行政院國家科學委員會專題研究計畫　成果報告

子計畫：九二一震災後高危險個案心理反應長期追蹤研究：創傷記憶之探討(I)

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行政院國家科學委員會補助專題研究計畫成果報告

災後心理反應歷程與心理處置歷程之長期追蹤研究-子計畫二：

九二一震災後高危險個案心理反應長期追蹤研究：
創傷記憶之探討 (4/5)

Psychological Responses of the 921 Earthquake Survivors at Risk:
A Longitudinal Follow-Up Study on Traumatic Memory (4/5)

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中文摘要

本子計畫承續陳淑惠等(Chen et al., 2000a & 2000b)與吳英璋等(2000b)的研究，進一步地瞭解高危險群個案在震災後各階段的生活與心理面向之動態，以及影響其適應的可能因素。是故，本子計畫的研究目的，旨在瞭解九二一震災後重建區高危險群個案在震災後一年至五年內的長程適應發展特性與可能的疾病傾向，並藉歷程取向（process approach）的研究設計，更有系統性的觀察受災者長期的身心健康與社會人際關係之變化、以擴展災難與創傷的心理病理成因之瞭解角度，並針對不同的受災型態與災後復健階段探索可能的矯治方針與其療效。第一年度將以高危險群個案的各項心理指標的基礎線之確立為主，第二年至第五年的研究，主要的研究任務是針對重建區居民之心理健康與適應做追蹤探討，並以防治並重(intervention & prevention)為研究目標。此外，根據五年的追蹤研究結果，亦可檢驗本子計畫自行發展的本土研究工具以及沿用國內外學者所發展之診斷、評量工具，以建立較為客觀的防災心理研究工具之資料檔與高危險群個案的資料庫。本子計畫第五年度繼續針對前一年的受試者進行訪談、心理症狀量表等之評量，以瞭解其身心健康與社會人際關係之改變方向。本報告綜合本年度以及前四年度資料，比較了成年倖存者在心理症狀、社會人際關係、與社會經濟生活人際健康上的變動趨勢，以及對地震經驗的創傷記憶的特性。研究結果期能作為後續探討與災後

心理復健介入方案之設計的基礎，以及建構災後社區心理復健計畫之參考。
關鍵詞：創傷後壓力症狀；創傷記憶；社會人際適應；台灣九二一地震；長程追蹤研究

ABSTRACT

This study aims to report the changes of PTSD symptoms and psychosocial adjustment in adult survivors along the five-year follow-up since the Taiwan 1999 Chi-Chi Earthquake. A sample of 105 adult survivors from a highly impacted town near the epicenter, Pu-Li, participated the individual interview and assessment once in a year from the first to the fifth anniversary after the earthquake. The Posttraumatic Stress Reaction Index (PTRSI) was used to assess posttraumatic symptoms. The Psychosocial Change Questionnaire (PCQ) was used for assessing the change pattern in interpersonal, health, and socio-economic domains of life. Moreover, specifically at the present year, the Impact of Events Scale-Chinese Version (IES-C) was used to assess intrusive and avoidance symptom. The 10-item Index of Specific and Overgeneral Memory (ISOM), designed by the authors and composed of four categories, i.e., events, time, place, and person, was used to assess overgenerality of autobiographical memory. Participants were asked to write down their memory about the Chi-Chi earthquake occurred in September 21, 1999. Trained raters then used the ISOM to encode the overgenerality tendency of autobiographical memory. Preliminary analyses showed that prevalence of PTSD symptoms gradually declines along with the posttraumatic process in the first three years, but slightly arises in the recent years. Moreover, it was found that tendency of overgeneral memory correlates inversely with intrusion, but the association no longer exists after controlling for depression. Differently and more specifically, overgeneral memory of event, rather than other categories, correlates inversely with intrusion and such an association still exists after controlling for depression. This study demonstrates the importance of process approach with periodic assessment to investigate individuals and communities affected by natural disasters. Given the variations of different aspects of posttraumatic psycho- social adjustment following a collective disaster experience, the results also suggest an imperative for the government and mental health professionals to implement psychosocial rehabilitation programs better fit for the themes at various post-disaster stages. Finally, limitations of the present study and suggestions for future research will be discussed accordingly.

Keywords: PTSD; traumatic memory; psychosocial adjustment; Taiwan 1999 Chi-Chi earthquake; adult survivors; longitudinal study.

INTRODUCTION

Earthquake was found to be one of the most frequent natural disasters in Asia (Kokai, Fujii, Shinfuku, & Edwards, 2004). It is suggested by a meta-analysis that, compared to human-made traumas, natural disasters are more likely to cause psychological distress and problems (Rubonis & Bickman, 1991). More specifically, natural disasters including earthquake often result in mass losses of lives and properties as well as damages of public facilities and regulations (Cao, McFarlane, & Klimidis, 2003; Kato, Asukai, Miyake, Minakawa, & Nishiyama, 1996). In terms of the number of deaths and affected victims, earthquake was also noted to be the deadliest natural disaster in recent decades, accounting for more than half of the death tolls reported in the period of 1992-2001 (International Federation of the Red Cross, 2001). Due to the broader impacts and more lasting adversities on the community, earthquakes could thus cause more physical and psychological damages to the individuals, especially for those who resided near the epicenter.

The Chi-Chi Earthquake measuring 7.3 on the Richter scale struck Central Taiwan on September 21, 1999 and unfortunately resulted in mass damages and high death toll, especially in the epicenter areas, Pu-Li and Tung-Hsih towns. Since the earthquake, prefabricated shelters and then reconstructive housing as well as financial compensation and assistance from both the government and non-governmental organizations have been placed in order to help the surviving residences to regain productive lives. According to extant literature, however, natural disaster might affect the basic social structures and cause coercion to the regular operations of the community (Miller, 1998) and violate self functions and thus cause posttraumatic responses in some specific individuals (Gusman, Stewart, Young, et al., 1997). The amount of trauma exposure and severities of traumas have been suggested to predict the subsequent risk for developing PTSD (e.g., Creamer,1995; Green, Grace, Lindy, et al., 1983; Honig, Grace, Lindy, Newman, Titchener, 1999; Maecker, Solomon, & Schützwohl, 1999; March, 1993; McFarlane, 1987).

Similar findings were noted in the studies conducted in the earlier stage after the Chi-Chi Earthquake. For example, Liao, Lee, Liu et al (2000) have found 6.5% of the victims met the PTSD diagnosis criteria of the DSM-IV, 25.7% met with the criteria of the caseness for crisis intervention, and 64.0% presented sub-clinical syndromes around the first month after the occurrence. In another study conducted three months after the earthquake, high-exposure adults were found to manifest significantly more

immediate and persistent posttraumatic psychological responses (Chen, Hung, Lin, & Tseng, 2002).

How victims remember trauma has been one of the most core, but inconclusive, issues in the area of trauma study and clinical works in recent decades (McNally, 2003). Traumatic memory may spoil memories for other events as well as perception of the present, and may thus lead to the development and maintenance of PTSD (van der Kolk & McGarlane, 1996). Traumas with strong emotions often hinder the survivors from consolidating their experiences. Thus, they tend to express vague or overgeneral memory rather than complete declaration (McNally, 2003). Likewise, Ehlers and Clark (2000) pointed out that the recollections of the traumatized victims often appear fragmented, disorganized, lacking details, and hard to keep accurate time sequences. Furthermore, based on clinical observations and anecdotes, the narratives reported during psychotherapy are rooted in patients' autobiographical memory. Healing requires remembering. Thus, the ways and features their traumatic experiences are remembered and declared appear very imperative for effective psychotherapy for the traumatic patients. Brittlebank, Scott, Williams, and Ferrier (1993) found that the tendency of overgeneral memory was associated with difficulty recovering from depression. Likewise, Foa, Molnar, and Cashman (1995) have also pointed that increasing specific recollection and reducing narrative fragmentation during psychotherapy may improve PTSD. However, the association between PTSD severity and traumatic memory is yet to be answered (Wolfe, 1995).

Inasmuch as the Chi-Chi Earthquake was very devastating, the adult survivors residing in the most impacted epicenter might be more vulnerable to maladjustment in general and suffered from PTSD in specific. Especially, there is lacking extant prospective and longitudinal study on psychosocial adjustment and traumatic memory in response to natural disasters in Taiwan, the present study thus asks what may be the long term impacts on the surviving adults from the 921 Chi-Chi Earthquake. More specifically, this study aims to report the changes of PTSD symptoms and psychosocial adjustment in various life domains of adult survivors along the five-year follow-up since the Taiwan 1999 Chi-Chi Earthquake. In addition, the present study aimed to explore to what extent the overgeneral tendency of memory of the 921 Chi-Chi Earthquake may be associated with PTSD severity three years post the event. Lastly, as there lacks data depicting long-term manifestations of post-earthquake psychosocial adjustment in Taiwan, the present paper also reports the

symptom pattern displayed from the first to fifth anniversary of the event in order to shed light on our understanding of long-term and collective effects of natural disasters in general and earthquake in specific.

METHOD

Subjects:

A group of adult survivors from a highly impacted town near the epicenter, Pu-Li (n = 105) was recruited for individual interview and assessment once in a year from the first to fifth anniversary after the earthquake in a prospective and longitudinal research project. As part of such a project, the data reported in this paper were collected from a sample of adults who continuously participated in the study in consecutive five years. The subjects recruited in this paper and missed for the follow-up study did not differ from each other with respect to their gender & education distributions as well as their earthquake exposure experiences. In total, there are one hundred and five middle-aged adults (aged 45 ± 8.74 years at the fourth anniversary), consisting of 76 females (72.4%) and 29 males (27.6%). As shown in Table 1, approximately 77% of the sample had education at senior high school or above. Concerning their exposure experiences of the 921 earthquake, about one sixth have got mild injury during the earthquake. Approximately 54% had either house partially damaged or totally collapsed, and only 7.7% had no damage in their houses. In regard to subjective experiences of the earthquake, about 44.8% have experienced moderate to severe threat to their lives and approximately 70% appraised the earthquake having damaged their living functions to some extent. There was no difference of exposure characteristics between the samples recruited for the current study (n = 105) and study at the first year post 921 Earthquake (n = 307).

It is noteworthy that there was significant difference in **s**ubjective sense of damage of living functions and threat of life ($?^2$ = 77.49, p < .01). It is possibly due to the subject characteristics of the remaining sample.

Measures:

Posttraumatic Stress Reaction Index (PSTRI). The PTSRI is 47-item measure designed to assess individual's self-reports of trauma-related symptoms. The scale consists of four factors, i.e., posttraumatic anxiety syndrome, posttraumatic psycho-somatic syndrome, avoidance / numbness, and maladaptive coping and has satisfactory internal consistency Cronbach coefficients for each factor (a = .67 ~ .96) (Chen, et al., 2002; Chen, Lin, Hung, & Tseng, 2000). This PSTRI asks "how have you been experiencing the following items since the occurrence of the earthquake?"

Table 1: Background Information and Exposure Characteristics of Subjects at the First Follow-Up

BACKGROUND INFORMATION	Pu-Li Sample (N= 105)	
	Mean	**S.D.**
Age	45.0	8.74
Sex	**N**	**%**
Male	29	27.6%
Female	76	72.4%
Education		
Elementary	12	11.4%
Junior High	11	10.5%
Senior High	57	54.3%
College and above	24	22.9%
EXPOSURE CHARACTERISTICS		
Self being injured during the earthquake?		
No	88	83.8%
Mildly injured	17	16.2%
Moderately injured	0	0%
Severely injured	0	0%
House being collapsed or damaged?		
No damage at all	8	7.7%
Slightly damaged	40	38.1%
Partially damaged	27	25.7%
Totally collapsed	30	28.6%
Subjective threat to life?		
No threat at all	32	30.5%
Slightly threat	26	24.8%
Moderately threat	22	21.0%
Severely threat	25	23.8%
Subjective damage of living functions?		
No damage at all	34	32.4%
Slightly damaged	30	28.6%
Moderately damaged	22	21.0%
Severely damaged	19	18.1%

The respondents are asked on the scale to rate each item on a 4-point Likert scale, ranging from *0 = never experienced, 1 = sporadically experienced, 2 = sometimes experienced*, to *3 = very often experienced*. Each subscale score consists of the mean of

item sum of each factor. The PTSD total score consists of mean of item sum of the whole scale.

Psychosocial Change Questionnaire (PCQ). The PCQ was designed for evaluation of psychosocial changes post the trauma. The respondents are asked on the scale to evaluate their subjective feelings of changes, either positive or negative, of physical and psychological health, outlook on life, and general/intimate interpersonal relationships.

Index of Changes in Life (ICL). The ICL was designed to recode the responses on the PCQ to present the changes in various life domains that were often revealed by the afflicted people (Wu, Hung, & Chen, 2002). In the ICL, the life domains after the trauma were divided into three areas, i.e., socio-economic domain, social interpersonal domain, and personal health domain.

Earthquake Exposure Index (EEI). The EEI, designed to assess the extent of exposure to the earthquake, consists of 1) index for death and injury, including physical injury level in self, injury and/or death in family member(s), relatives, and close friends; and 2) index for property loss, i.e., degree of house damage.

Beck Depression Inventory-II (BDI-II) The BDI-II is a 21-item self-report measure of depression. It is a widely used measure of depression, with well-established reliability and validity.

Modifies Autobiographic Memory Task for Earthquake (M_AMT_E) and Index of Specific and Overgeneral Memory (ISOM). Adapting the design of Modifies Autobiographic Memory Task (M_AMT; Yu & Chen, 2004), the M-AMT_E of the present study asked the subjects to describe their personal memory about the 921 Earthquake as much detailed as possible. The 10-item Index of Specific and Overgeneral Memory (ISOM; Yu & Chen, 2004), composed of four categories, i.e., events, time, place, and person, was used to index overgenerality of autobiographical memory. Trained raters then rated on the 10-item index for specific memory. The tendency of overgeneral memory was then reversed from the score for specific memory. Each memory episode scores ranged from 0-10, indicating the higher the greater tendency of overgeneral memory. The inter-rater reliabilities appear pretty satisfactory in Yu and Chen's study (.94) and the present study (.91 ~ .94).

Procedure:

The data were collected once in a year around one or two months after the anniversary on the selected participants with individual interview and assessment at their

home settings. Oral consent was obtained before staring the interview. The whole process took from 30 to 40 minutes. A thank-you letter with brief feedback was sent to the participants around two months after the assessment each year.

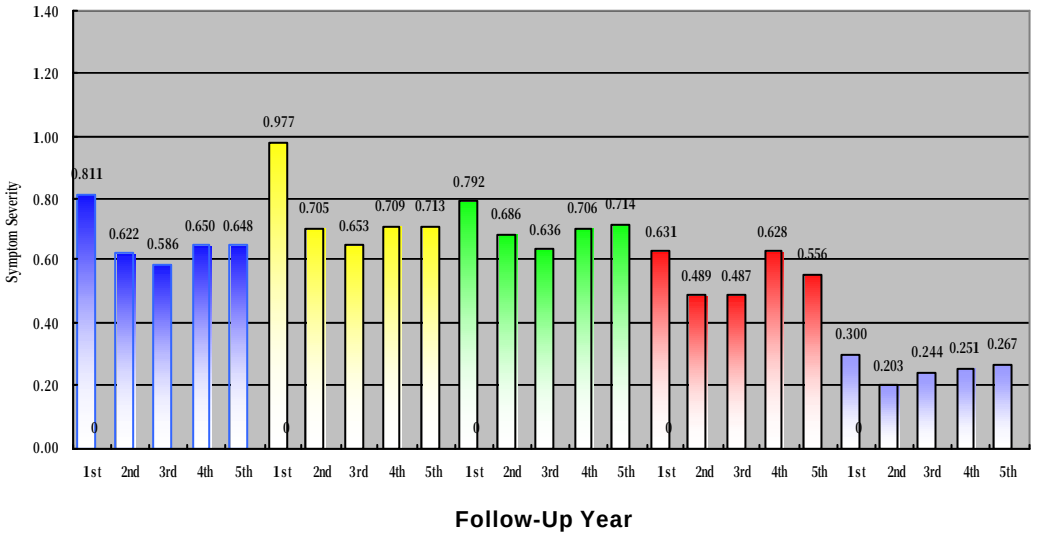
RESULTS:

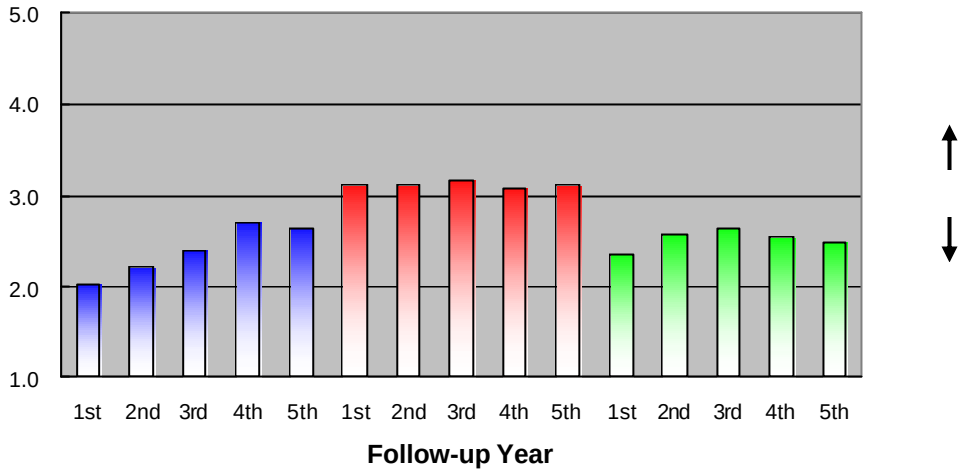
Posttraumatic Stress Responses along Four Years post the Earthquake

As shown in Figure 1, along the five posttraumatic years, gradual declines were shown in the PTSD total and prevalence of PTSD symptoms in the first three years. However, it is noteworthy that the decline tendency was stopped after three years post 921 earthquake. . More specifically, over the four years past the earthquake, the subjects experienced more posttraumatic anxiety and posttraumatic psychosomatic symptoms than avoidance/numbness and maladaptive coping. Magnitudes of symptom declines were also noted more in posttraumatic anxiety and posttraumatic psychosomatic symptoms than in avoidance / numbness and maladaptive coping.

Changes in Life Domains along Four Years post the Earthquake

As shown in Figure 2, overall positive changes in each life domain were shown along the three posttraumatic years. Of the life domains, the subjects experienced relatively more stably positive changes in social interpersonal domain over the five years since the earthquake. In health domain, the subjects subjectively reported more positive changes at the first year post-earthquake, then returned to the status as before the trauma since the second year and remained at the similar status.





More specifically, as shown in Table 2, overall more subjects moving toward positive changes were shown along the three posttraumatic years. Of the life dimensions, subjects experienced improvement in their financial condition living condition and health conditions over the three years since the earthquake. However, the increased tendency was stopped until four to five years post 921 earthquake. However, relatively more subjects reported that their relationships with neighbor returned to the same status as before. Similar pattern were also noted for the relationships with relatives, but it did not reach significant level.

Overgeneral Traumatic Memory and PTSD Symptoms

The 10-item Index of the Specific and Overgeneral Memory (ISOM; Yu & Chen, 2004) was used to index the tendency of overgeneral traumatic memory in the survivors three years post the 921 Earthquake. Three well-trained independent raters were asked to score the memory of the 921 earthquake. Satisfactory inter-rater reliability was resulted to ensure the final scores for further statistical analyses. On the ISOM that scores range from 0 to 10, the sample presented a mean score at 5.05 (S.D. = 2.18), indicating that these earthquake survivors as a group remembered the earthquake to the extent not too specific or too general. Preliminary analyses showed no difference in terms of gender, age, education level, and marital status.

Table 2: Percent of changes in various life domains Along the post-earthquake years

Life Domains	Dimensions	Change Status	Year				
			1st	2nd	3rd	4th	5th
Socio-economic Domain	**Financial Conditions**	Worse	73.3%	65.7%	55.2%	42.9%	41.7%
		Same	26.7%	29.5%	35.2%	39.0%	42.7%
		Better	0%	4.8%	9.5%	18.1%	15.5%
	Living Conditions	Worse	49.5%	50.0%	34.3%	29.5%	26.0%
		Same	47.6%	44.25	60.0%	60.0.%	61.5%
		Better	2.9%	5.8%	5.7%	10.5%	12.5%
Interpersonal Domain	**Family Relationships**	Worse	18.4%	14.3%	15.4%	19.2%	16.3%
		Same	61.2%	61.9%	59.6%	54.8%	58.7%
		Better	20.4%	23.8%	25.0%	26.0%	25.0%
	Parent-Child Relationships	Worse	7.8%	8.6%	7.7%	15.4%	11.4%
		Same	63.1%	69.5%	63.5%	55.8%	62.9%
		Better	29.1%	21.9%	28.85	28.8%	25.7%
	Relative Relationships	Worse	4.9%	9.5%	9.5%	13.5%	14.3%
		Same	68.6%	75.2%	73.3%	72.1%	70.5%
		Better	26.5%	15.2%	17.1%	14.4%	15.2%
	Neighbor Relationships	Worse	6.9%	6.7%	5.8%	5.8%	4.8%
		Same	62.7%	73.1%	73.15	76.9%	79.0%
		Better	30.4%	20.2%	21.2%	17.3%	16.2%
Health Domain	**Physical Health**	Worse	53.3%	49.5%	51.4%	*59.0%*	*61.0%*
		Same	44.8%	41.9%	38.15	37.1%	33.3%
		Better	1.9%	8.6%	10.5%	3.8%	5.7%
	Mental Health	Worse	61.0%	45.7%	41.9%	*37.1%*	*44.8%*
		Same	35.2%	43.8%	40.0%	48.6%	41.9%
		Better	3.8%	10.5%	18.1%	14.3%	13.3%

*$p < .05$, **$p < .01$, ***$p < .001$

The IES-C was used to indicate the severity of PTSD symptoms as well as intrusive and avoidance symptoms. The mean of IES-C total, intrusion symptoms, and avoidance symptoms for earthquake survivors were 13.89 (S.D. = 14.44), 10.26 (S.D. = 10.6), and 3.63 (S.D. = 4.67), respectively. Correlation coefficients between IES-C total and intrusion, IES-C total and avoidance, and intrusion and avoidance are .98, .87, and .75, respectively ($p < .001$). Preliminary analyses on the IES-C showed no difference in terms of gender, age, education level, and marital status.

With regard to the plausible association between overgeneral traumatic memory and overall PTSD symptoms at the fourth anniversary of the Earthquake, the correlation analyses resulted insignificantly (Table 3). Exceptionally, however, one of the index of overgeneral traumatic memory, lacking outcome of the trauma, was found to be reversely associated with IES-C total, intrusion, and avoidance (r = -.27, -.28, and -.21, $p < .01$~$.001$, respectively). This suggests that the more specific event outcome the survivors remembered the greater PTSD symptoms they experienced.

Table 3: Correlation Coefficients of traumatic symptoms and indexes for overgeneral memory

	IES total	Intrusion	Avoidance
Sum score of Overgeneral memory	-0.06	-0.11	-0.07
Non-signal event	-0.13	-0.15 *	-0.04
Non-concrete description	0.04	0.00	0.11
Lacking details	0.02	-0.00	0.08
Lacking cause	-0.01	-0.00	-0.05
Lacking result	-0.26 *	-0.27 *	-0.20 *
Non-specific time point	-0.01	-0.05	-0.07
Lasting over one day	-0.04	-0.07	-0.04
Lacking place	-0.01	-0.06	-0.09
Repeated places	-0.01	-0.06	0.09
Non-specific figures	0.02	-0.01	0.10

CONCLUSIONS

This study reports the changing patterns of psychological responses and adjustments in various life domains in a prospective and longitudinal study with five waves of follow-ups after the 1999 Chi-Chi Earthquake. The nature and intensity of exposure to the triggering traumatic events are suggested to be the main causes for maladjustment in general and PTSD in specific (Green, et al., 1983). Disastrous earthquake such as the Chi-Chi Earthquake could undesirably result in severe psychological distress and derailed psychosocial regulations. Similar to a number of empirical studies (e.g., Goenjian, et al., 1994; Green, et al., 1983; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995), our study has also found that posttraumatic stress reactions endure over prolonged periods of time in surviving adults.

With regard to posttraumatic adjustment, some researchers suggest that PTSD and pathology-toned behavioral manifestations could be a lasting and chronic ailment regardless of whether the afflicted person had been on treatment or not (e.g., Kessler et al, 1995), whereas many other researchers suggest that posttraumatic growth seems to be particularly common to the survivors (e.g., Park, Cohen, & Murch, 1996). Although trauma often results in more negative and pathology-toned manifestations as reported in numerous studies, our previous study conducted at three months post the earthquake found that a great proportion of people in the high-impact area became more optimistic in their outlooks on life and developed closer interpersonal relationships (Chen, et al., 2002). More intriguingly, the present study using periodic assessment with a same group of surviving adults suggests of a natural posttraumatic process. In that, the afflicted people were still dissatisfied with the quality of their current lives as compared to the pre-trauma status (as shown in Figure 2).

Along trauma research line, more and more recent attention has been placed on how survivors remember their trauma and the predictive power of the characteristics of traumatic memory for PTSD progress. Some researchers suggested that overgeneral memory may worsen the PTSD (e.g., Brewin, et al., 2002; McNally, et al., 1995; Wessel, et al., 2002), whereas others found otherwise (e.g., Henderson, et al., 2002; Porter & Birt, 2001). Similar to the findings of Porter and Birt (2001), our present study did not find any association between overgeneral memory tendency and PTSD severity. It is worthy to note, however, our data shows that remembering the details of outcome of the event, rather than the causes as well as the person, place and time components of memory for the event, was more likely to worsen PTSD

severity.

A methodological limitation of this study should be mentioned. The study could have been improved by a better research design to include a matched control group consisted of subjects from a non-afflicted areas nearby. In conclusion, social support from close relationships has been suggested to facilitate the cultivation of well-being and to prevent from the development of psychological and physical disorders (e.g., Green, Lindy, & Grace, 1988; Norris & Kaniasty, 1996). Thus, it is noted that, living in a relatively more collectivism-oriented society, Taiwanese people seem to gradually recover from the ordeal in a more promising and uplifting way, as indicated by our data. Moreover, although there have been a great deal of assistance provide by both government and non-governmental organizations, it is of even greater importance that the whole society can be more supportive for recovery through collective efforts to help the survivors to recover at their favorable paces, to maintain their existent social networks and resources at their best along the posttraumatic flow.. It may be equally important to take into account that, for those who are still suffered from severe PTSD symptoms, implementation of psychosocial rehabilitation programs better fit at various stages after the disaster appears to be an imperative for the government and mental health professionals. Finally, it deserves more professional attention to continue periodic follow-up research such like the present study.

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