W., Huifang, Y., Shujing, X., & Ying, Z. (2011). Risk factors for posttraumatic stress reactions among Chinese students following exposure to a snowstorm disaster. *BMC Public Health, 11*(96), 1-7. doi:10.1186/1471-2458-11-96

de la Barra, Flora, & Silva, Hernán. (2010). Desastres y salud mental. *Revista chilena de neuro-psiquiatría*,*48*(1), 7-10. doi:10.4067/S0717-92272010000200001

Echeburúa, E., Corral, P. D., Amor, P. J., Zubizarreta, I., & Sarasua, B. (1997a). Escala de gravedad de síntomas del trastorno de estrés postraumático: propiedades psicométricas. *Análisis y modificación de conducta*, *23*(90), 503-526.

Echeburúa, E., Corral, P. Amor, P.J., Sarasua, B., & Zubizarreta, I. (1997b). Repercusiones psicopatológicas de la violencia doméstica en la mujer: un estudio descriptivo. *Revista de Psicopatología y Psicología Clínica, 2*, 7-19.

Echeburúa, E. Corral, P., & Amor, P.J. (2003). Evaluation of psychological harm in the victims of violent crime. *Psychology in Spain*, 7, 10-18.

Ferragut, M.& Fierro, A. (2012). Inteligencia emocional, bienestar personal y rendimiento académico en preadolescentes. *Revista Latinoamericana de Psicología, 44(*3), 95-104

Félix, C., & Rincón, P. (2010). El Terremoto y Tsunami del 27-F y sus Efectos en la Salud Mental. *Terapia Psicológica, 28*(2), 179-185. doi:10.4067/S0718-48082010000200006

Figueroa, R.A., Marín, H., & González, M. (2010). Apoyo psicológico en desastres: Propuesta de un modelo de atención basado en revisiones sistemáticas y metaanálisis. *Revista médica de Chile*, *138*, 143-151.

Giorgi, G., Fiz Pérez, F.S., Castiello, A., D'Antonio, A.C., Mucci, N., Ferrero, C. ... Arcangeli, G. (2015). Psychometric properties of the Impact of Event Scale-6 in a sample of victims of bank robbery. *Psychology Research and Behavior Management, 8*, 99-104. doi:10.2147/PRBM.S73901

Grimm, A., Hulse, L., Preiss, M., & Schmidt, S. (2012). Post- and peritraumatic stress in disaster survivors: an explorative study about the influence of individual and event characteristics across different types of disasters. *European Journal of Psychotraumatology, 3*(7382) 1-9. doi:10.3402/ejpt.v3i0.7382

Guimaro, M., Santesso Caiuby, A., Pavão dos Santos, O., Lacerda, S., & Baxter Andreoli, S. (2013). Sintomas de estresse pós-traumático em profissionais durante ajuda humanitária no Haiti, após o terremoto de 2010. *Ciência & Saúde Coletiva, 18*(11), 3175-3181. doi:10.1590/S1413-81232013001100008

Gutiérrez, P. (26 de marzo de 2015). Catástrofe en el norte. *La nación*. Recuperado de http://www.lanacion.cl/noticias/regiones/catastrofe-en-el-norte/denuncian-que-bidones-de-agua-se-venden-a-15-mil-en copiapo/2015-03-26/123315.html

Hussain, A., Weisæth, L., & Heir, T. (2013). Posttraumatic stress and symptom improvement in Norwegian tourists exposed to the 2004 tsunami – a longitudinal study. *BMC Psychiatry, 13*(232), 1-11. doi:10.1186/1471-244X-13-232

Instituto Nacional de Estadísticas (2015). *Encuesta nacional de calidad de vida y salud*. Recuperado de http://www.ine.cl/canales/chile_estadistico/calidad_de_vida_y_salud/calidadvida/final3region.pdf

Jiménez, A.E., & Cubillos, R.A. (2010). Estrés percibido y satisfacción laboral después del terremoto ocurrido el 27 de febrero de 2010 en la zona centro-sur de Chile. *Terapia Psicológica, 28*, 191-196. doi:10.4067/S0718-48082010000200007

Meyer, E.C., Kimbrel, N.A., & Morissette, S.B. (2015). The structure of DSM-5 posttraumatic stress disorder symptoms in war veterans. *Anxiety Stress Coping* 16, 1-10. doi:10.1080/10615806.2015.1081178

Leiva-Bianchi, M. (2011). Relevancia y prevalencia del estrés post-traumático post-terremoto como problema de salud pública en Constitución, Chile. *Revista Salud pública 13*(4), 551-559.

Lima, B.R., Santacruz, H., Lozano, J., Luna, J., & Pai S. (1988). Primary mental health care for the victims of the disaster in Armero, Colombia. *Acta Psiquiátrica y Psicológica de América Latina,, 34*(1),13-32.

Ling-Xiang, X., & Cody, D. (2011). The Relationship between Interpersonal Traits and Posttraumatic Stress Disorder Symptoms: Analyses from Wenchuan Earthquake Adolescent Survivors in China. *Journal of Traumatic Stress, 24*(4), 487–490. doi: 10.1002/jts.20655

López-Ibor, J. (2004). ¿Qué son desastres y catástrofes? *Actas Españolas de Psiquiatría, 32*(2), 1-16.

Lopez-Ibor, J., Christodoulou, G., Maj, M., Sartorius, N., & Okasha, A. (2005). *Disasters and Mental Health*. The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England: Wiley.

McFarlane, A., & Norris, F. (2006). Definitions and concepts in disaster research. In F. Norris, S. Galea, M. Friedman, & P. Watson (Eds.), *Methods for disaster mental health research* (pp. 3–19). New York: Guilford Press.

Matsuoka, Y., Nishi, D., Nakaya, N., Sone, T., Noguchi, H., Hamazak, K., ...Koido, Y. (2012). Concern over radiation exposure and psychological distress among rescue workers following the Great East Japan Earthquake. *Public Health 12*(249), 1-5. doi:10.1186/1471-2458-12-249

Mil militares resguardan Atacama: Hay 1.727 albergados y 800 damnificados. (25 de marzo de 2015). *Diarioatacama.* Recuperado de http://www.soychile.cl/Copiapo/Sociedad/2015/03/25/312324/Rio-se-desborda-y-deja-inundado-a-Copiapo.aspx

Ministerio de Vivienda y Urbanismo (2015). *MINVU presenta estrategia para reconstrucción de la región de Atacama.* Recuperado de http://www.minvu.cl/opensite_det_20150422130517.aspx

Momma, H., Niu, K., Kobayashi, Y., Huang, C., Otomo, A., Chujo, M.,…Nagatomi, R. (2014). Leg Extension Power Is a Pre-Disaster Modifiable Risk Factor for Post-Traumatic Stress Disorder among Survivors of the Great East Japan Earthquake: A Retrospective Cohort Study. *PLOS ONE, 9*(4), 1-10. doi:10.1371/journal.pone.0096131

Morina, N., Ehring, T., & Priebe, S. (2014). Diagnostic Utility of the Impact of Event Scale–Revised in Two Samples of Survivors of War. *PLOS ONE, 8*(12), 1-8.doi:10.1371/journal.pone.0083916

Moscoso, V. (2013). Caracterización de la escala de gravedad de síntomas del trastorno de estrés post-traumático en personas afectadas por terrorismo de Estado en Chile: un acercamiento a la evaluación del daño. *PRAXIS Revista de Psicología, 15*(*24*), 89-114.

Mouthaan, J., Sijbrandij, M., Reitsma, J. B., Gersons, B. P. & Olff, M. (2014). Comparing Screening Instruments to Predict Posttraumatic Stress Disorder. *PLOS ONE, 9*(5), 1-8. doi:10.1371/journal.pone.0097183

Norris, F.H. & Elrod, C.L. (2006). Psychological consequences of disaster: a review of past literature. F.H., Norris, S. Galea, M.J., Friedman, P.J., Watson (eds). *Methods for Disaster Mental Health Research*. New York: The Guilford Press.

Ministerio del Interior y Seguridad Pública. ONEMI (2015). *Monitoreo por Evento Hidrometeorológico*. Recuperado de http://www.onemi.cl/alerta/monitoreo-por-evento-hidrometeorologico/

Ochoa Zaldivar, M., Castellanos Martínez, R., Ochoa Padierna, Z., & Oliveros Monzón, J. L. (2015). Variabilidad y cambio climáticos: su repercusión en la salud. *MEDISAN*, *19*(7), 873-885. Recuperado de http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1029-30192015000700008&lng=es&tlng=es.

Osorio Yepes, C. D., & Díaz Facio Lince, V. E. (2012). Modelos de intervención psicosocial en situaciones de desastre por fenómeno natural. *Revista de Psicología Universidad de Antioquia*,*4*(2), 65-84. Recuperado de http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S2145-48922012000200005&lng=pt&tlng=es.

Peña-Sarrionandia, A., Mikolajczak, M., & Gross, J. (2015). Integrating emotion regulation and emotional intelligence traditions: a meta-analysis. *Frontiers in Psychology, 6*(160), 1-27. doi:10.3389/fpsyg.2015.00160

Pérez Benítez, C. I., Vicente, B., Zlotnick, C., Kohn, R., Johnson, J., Valdivia, S., & Rioseco, P. (2009). Estudio epidemiológico de sucesos traumáticos, trastorno de estrés post-traumático y otros trastornos psiquiátricos en una muestra representativa de Chile. *Salud Mental, 32*(2), 145–153.

Pinchen, Y., Cheng-Fang, Y., Tze-Chun, T., Cheng-Sheng, C., Rei-Cheng, Y., Ming-Shyan, H.,…Hsin-Su, Y. (2011). Posttraumatic stress disorder in adolescents after Typhoon Morakot-associated mudslides. *Journal of Anxiety Disorders, 25*, 362–368. doi:10.1016/j.janxdis.2010.10.010

Pineda Marín, C., & López-López, W. (2010). Atención Psicológica Postdesastres: Más que un "Guarde la Calma". Una Revisión de los Modelos de las Estrategias de Intervención. *Terapia psicológica, 28*(2), 155-160. doi:10.4067/S0718-48082010000200003

Pollice, R.; Bianchini, V., Roncone, R. & Casacchia, M. (2012). Distress psicológico e disturbo post-traumático da stress (DPTS) in una popolazione di giovani sopravvissuti al terremoto dell'Aquila. *Rivista di psichiatria, 47*(1), 59-64.

Rojas Vilches, O., & Martínez Reyes, C. (2011). Riesgos naturales: evolución y modelos conceptuales. *Revista Universitaria de Geografía*, *20*(1), 83-116. Recuperado de http://www.scielo.org.ar/scielo.php?script=sci_arttext&pid=S1852-42652011000100005&lng=es&tlng=es.

Roncone, R., Giusti, L., Mazza, M., Bianchini, V., Ussorio, D., Pollice, R., & Casacchia, M. (2013). Persistent fear of aftershocks, impairment of working memory, and acute stress disorder predict post-traumatic stress disorder: 6-month follow-up of help seekers following the L'Aquila earthquake. *SpringerPlus, 2*(636), 1-11. doi:10.1186/2193-1801-2-636.

Rubonis, A., & Bickman, L. (1991). Psychological impairment in the wake of disaster: The disaster–psychopathology relationship. *Psychological Bulletin, 109*(3), 384-399.

Salcedo, V. (2014). La salud mental ante los desastres naturales. *Salud Mental 37*(5), 363-364.

Samper Lucerna, E. (2015). *Factores de riesgo psicológico en el personal militar que trabaja en emergencias y catástrofes*. (Tesis doctoral). Universidad Complutense de Madrid. España.

Soto, F.L. (2013). *Impacto de los desastres en la salud mental del personal sanitario de ayuda de emergencia. Revisión bibliográfica.* (Tesis de Maestría). Universidad de Oviedo. España.

Takeda, T., Tadakawa, M., Koga, S., Nagase, S., & Yaegashi, N. (2013). Relationship between Dysmenorrhea and Posttraumatic Stress Disorder in Japanese High School Students 9 Months after the Great East Japan Earthquake. *Journal of Pediatric and Adolescent Gynecology,* 355-357. doi:10.1016/j.jpag.2013.06.020.

Ugarte, A.M., & Salgado, M. (2014). Sujetos en emergencia: Acciones colectivas de resistencia y enfrentamiento del riesgo ante desastres; el caso de *Chaitén*, Chile. *Revista INVI 80*(29), 143-168.

Villalba, C. A. (20 de setiembre de 2012). Plataforma Regional para la Reducción del Riesgo de Desastres en las Américas. Recuperado de http://eird.org/pr14/nota-igninte-stage-todo-desastre-es-socionatural.html

Warsini, S., Buettner, P., Milles, J., West, C. & Usher, K. (2015). Psychometric evaluation of the Indonesian version of the Impact of Event Scale-Revised. *Journal of Psychiatric and Mental Health Nursing, 22,* 251–259. doi:10.1111/jpm.12194

Weiss, D.S., & Marmar, C.R. (1997). *The Impact of Event Scale-Revised.* En Wilson JP & Keane TM (eds.), Assesing psychological trauma and PTSD: A Handbook for practioners. New York: Guilford Press.

Wu, K.K., & Chan, S.K. (2004). Psychometric Properties of the Chinese Version of the Impact of Event Scale-Revised. *Hong Kong J Psychiatry, 14*(4), 2-8.

Zhang, Y., Feng, B., Xie, J., Xu, F., & Chen, J. (2011). Clinical Study on Treatment of the Earthquake-caused Post-traumatic Stress Disorder by Cognitive-behavior Therapy and Acupoint Stimulation. *Journal of Traditional Chinese Medicine*, *31*(1): 60-63.

Zhiyong, Q., Donghua, T., Qin, Z., Xiaohua, W., Huan, H., Xiulan, Z., . . . Fan, X. (2012). The Impact of the catastrophic earthquake in Chine's Sichuan province on the mental health of pregnant women. *Journal of Affective Disorders, 136*, 117–123. doi:10.1016/j.jad.2011.08.021