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Prevention of Psychopathological Consequences in Survivors of Tsunamis

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1. Introduction

During the last decade three massive tsunamis have affected the world. On December 26, 2004, a Mw 9 earthquake, with epicenter at 250 kilometers northwest of Sumatra, caused a devastating tsunami [T-2004] that swept through a large part of the Indian Ocean, the Bay of Bengal and the Andaman Sea (Yamada et al., 2006), causing an estimated death toll of 280,000 and millions of victims along 13 countries, including Indonesia, Thailand, Sri Lanka and India was among the most affected (Rajkumar et al., 2008). Six years later, during the morning of February 27, 2010, the south central region of Chile was devastated by an Mw 8.8 earthquake with epicenter in the city of Cobquecura. After the quake, several tsunamis devastated the seaboard [T-2010], causing the disappearance of some localities as well as a considerable number of victims and changing the morphology of the coast. In the end, the death toll was 521 and 56 people were missing due to the natural disaster. Of these, 156 dead and 25 missing were caused exclusively by the tsunami (Fiscalía Nacional del Ministerio Público, 2011). The last tsunami occurred on Friday, March 11, 2011 in Japan, when a Mw 9 earthquake at 14:46 local time (05,46 GMT), caused a tsunami that stroke vast areas of the Pacific coast, whose waves reached even far-off locations as the Chilean coast, affecting the same areas that had already begun to be reconstructed after the T-2010. It is stated that one of the biggest waves (38,9 meter high), arrived in the coast of Miyako, Japan at 15:55 hrs. (ANSA, 2011, April 15). The real magnitude of this disaster remains unknown, but the number of victims is estimated in the thousands because many people failed to reach safety and were drowned by the wave.

In the case of T-2010, the loss of life would probably have been lower if there were not coordination and prediction failures of the authorities, who were unable to give the alarm for the population's safety. On the contrary, they asked the population to stay calm saying that there was no tsunami risk before the waves reached the coast (Marín, 2010). In the T-2004 it was impossible to alert the population to the tsunami. These failures show a lack of training in communities to cope with these events and prevent the loss of lives.

In Chile, these human errors caused the population's distrust of official information, creating a state of constant alarm at every aftershock that occurred in the following days and months, many of them with a magnitude of more than 6 MW. These aftershocks caused a mass exodus to higher ground even though they did not cause another tsunami. Fear in Chile remains. The press published, almost a year after the earthquake, studies of geologists like Lorito et al. (2011), who state that another big earthquake can occur. Regarding the

possibility of another earthquake in Chile, Lorito et al. conclude: “increased stress on the unbroken patch may in turn have increased the probability of another major to great earthquake there in the near future”.

Despite the prediction (Lorito et al. 2011), the vast majority of scientists agree that earthquakes are difficult to predict. On the other hand, tsunamis can supposedly be anticipated since they are generated as a result of earthquakes of great magnitude (Gaborit, 2001). However, their predictability depends on the mechanisms designed to alert the population, the same ones that failed in the T-2004 and in the T-2010. On the other hand, the destructive wave can move to areas that have not been shaken by earthquakes, making it difficult to implement actions to prevent harm to people, as happened in Thailand or Sri Lanka in 2004 or Juan Fernandez Islands, 650 miles off the coast of Chile, in 2010. In Juan Fernández, the wave arrived an hour after the quake and destroyed the only village, without the possibility of alerting the population.

The traumatic character of an event of this nature is undeniable. Not only in the natural disaster itself, but also from the consequences of destruction, death, displacement, social chaos and deficits in the satisfaction of basic needs. On the other hand, aftershocks cause constant re-experiencing and difficult adjustment to a more normalized lifestyle. Therefore it is important to first consider the emotional consequences that these events cause to people, than to differentiate risk and protective factors for mental health problems and to finally promote the use of early intervention models that could reduce the prevalence of different psychopathologies associated with these disasters. Regarding the psychopathological consequences, responses of the survivors tend to be more varied than people might think.

2. Psychological responses

Gaborit (2006) states that, in view of an earthquake, the individual routines are abruptly altered for an indefinite period of time. Many plans, projects and lifestyles must change as a result of the earthquake. The need to adapt is strong and apparently not everyone is prepared.

Sasson (2004) advised that during disasters basic beliefs about own invulnerability, life's meaning and events control are lost. These beliefs are strongly affected after a disaster and not only psychological consequences are caused to the population but also change the view of themselves, the world and others, towards a more negative view. Janoff-Bulman (1992, as cited in Paez et al., 1995) suggests that disaster victims reduced their belief that the world makes sense and lose the illusion of control. However, he concluded that as time passes people end up readjusting. In the T-2010, it can be stated that there were two types of disaster: one with a natural origin including an earthquake and a tsunami, and a human catastrophe, caused by looting and social chaos, both with a highly destructive and traumatic capability. If we add to that, that everyday life stressors increase, such as uncertainty, frustration, indolence or political advantage (Cova & Rincon, 2010), all of them consequences of the earthquake, we can hypothesize a high impact on the belief structure of the population.

In identifying the phases in the reaction of people after a natural disaster, Paez et al. (1995) indicate the following: a) a first phase characterized by a sense of victimization and abandonment experienced by those affected, b) a second phase increases, characterized by adaptive behaviors such as distance from the events, seeking an explanation to understand

what happened, by emotional expression and early action to protect themselves from danger, even though there are also collective panic, escape and complaint; c) a third phase in which rumors increase, self-esteem is retrieved, helping each other and losing control of the situation restoring, d) finally, the fourth, or post-critical phase; depending on the subjects in particular and the social support available to them, as well as on their beliefs about the world and ways of coping, it may show two opposing tendencies: some thinking and ruminating about the events, while others develop avoidance behavior, refusing to recall and talk about what happened.

From another perspective, Marcos et al. (2002) classified the possible reactions to a disaster in three types: a) adapted reactions, characterized by the ability to remain calm. Here, care on protection is taken, and sometimes a solidarity behavior and assistance towards others is observed, b) inappropriate reactions, corresponding to panic behavior, emotional overflow, inhibition, stupor, denial and opposition; c) influenced by reactions. In these cases people who show themselves insecure and indecisive and, acting according to circumstances, can be mobilized to help or to a more negative sense as inhibition, panic and escape. The type of reaction would be mediated by perceived personal risk assessment of the survivors (Perry et al., 1980, as cited in Costa & De Gracia, 2002). In this regard, there are two evaluation forms: primary focuses on threat assessment, and secondary on individual capacities for risk perception and cognitive ability to manage those risks and acting accordingly. Thus, if the situation is perceived as dangerous or hazardous and people feel that their coping skills are limited, it is common to overreact with inappropriate responses that can increase the risk of emotional stress.

According to Flynn and Norwood (2004), normal psychological responses after a disaster include fear, anger and anguish. Considering that all those who experience a natural disaster are affected by it, psychological reactions are expected. However, the nature, duration and magnitude of responses may vary (Galambos, 2005). Figueroa et al. (2010) state that although it is well known that most of those affected by a disaster will not develop psychopathology, a significant group will. Among the most common psychological consequences of a natural disaster are the subclinical distresses, acute stress disorder, post-traumatic stress disorder (PTSD), major depression, increased alcohol and drug consumption such as heroin (Yamada et al., 2006), other anxiety disorders and somatic symptoms (Batniji et al., 2006). In relation to tsunamis, among the most common symptoms reported by the European population exposed to the effects of T-2004, we found dissociation, flashbacks, sleep disturbance, hyperarousal, ideation and attempts at suicide, loss of appetite and mourning reactions (Bronisch, 2006).

A separate comment should be made concerning PTSD, because it is the most expected psychopathological response by both the general population and specialists after a traumatic experience (Echeburúa, 2010). McNally et al. (2003) notice that many of the reactions are normal and expected, and do not necessarily mean disorder. On the other hand, it is noteworthy that while many people in their lives have been exposed to traumatic situations, it is rather a small number who develop PTSD; in other words, traumatic events do not cause PTSD, at least not in a linear cause-effect relationship. For example, McNally et al. cite the National Comorbidity Survey in the U.S. revealed that 60.7% of randomly selected adults reported exposure to traumatic events, but from these people only 20.4% of women and 8.2% of men had developed PTSD. Moreover, Shinfuko (2002) suggests that while the PTSD should be considered as part of the variety of mental health problems among survivors of an earthquake, people tend to use this diagnosis to refer to all mental

problems, just as in the earthquake that occurred in Kobe, Japan, in 1995, where the concept was widely used and accepted by the Japanese press and was used incorrectly as a synonym for the whole range of psychological problems.

Perhaps this confusion, coupled with problems relating to the instruments and access to the affected population, may explain the great variability of results in studies on the prevalence of PTSD in survivors of a natural disaster. For example, following the 1999 earthquakes in Taiwan and Greece, a prevalence of only 4.4% (Wu et al., 2006) and 4.5% (Roussos et al., 2005) was found respectively in the surveyed groups. Ketumarn et al. (2009) measured the prevalence of PTSD in Thai students after the T-2004, obtaining 15.1%, 23 months after the event. On the other hand, after the earthquake in California in 1994 (McMillen et al., 2000) and the T-2004 (Dewaraja & Kawamura, 2006), found 48% prevalence of posttraumatic symptoms and 42% of PTSD respectively. Lommen et al. (2009) notice the prevalence of 52.2% of PTSD 15 months after the T-2004 in adult population of Sri-Lanka. John et al. (2007) revealed a prevalence of 70.7% for acute PTSD in Tamil children from southern India affected by the T-2004. As we can observe, the results of different studies show staggering differences. Even more noticeable were the differences in Wenchuan earthquake survivors who obtained a 21.5% prevalence measured by a scale and 40% with DSM-IV (Xu & Song, 2010). This difference, obtained by different instruments in the same population, forces you to evaluate with skepticism any study on the prevalence of PTSD.

In Chile, recent epidemiological studies comparing the prevalence of PTSD and other psychiatric disorders in children and adolescents before and after the T-2010, indicate no significant differences between the two measurements (Diaz, 2011). Tharyan et al. (2005) also summarized studies indicating that PTSD has not been a significant mental health problem in Asian tsunami survivors in Tamil population in India. This shows that the fear of an increased prevalence of psychiatric disorders after T-2010 is unfounded and apparently the population has natural recovery mechanisms which should also be investigated.

3. Risk factors

Considering then that not all people exposed to a natural disaster develop psychopathological consequences, it is necessary to direct efforts to identify at an early stage the most vulnerable people in order to intervene early, as proposed by many authors, who have been concerned about the topic (Dewaraja & Kawamura, 2006; Karakaya et al., 2004; Ranawaka & Dewaraja, 2006).

Some vulnerability factors that have been found in survivors of earthquakes and tsunamis are:

- a. female sex (Baddam et al., 2007, Batniji et al., 2006, John et al., 2007, Tang, 2006, Tural et al., 2001, Xu & Song, 2010).
- b. objective experience of the event, suffering from the loss of life or property as a home, as well as from physical injury, being a witness of the death of someone close, being without food or water, prolonged displacement (Baddam et al., 2007, Dewaraja & Kawamura, 2006, Irmansyah et al., 2010, John et al., 2007, Tang, 2006, Tural et al., 2001, Wickrama & Kaspar, 2007).
- c. subjective experience of event: fear of dying or being hurt, lack of perceived control, negative evaluation of the stress response (eg, see as a sign of personal weakness), negative interpretation of the memories of trauma (Batniji et al., 2006, Figueroa et al.,

- 2010, Lommen et al., 2009, Roussos et al., 2005, Tural et al., 2001, Wahlstrom et al., 2008, Xu & Song, 2010)
- d. previous psychiatric history of anxiety disorders, mood disorders, introvert personality features or low IQ (Batniji et al., 2006, McNally et al., 2003, Tang, 2006, Wahlstrom et al., 2008).
 - e. have suffered physical or sexual abuse during childhood (McNally et al., 2003).
 - f. family instability during childhood (McNally et al., 2003).
 - g. low social support after the disaster (Batniji et al., 2006, Figueroa et al., 2010, Tang, 2006, Xu & Song, 2010)
 - h. the type of peri-traumatic emotional response and the level of peri-traumatic dissociation (Figueroa et al., 2010, Lommen et al., 2009).

There is controversy concerning the last factor mentioned. McNally et al. (2003) discussed several studies which suggest that the presence of posttraumatic symptoms or dissociation one or two days after the event is not a good predictor of future PTSD, but it certainly is if they continue a week or two later. Some authors find that even dissociation and peritraumatic depersonalization are more adaptive mechanisms. Apparently, this "PTSD-dissociation" link may be mediated by how individuals appraise their dissociative reactions, making it more severe when the interpretation of them is catastrophic. For example, an individual who interprets emotional numbing as a normal response to a traumatic event may have less difficulty than another individual who interprets the emotional anesthesia as a sign of insanity.

It is also necessary to emphasize that in order to be considered as an at-risk population, you do not have to directly experience the trauma. Ketumarn et al. (2009), in a study with Thai students after the T-2004, concluded that indirect exposure through parents, neighbors, community and media, may also be related to PTSD, which is consistent with other studies that emphasize influence of observation and oral transmission.

4. Protective factors

We have already seen several risk factors that scientific literature states. However, we have also reported that not everyone exposed to a traumatic event develops psychopathology in the future. Apparently, a number of protective factors must be recognized and strengthened, either in survivors or in relief teams.

For example, Bronisch et al. (2006) analyzed the protective factors in rescue workers who provided support to European survivors of the T-2004. Among the protective factors they found: group cohesion, telephone contact with their families, dissociation or disconnection of negative emotions during the relief efforts and the perspective of seeing their own work as valuable.

Regarding the survivors, Chilean researchers who studied the prevalence of PTSD before and after the T-2010 in the infant and adolescent population of the Bio Bio region, found no significant differences between the two moments, which indicated that the population apparently has resilient characteristics that explain the absence of changes. We also hypothesized that this result could be due to the effects of initial interventions which were performed after the catastrophe (Díaz, 2011, January 23). This absence of significant psychopathology was also mentioned by Rajkumar et al. (2008) after the T-2004 in India, who even detected positive effects on the population studied, which apparently depended on the coping strategies used, whether individual, collective or spiritual. Specifically, among

the positive coping strategies used there were: personal trauma collectivizing, meaning re-building after the disaster by using a fatalistic perspective, a problem-focused coping style, extended social supports using, public grief and mourning displaying, and strongly rooted spiritual beliefs and practices. Of all the strategies outlined by Rajkumar, there are two that are insistently repeated in studies concerning this topic: the social support network availability and meanings making.

Social support can be conceived as the feeling of being appreciated and valued by others and belonging to a network (Barra, 2004), and seems to positively influence a better quality of life, low psychological morbidity and extended survival. Its importance has been demonstrated by several studies that indicate, for example, that the lack of social support is a risk factor for the onset of PTSD (Brewin et al., 2000) or that it is a good predictor for the occurrence of this disorder in survivors of an earthquake (Altindag et al., 2005). McNally et al. (2003) emphasize that the vast majority of trauma survivors are able to recover without professional help, as they have good networks and prefer to rely on their close acquaintances. They highlight that a support environment after a traumatic event may reduce acute symptoms and the risk of developing PTSD. This implies that the sensitive and respectful attitude on behalf of emergency equipment, health services and police personnel can help the survivors to prevent the development of PTSD.

Armenian et al. (2000) found that, along with a higher educational level and the ability to make friends after the tragedy, the immediate support was an important protective factor to prevent PTSD in survivors of the earthquake in Armenia in 1988, measured two years after the disaster. They conclude that early support to survivors with high levels of losses may prevent PTSD. Tang (2006), by assessing Thai T-2004 survivors, found that the difference between those who achieved a positive adjustment and negative one was that the first ones had a job before the disaster, and often sought support from others. On the other hand, positive relations between mother and child have a compensatory effect for depressive symptoms and posttraumatic stress disorder in adolescents in Sri Lanka affected by the T-2004 (Wickrama & Kaspar, 2007). All these studies help to emphasize the need to strengthen support networks of survivors, in order to prevent psychopathology.

On the other hand, the making of sense has been highlighted by Black and Tufnell (2006), who state that in children, the best results in post-disaster settings are associated, among other factors, with the ability to make sense of the experience, plus the availability of consolation and understanding. The emphasis on making sense in preventing or lightening trauma consequences has been raised by the narrative therapy, which will be discussed further on.

5. Psychological interventions

One of the main aims of psychological interventions for survivors of a catastrophe is not only reducing the associated symptoms, but also improving the quality of life, usually disturbed as a result of a natural disaster.

Several studies suggest that certain methods of cognitive-behavioral therapy can reduce the incidence of PTSD among people exposed to traumatic events (Echeburúa, 2010, Pineda & López, 2010). These methods are more effective than supportive counseling or no intervention. Among the therapies used, which have proven effective are: brief psychotherapy focused on trauma / grief, used in young survivors of the earthquake in Armenia in 1988 (Goenjian et al., 1997); exposure techniques in seismic simulator, used by

Basoglu et al. (2003) in survivors of the same earthquake; cognitive therapy focused on the interpretation of the memories of trauma (Lommen et al., 2009); the eye movement desensitization and reprocessing or EMDR (Fernandez, 2008) in survivors T-2004 in Sri Lanka and Thailand; and cognitive-behavioral group therapy in children between 8 and 12 survivors of the earthquake in Athens in 1999 (Giannopoulou et al., 2006).

Also, it has been used Narrative Exposure Therapy for survivors of political violence in Romania, several years after the traumatic experience, achieving promising results in reducing symptoms of PTSD and depression compared with psychoeducation (Bichescu et al., 2007). The same technique has been applied to children survivors of the T-2004, with better results than no treatment and equivalent to an intervention based on meditation and relaxation techniques (Catani et al., 2009). This therapy involves the exposure to emotional memories of traumatic events and the reorganization of these memories into a chronological coherent narrative (Robjant & Fazel, 2010).

McNally et al. (2003) and Ruzek et al. (2007) warn that while clinical interventions (especially those found in cognitive-behavioral spectrum) have proven effective, this has not been empirically examined in the immediate aftermath (0-14 days) in trauma. Therefore, it does not correspond to models of early intervention and prevention. On the other hand, Ruzek et al. indicate that the post-traumatic event can reduce the energy and time required to participate in a process of psychotherapy, so they recommend that a process of cognitive-behavioral psychotherapy may not run until the secondary stressors in the environment are under sufficient control to enable the person to focus on intervention, usually not less than three weeks after the incident.

6. Models of early intervention

Most studies on the psychological effects of natural disasters, conclude that early intervention is necessary to prevent the occurrence of various psychological problems as time passes. However, this need is facing a number of obstacles.

For example, McNally et al. (2003) referred to studies indicating that, if given the choice, only 10% of trauma survivors accept to discuss their experiences with mental health professionals. Faced with this, it might be believed that this initial reluctance is a dysfunctional form of avoidance which can hinder recovery. However, this apparently allows them to better adapt to the survivors making it possible for them at the same time to start rebuilding their lives and focus on the practical problems they face. This will help to leave the event in the past. Furthermore, memories tend to fade over time, and it remains unproven whether early exposure to traumatic memories promotes or retards this process.

Similarly, Shinfuko (2000) says, referring to the earthquake in Kobe, Japan, 1995, that the most appreciated by the victims was the support for their daily life rather than mental health professionals. The victims shared their experiences along with the volunteers who helped them. The work of mental health professionals was to prepare simple guidelines for volunteers on how to listen, encourage and maintain confidentiality.

Complementing this, McNally et al. (2003) warn that after the attack on the Twin Towers in New York, very few survivors sought counseling after the attack. According to McNally et al., apparently people were more concerned with seeking help in more practical matters such as finding work, doing paperwork on insurance companies, among other activities, but it is also likely that people have spontaneous recovery mechanisms or count on support networks of family, friends and church groups that make professional psychological help

unnecessary. At the lack of interest in obtaining free counseling, New York authorities were prepared to receive a lot of people who present delayed-onset PTSD, but this did not happen. The authors conclude that not all people exposed to trauma need or want psychological services.

A second obstacle lies on the fact that, contrary to popular belief, pushing people to talk about their feelings and thoughts immediately after trauma may not be beneficial (McNally et al., 2003). Perhaps the systematic exposure to traumatic memories should be reserved for those who cannot recover by themselves. Brewin (2001) as well concluded that any intervention that takes place two or three days after minor trauma, or within a month after a severe trauma, is likely to coincide with natural recovery processes. An obvious concern is that intervention should interfere as little as possible with these processes, at least until the presence of an obstacle to recovery becomes evident. Therefore, clinicians working with trauma survivors soon after the event face a dilemma. On the one hand, any interventions they attempt should not interfere with natural recovery. In contrast, it is their duty to provide immediate care to the most exposed survivors, to shorten their suffering and prevent the development of secondary problems such as job loss, relationship problems or substance abuse. Faced with the possibility that early psychological intervention may be iatrogenic, Figueira (2005) warns that care must be taken to use only those interventions that have proven results, to avoid the risk of creating damage. He proposes, first, to avoid pathologizing the survivors, especially, given the clear evidence that very few people will eventually develop PTSD. Second, he proposes avoiding the use and abuse of benzodiazepines as an exclusive strategy for symptoms of stress, since studies show harmful effects. Finally, he suggests avoiding the use of debriefing, a technique which will be discussed below, due to the disparate findings regarding its effectiveness.

This brings us to the third problem: the almost impossible rigorous studies with control groups and random assignment to the same, in order to report the effectiveness of early intervention models. Ruzek et al. (2007) note that there are many barriers to conducting research on intervention strategies in the immediate aftermath of disasters and it is likely that more rigorous methodologies to evaluate mental health interventions (ie, randomized clinical trials) will never be possible. Immediate investigation after a disaster is so difficult that some authors warn about the ethical issues involved, proposing a series of guidelines to be followed in order to do so (Sumathipala & Siribaddana, 2005).

By assuming the need for intervention in crisis despite these obstacles, Galea et al. (2003, as cited in Ruzek et al., 2007) suggest to remember, before launching an intervention that: (a) the reactions of people should not necessarily be regarded as pathological responses or even as precursors of subsequent disorder; (b) many people will have temporary stress reactions in the aftermath of mass violence, and such reactions may occur, occasionally, even years later; (c) rather than traditional diagnosis and clinical treatment, most people are likely to need support and resources supply to ease the transition to normalcy; and (d) some survivors may experience great distress and require community and sometimes clinical intervention

The objectives of an initial intervention would be: to provide systematic support to facilitate emotional expression; to resolve conflicts and inconsistencies and provide strategies to accept reality and reorganize attitudes (Costa & De Gracia, 2002). Ruzek et al. (2007) also remind us that the various studies on the subject have identified the following five principles to guide intervention in both the early and medium term. These principles are: (a) to promote sense of safety, (b) to promote calm, (c) to promote a sense of self- and community-efficacy, (d) to promote connection with support networks, and (e) hope instilling.

Until now, there are at least four early intervention models with efficacy studies, even if their results are inconclusive or even negative: Debriefing, Psychological First Aid, Pennebaker's Emotional Disclosure Technique, and Narrative Therapy. It becomes necessary to detail these models.

6.1 Debriefing

Psychological debriefing has its roots in World War I (McNally et al., 2003, Vera, 2004), when after a great battle, commanders met with their men to keep them aware. Mitchell (1983, as cited in McNally et al.) drew a parallel between the stress of combat and stress suffered by the medical emergency service, arguing that a similar approach could reduce stress reactions among firefighters, police, emergency technicians, physicians, and others exposed to what he called "critical incidents" (i.e. traumatic events). In his seminal article, Mitchell stressed that many people mistakenly believe that emergency services personnel are impervious to emotional trauma. By contrast, Mitchell says that helping the main victims of trauma can be a major stressor for the helpers themselves. Accordingly, Mitchell asserted that the mental health of emergency personnel is best protected when they participate in a structured session that allows them to talk about the traumatic event and vent their emotions, especially in the company of peers who have experienced the same incident. The debriefing is designed to mitigate the adverse psychological consequences of traumatic events by attenuating the intensity of acute stress symptoms, reducing the risk of subsequent psychiatric problems. Over time, the debriefing began to be considered useful even for "primary victims", i.e. those directly exposed to trauma.

In general terms, a session of debriefing lasts 3 to 4 hours and takes place between 2 and 10 days after a critical incident, except in cases of mass disasters. In that case, it could be done 3 to 4 weeks after the disaster (Everly & Mitchell, 1999, as cited in McNally et al., 2003). According to its proponents, the debriefing is successful because of its immediacy, since it provides psychosocial support and an opportunity to express emotions and thoughts about the trauma, and because it provides tips on how to address this situation and education about stress and its management.

A session of debriefing has seven phases:

1. Introduction phase, the facilitator explains the process of debriefing to participants by answering any questions they may have.
2. Fact phase: the person tells the facts of the traumatic event.
3. Thinking phase: it allows each participant to describe their cognitive reactions to the traumatic event.
4. Reaction phase: designed to foster emotional processing of trauma, participants make catharsis of their experience through expressing their feelings about the event.
5. Symptoms phase: its purpose is to identify stress reactions that members want to share.
6. Teaching phase: the objective is to demonstrate that stress reactions that participants have been experiencing are normal and not necessarily a medical problem,
7. Re-entry phase: it seeks to achieve closure of the traumatic event.

Regarding the results evaluation, McNally et al. (2003) note that, considering that only some individuals exposed to trauma develop PTSD, and most of them recover on their own, the efficacy of debriefing can be measured only by comparing the results for those who did receive and not received this intervention. In this regard, studies show that debriefing does not seem to generate significant differences between those who participate in these sessions and those who do not (van Emmerik et al., 2002). Other researchers have shown that even

iatrogenic damage generated in the participants (Aulagnier et al., 2004; Rose et al., 2002; Sijbrandij et al., 2006; Woods, 2007). On the other hand, Chan and Huake (2004) conducted a study where they assess the effects of this technique in health care workers in Singapore who came to help their neighbors in Southeast Asia after the T-2004. The results of this intervention first revealed the high levels of acute stress experienced by rescue teams but also showed how beneficial it was for them, according to their own testimony. The same positive result reported a group of journalists from Singapore who participated in debriefing sessions after the T-2004 (Sin et al., 2005). Costa and De Gracia (2002) only presents evidence that supports the use of debriefing in disaster situations. Vera (2004) and Santacruz (2008) have reviewed studies for and against the effectiveness of this technique. McNally et al. (2003) note that the main difference between studies developed by critics and defenders of the debriefing would arise due to the absence of a control group in studies that approved the debriefing, who defended themselves by pointing out that to leave people exposed to trauma without psychological support is hardly ethical. However, studies that follow an appropriate methodology conclude that, given a lack of satisfactory evidence for debriefing, it is best to seek other methods to prevent psychopathological consequences in people exposed to trauma.

There are several possible explanations to the iatrogenic effect that would cause the debriefing in some people. Aulagnier et al. (2004) propose that the debriefing involves a re-exposure to the traumatic memory that can interfere with the natural course of recovery. The attempt to forget or distance themselves may be an adaptive response and intervention may interfere with this mechanism. Rose et al. (2002) suggest that it could even lead to "secondary trauma" due to the intense imaginary exposure to a traumatic incident within a short time from the event. It is possible that for some individuals this results in additional trauma and exacerbates their symptoms without helping the emotional processing. Although exposure therapy, practiced for the routine treatment of PTSD, may cause a slight initial exacerbation of symptoms as they remember the images of distress, it is reduced as the person reaches the habituation over time. However, in a single intervention, as in the debriefing, this habituation may not occur unless the recipient engages in additional exposure directed by himself or herself.

On the other hand, studies have shown that certain conditions are necessary to facilitate emotional processing of distressing material: "The material, especially in the early stages of treatment, should be made predictable, controllable, presented in small chunks, and tackled in a progressive but gradual way" (Rachman, 2001, p. 166, as cited in McNally et al., 2003). These conditions are not met in the debriefing, because it is more cathartic. Therefore, encouraging survivors to discuss their thoughts and feelings right away may increase the risk of feeling overwhelmed by the experience, which would be counterproductive.

Another explanation is that the "debriefing" can consider normal anxiety as a "medical condition" and therefore could increase the expectation of developing psychological symptoms otherwise it would not have been presented. While studies show that only a minority of people exposed to a traumatic event develop PTSD, the debriefing, since it raises awareness about the symptoms, may paradoxically induce this disorder which otherwise would not have been developed. Thus, the normal responses to stress produce expectations of developing subsequent pathologies (Raphael, 1995, as cited in Vera, 2004).

Finally, the treatment that promotes the debriefing, which includes all people exposed to a traumatic event, is excessive and ignores the positive effects of coping strategies that people naturally have and the potential of every human to learn and grow as a result of a traumatic

experience (Vera, 2004). In addition, it focuses too much on the trauma, excluding other more relevant stressors, and may not be compatible with the natural coping strategies of many.

Summerfield (2006) indicates a darker aspect of the use of debriefing. This author argues, in relation to survivors of the T-2004 in Sri Lanka, that despite the alarmist voices which predicted up to 25% of children with PTSD and reported to have found up to 70% of these children with PTSD, demonstrated a rather remarkable resilience and joy in the survivors, and that the children seemed more inclined to return to school to talk about the events of 26 December. For this reason, they were described as "clearly in denial". There were a large influx of Western counseling teams specialized in trauma, most of them with little or no knowledge of the views and local culture. In Sri Lanka there are reports of survivors that say they had been led to virtually mandatory counseling.

Rose et al. (2002) concluded in an exhaustive way that the use of mandatory debriefing of trauma survivors must stop. Instead of that, the authors recommend early detection of those at risk of developing psychopathology to conduct early intervention only to this group.

6.2 Psychological First Aid (PFA)

MacNally et al. (2003) summarized studies that conclude that the provision of practical help can be seen as more useful and positive than specific psychological care. Trauma survivors have many immediate needs in their efforts to adapt to the event. For example, survivors may need a roof, help for overcoming exhaustion, for getting financial support, for finding relatives and friends, for protecting children, etc. There are also studies that emphasize the need for survivors to receive information from both the traumatic event, and the location of relatives or the ability to recover from an injury.

Although the provision of information by itself does not appear to promote recovery, it is generally recommended to provide information on common reactions to trauma, including natural recovery. Bryant (2006) recommends that after a trauma, victims should receive assistance in order of priority. The first priorities are basic requirements like food, water and shelter, followed by emotional support for physical suffering and psychological interventions. In the end only for those with acute stress disorder or PTSD. Black and Tufnell (2006) note that for survivors of traumatic events, access to support and information networks is crucial to get a sense of security.

With all this evidence at hand, PFA were designed by a collaborative effort of the National Center for PTSD and the National Child Traumatic Stress Network, of USA, intended for use by disaster mental health responders and others, including mental health counselors, who may be called upon to provide immediate support for trauma survivors (Ruzek et al., 2007). One of the qualities of the PFA is that they can be provided by people who are not necessarily mental health professionals, even though it requires a basic training for implementation. Another advantage is that they can be applied wherever there are survivors of trauma (Uhernik & Usson, 2009). In addition, the PFA are consistent with the concept of resilience in individuals and communities, which encourages self-efficacy and decreases the victimization and dependency.

The Pan American Health Organization [PAHO] (2006) notes that the PFA should be the first aid provided to those who are affected in an emergency, crisis or disaster, especially when there is a predominance of certain emotions such as fear, sadness, anger, tears and pain, after the event. Its objectives are: a) providing immediate relief of emotional suffering,

b) reduce the risk of normal reactions into something more serious and c) help meet the survival and basic needs that suffer most of the people who survive disasters (PAHO, 2006). Figueroa et al. (2010) recommend PFA for those most affected, even though they not present formal psychiatric disorders. Parallel to the PFA it should be done a psychological screening for detecting risk population that requires more specialized support.

According to Vernberg et al. (2008), the principles, objectives, and techniques of PFA are designed to meet four basic standards:

1. Consistent with research evidence on risk and resilience following trauma.
2. Applicable and practical in field settings.
3. Appropriate for developmental levels across the lifespan.
4. Culturally informed and deliverable in a flexible manner.

Figueroa et al. (2010) suggest not forcing the affected to talk about their feelings, since the psychotherapeutic interventions that do so, as does the debriefing, has not been shown to reduce the development of later psychiatric disorders and worse, it could increase them. However, the PFA also recommends making it possible for survivors to construct a "trauma story" narrative and to expose their feelings. But what differentiates it from a debriefing? The difference is that the PFA respects the desire of the person to talk or not, about the trauma. The goal of the PFA is not to maximize emotional processing of the traumatic event, but to respond to the urgent need that arises in many people who want to share their experience. At the same time the PFA respects those who do not want to talk about what happened (McNally et al., 2003). The conclusion is that in the immediate after-effects of trauma, practitioners should take their lead from the survivors and provide the help needed, instead of mentioning how the survivors will get better.

It still remains to be proved empirically if the PFA is effective in preventing or recovering from PTSD and other psychopathological consequences of natural disasters. However, its nature of general support and its proposal of non-directive intervention, as well as empirical support that sustain many of its components (satisfaction of basic needs, providing information, formation of social support networks and facilitation of emotional expression) suggest that it is unlikely to generate damage. Fortunately, the procedure of PFA is governed by standardized guidelines, making it susceptible to evaluation (Vernberg, 2008).

A complete guideline of PFA can be downloaded from

<http://www.ptsd.va.gov/professional/manuals/psych-first-aid.asp>

6.3 Emotional disclosure

Different research guided by Pennebaker or made following their postulates, has shown that the emotional disclosure of the meanings associated with the trauma prevents long-term health problems and generates an increase in immune function, among other consequences (Owen et al., 2006; Pennebaker, 1997; Pennebaker et al., 1988; Pennebaker & Seagal, 1999; Petrie et al., 1998). Pennebaker (2004) has developed an emotional writing exercise that has been applied in different contexts and that, according to a review of Cabrera (2006), has led to improvements in the physical and psychological health of participants.

On the other hand, Cabrera (2006) notes that certain ways of writing seem to show better effects on health than others. For example, it is important to identify and properly label the positive and negative emotions, to build a consistent and significant history of traumatic events and to be able to tell of the experience from different perspectives. Cabrera says that people who would be favored from the writing exercises are those that have experienced a

trauma and have difficulties in confronting the facts with others and consequently keep their difficulties secret.

McNally et al. (2003) note that studies of Pennebaker would confirm one of the main tenets of debriefing: that expressing thoughts and feelings about the trauma accelerates healing, and that "encapsulating" these feelings prevents it. However, Pennebaker (2001) noted that his research focused on the psychobiological benefits of writing about traumatic events that had remained hidden for months or years. Therefore, Pennebaker's work cannot be invoked in support of the psychological debriefing that occurs soon after the traumatic event. On the other hand, Vera (2004) uses the opinion of Pennebaker meaning that writing can be seen as a form of spontaneous social communication that is quite different from the forced expression used in a group debriefing, and that social pressure to speak and express emotions in front of a professional can awaken feelings of humiliation and shame for many people.

Pennebaker's methodology has been tested with survivors of different types of trauma, including terrorist attacks (Fernández et al., 2004) or newly diagnosed women with breast cancer (Garcia & Rincon, 2009).

6.4 Narrative therapy

Given the importance of emotional expression and social support, the narrative intervention model, whose development was also influenced by the research of Pennebaker (Galarce, 2003, Tarragona, 2003), could be a useful model for preventing psychopathological symptoms in survivors of natural disasters. However, the relative newness of this approach has provided less evidence about its outcome. Among these, the revision of O'Kearney and Perrott (2006) who analyzed 19 studies stands out, which described the narratives of trauma in individuals diagnosed with PTSD symptomatology. Kaminer (2006), in turn, makes a review of other studies focusing on the influence of the narrative of trauma on recovery from PTSD, focusing on identifying the psychological processes involved in each of them, suggesting that the specific process involved in the narrative therapy is to identify the purpose and value of adversity.

The importance of attributing the meaning of traumatic experiences can be found in a study by Norman (2000) which concluded that while exposure to traumatic events can lead to PTSD, not all people develop the syndrome. The difference, according to Norman (2000), would be that "some people know how to find meaning for their horrific experiences, while others can't" (p. 305). The attempt to give meaning to negative experiences has been highlighted by recent positive psychology, a school that incorporates constructions such as resilience. This is a quality that some people have for overcoming adversity and traumatic events. The narrative model of White and Epston (Epston, 1994, White, 2002a, 2002b, White & Epston, 1993), consistent with this, states that the adverse experiences are stories of resilience and survival and that these aspects can be expanded and enriched through the therapeutic process (Kaminer, 2006).

The narrative approach of White and Epston is based on the assumption that the narratives do not represent people's identity and problems, rather the narratives are the identity and problems. In this regard, Carr (1998) points out that human problems arise and are maintained by oppressive histories that dominate the lives of people. But these stories do not only determine the meaning attributed to his experiences, but also determine what aspects of the experience they select to assign them a meaning.

The goal of narrative therapy is to help clients to rewrite their life story, incorporating pieces of their history that have been marginalized from their experience, events that are exceptions to the current narrative: then the people will be able to give a new meaning to their past life and to plan a future less oppressive than the one manifested today. This approach also points out that new meanings assume greater value if they are transmitted and shared with the social network (family, friends) that surrounds and supports the patient, encouraging, therefore, several instances where it is possible to establish this connection, either symbolic (therapeutic letters) or directly (forums, workshops, family gatherings).

Narrative therapy is based on the principle that people categorize their experiences through language. However, in the process of putting the experience in the form of a story, certain parts are left out because they are not much considered than other parts. As people remember these neglected parts, they are able to formulate a more complete story of their experience. If patients are encouraged to attend to the neglected parts of their experiences, they can create full stories and give a new meaning to their experiences. In other words, narrative therapy invites the survivors to engage in a reassessment, to construct new meanings and integrate them into their experience (Petersen et al., 2005).

The narrative approach is also characterized by stimulating discussions to find personal resources to facilitate coping with difficulties in life, so it becomes a respectful approach to the experiences, beliefs and the times that a person takes to decide to address their difficulties. This shows a closer relation with some of the principles of the PFA than psychological debriefing. Within this respectful attitude there is an emphasis on finding and validating local narratives over the narratives of the dominant culture. In that sense, it is important to note the existence of studies that question the universality of the conceptualization and interventions on psychological trauma, suggesting adaptation to local situations (Miller, 2006). The same emphasis on ethno-cultural particularities before providing a standard psychological support to survivors of trauma was indicated by Rajkumar et al. (2008) regarding the T-2004 in India. The author argues that cultural practices should be included in any model of intervention. This is what Silove and Zwi (2005) say in their analyses of early psychosocial interventions in the disaster zone of T-2004, noting that the need for any intervention of this kind should be adopted in consultation with local professionals before implementation, otherwise it would be arrogant to decide so without their permission. According to Silove and Zwi (2005), those communities affected by the disaster should be the architects of their own psychosocial recovery. They warn that to come and go in with quick-solution approaches can cause more damage than good and may leave a bit of resentment and unfulfilled promises. Simons et al. (2004) suggest the same need to build on community resources rather than imported techniques. They worked with survivors of the T-2004 from a psychological community perspective. Summerfield (2006) also calls for the adaptation of the types of assistance to local cultures, in addition to questioning the concept of "disaster mental health" considering that initial aid should be primarily social and community. This emphasis on local culture can even have a repairing role before the deficit of the central organization to go in support of survivors. Therefore, when government agencies or the community are harmed as a result of the disaster, it is necessary to strengthen local networks; concluded Mendez et al. (2010).

Silove and Zwi (2005) propose that instead of using ineffective high-cost strategies, such as debriefing, appropriate culturally-social strategies should be emphasized to provide

protection for the vulnerable, to bring families and communities together wherever it is possible, to create meaningful roles and livelihoods, and to restore institutions and services (religious, cultural, mental health) that promote community cohesion and a sense of order. Considering this background, it seems that the narrative approach, focused on the meaning of experience and reconnecting people with their social support networks, but at the same time respecting the rhythms of people and knowledge of local culture, could become a model for preventing or reducing symptoms of PTSD, so it is necessary to conduct studies to prove its effectiveness. One of those studies was developed by García and Rincón (2009) to prevent the occurrence of PTSD in patients that were just diagnosed with breast cancer and later used for individuals and group work for survivors of the T-2010 in Chile (García & Mardones, 2010; Avalos & Balic, 2010).

Model	DEBRIEFING	PSYCHOLOGICAL FIRST AID	EMOTIONAL DISCLOSURE TECHNIQUE	NARRATIVE THERAPY
Author	Jeffrey Mitchell	National Center for PTSD and the National Child Traumatic Stress Network	James Pennebaker	Michael White & David Epston
Emotional Expression	Compulsory	Facilitated	Compulsory, but written	Facilitated
Moment of application	Between 2 and 10 days after the event	The day after the event	Several days after	Several days after
Research outcomes	Inconclusive or even negative	Based on conclusive evidence	Positive mid-term and long-term effects	Further investigation is needed

Table 1. Comparative table of the four models

7. Conclusion

The psychological reactions to a natural disaster like a tsunami are varied. Many of them are normal behaviors faced with an event of great emotional intensity, even if they are perceived as unpleasant. Focusing only on the psychopathological reactions prevents us from addressing more adaptive responses and also it has the risk of qualifying many of these normal reactions as symptoms of mental illness. In this regard, Cova and Rincon (2010) believe particularly valuable the responses aimed at strengthening the skills and resources of individuals and communities to be able to address their own problems and those that not only aim at specific "symptoms", but also at their quality of life.

Therefore, it is relevant to design and evaluate early intervention strategies that are able to prevent future maladaptive reactions in tsunami survivors, among others natural disasters.

However, aid interfering with natural recovery, or causing more harm than good, should be avoided. These interventions must take into account risk factors, in order to detect the vulnerable but also personal- and community-protective factors that must be recognized and encouraged by any model that is offered to help immediately after a natural disaster. Unfortunately there are difficulties for developing effectiveness studies of these interventions in a natural context.

McNally et al. (2003) claim that in recent times, it seems that the focus of crisis intervention is shifting, since it directly encourages people to review and make known their traumatic experiences, as reflected in debriefing, and it provide support and a forum for people to talk about their reactions, if you will, as in the PFA or narrative therapy.

The interest of this chapter was to report the results of studies on these factors and intervention models that have been studied to date.

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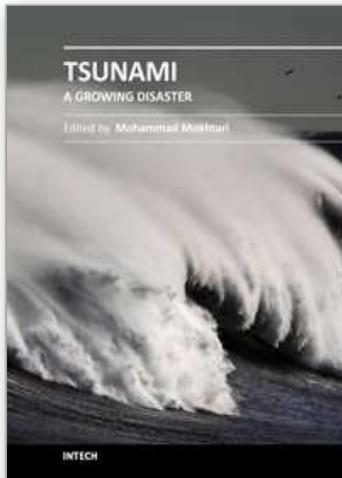
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The objective of this multi-disciplinary book is to provide a collection of expert writing on different aspects of pre- and post- tsunami developments and management techniques. It is intended to be distributed within the scientific community and among the decision makers for tsunami risk reduction. The presented chapters have been thoroughly reviewed and accepted for publication. It presents advanced methods for tsunami measurement using Ocean-bottom pressure sensor, kinematic GPS buoy, satellite altimetry, Paleotsunami, Ionospheric sounding, early warning system, and scenario based numerical modeling. It continues to present case studies from the Northern Caribbean, Makran region and Tamil Nadu coast in India. Furthermore, classifying tsunamis into local, regional and global, their possible impact on the region and its immediate vicinity is highlighted. It also includes the effects of tsunami hazard on the coastal environment and infrastructure (structures, lifelines, water resources, bridges, dykes, etc.); and finally the need for emergency medical response preparedness and the prevention of psychological consequences of the affected survivors has been discussed.

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