Survey of Psychiatric Disorders and Quality of Life among Kaohsiung Gas Explosion Victims 12 Months after the Event

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Abstract

Objective: To investigate the probable disaster-related psychiatric disorders, such as major depressive episodes (MDEs) and post-traumatic stress disorder (PTSD); and quality of life (QoL) in survivors of a fossil fuel gas explosion in Taiwan with a long-term follow-up twelve months after the event.

Methods: We used two screening tools, including the Disaster-Related Psychological Screening Test (DRPST) and Short Form 12v2 (SF-12v2), to survey a representative sample of 486 participants (average age: 42.89 ± 16.05 years; M: 255, average age: 40.68 ± 15.92 years; F: 231; average age: 45.32 ± 16.20 years) twelve months after the event.

Results: Twelve months post-gas explosion, probable PTSD, probable MDE, probable PTSD and MDE, and non-PTSD or non-MDE (non-P or M) were present in 50 (10.3%), 14 (2.9%), 34 (7.0%), and 388 (79.8%) participants, respectively. The significant risk factors of probable PTSD or MDE and QoL in survivors were older age, female sex, physical injury, occupation, educational level, financial problems, probable PTSD and probable MDE.

Conclusion: Survivors still exhibited an increased prevalence of psychiatric impairment, and their quality of life was affected after twelve months. Thus, mental rehabilitation requires not only short-term intervention but also long-term follow-up and regular psychiatric management.

Keywords: Gas explosion; Major depressive episode; Post-traumatic stress disorder; Disaster-related psychological screening test; Short form 12v2

Introduction

In recent years, the number of major disasters has been increasing worldwide, including in Taiwan. These types of disasters can be natural or man-made [1,2] and severely threaten a region's social and economic development. Natural disasters include typhoons, tsunamis, floods, earthquakes (including the 2004 South Asian tsunami, which was caused by an earthquake), droughts, and landslides. Man-made disasters include major fires, explosions, aircraft accidents (including the 911 terrorist attacks in 2001 that caused panic in the United States and around the world), toxic chemical and gas leaks, and epidemics. The major natural disasters that have occurred in Taiwan include the following: the Nantou Chi Chi 921 earthquake in 1999 [2,3]; the South Taiwan Morakot flood disaster on August 8, 2009 [3]; and the Tainan City Yongkang Wei Guan Jinlong building collapse caused by the Mei-Long earthquake on February 6, 2016. Man-made disasters in Taiwan include the 2003 SARS epidemic, the Taipei Mass Rapid Transportation mass killer in 2014, the recovery efforts after a large airplane crash, the Penghu shipwreck, and food safety issues. In this study, we focus on a petrochemical gas explosion, a major man-made accident, which occurred in Kaohsiung on August 1, 2014.

According to the Red Cross Society, Asia is more disaster prone than other areas of the world [3,4]. The most common disaster-related psychiatric diagnoses are major depressive episode (MDE) and post-traumatic stress disorder (PTSD) [3]. The brief case definition of MDE is someone with a persistent depressed mood and/or loss of interest almost daily for at least two weeks combined with impairments of vegetables sign, such as insomnia, poor appetite or weight loss [4]. The brief case definition of PTSD is someone who experienced at least one of re-experience symptoms, three of numbness/avoidance and two of arousal responses for at least one month according to the DSM-IV-R [3,5]. When survivors had MDE/PTSD, except mental health impairment, their work ability decreased, and symptoms last longer. Thus, these individuals require psychiatric treatment to prevent individual disabilities.

Physical risk and material losses are strongly associated with PTSD [6,7]. Following a disaster, psychological problems have a greater impact on quality of life than injuries [8]. Health-related quality of life (HRQoL) includes physical, mental, and social dimensions. HRQoL is determined in part by the patients' perceptions of their state of mental and physical health [9]. Many studies have shown that quality

of life (QoL) is significantly negatively correlated with age, female sex, mental illness, physical illness and economic problems and is positively correlated with social support and psychological assistance [10-14]. Therefore, a survey of post-disaster survivors' psychiatric diseases and QoL could be helpful for further mental rehabilitation preparation.

Early in the morning of August 1, 2014, a major petrochemical gas explosion occurred, causing more than 700 casualties in Lingya District, Kaohsiung City [14]. A health organization carried out disaster mental health rehabilitation and simultaneously established a disaster psychological assistance group. We performed "walk around" care to provide victims with emergency mental health services from the event until twelve months after. We expected to eliminate the negative psychological impact of the catastrophic event to restore a normal and calm emotional state and QoL. However, many survivors with mental illness did not seek psychiatric help due to stigma or did not understand their own suffering from mental illness. These individuals may use alcohol, drugs or self-harm to seek relief [3]. A support system is particularly important after disasters. Some people suffering from a disaster can recover with the support of their families, friends or colleagues. However, even with the right activities, there are still long-term health problems in many victims [6]. Therefore, reconstruction of life after a disaster can be a challenging process. Mental rehabilitation is a part of life reconstruction and requires a planned and comprehensive approach. After a disaster, PTSD will have a more severe and painful effect and must be addressed with appropriate treatment and assistance. In addition, post-disaster intervention is required for the emergency stage and to maintain victims' long-term recovery. Given the strong relationship between psychiatric disorders and QoL, especially after a disaster, the purpose of this research was to investigate the prevalence and risk factors of psychiatric disorders (probable PTSD and MDEs) in individuals who survived the petrochemical gas explosion in Taiwan; these factors were compared between six and twelve months after the event. Additionally, the QoL of the victims with related risk factors was simultaneously investigated.

Materials and Methods

Instrument

In this study, we used the Disaster-Related Psychological Screening Test (DRPST) developed by Chou et al. [15], which is a rapid screening scale for MDEs and PTSD supplemented with information regarding background and risk factors. The DRPST was initially designed to enable effective and rapid screening of MDE and PTSD in disaster survivors [1-3] and policemen/firefighters [8,14,16] (including 17 items for PTSD and 9 items for MDEs) according to the DSM-IV criteria. A seven-symptom scale and a three-symptom analog scale were selected for PTSD and MDE screening, respectively. Scores of 4 or higher on the PTSD scale were used to define the group of survivors with PTSD; this method has been validated in previous studies [1-3,8,15,16]. The positive predictive value of this cutoff score was 97.2%, and the negative predictive value was 97.4%. A score of 2 or more on the MDE scale was used to define cases with MDE, and this method has shown a positive predictive value of 83.3% and a negative predictive value of 99.3% [15]. The SF-12v2 incorporates two dimensions, the physical component summary (PCS) and mental component summary (MCS), to estimate health-related functions within the following eight subscales: physical functioning (PF), role limitations caused by physical problems (RP), bodily pain (BP), general health (GH), role limitations caused by emotional problems (RE), vitality (VT), social functioning (SF), and mental health (MH). All 8 scales were used to score PCS and MCS,

which were calculated by multiplying by different coefficients. A higher score is indicative of better of QoL [17-20].

Procedure

In this study, the authors selected community residents and survivors affected by the fossil fuel gas explosion after the event as the first-year research subjects. The Kaohsiung municipal government health bureau created a petrochemical gas explosion public information file, which focused on the disaster after the end of the acute period. It was necessary to survey this dynamic population twice (six and twelve months after the event) to compare the change in psychiatric diseases and recovery as well as quality of life. Thus, a community-based screening survey with a dynamic population was conducted. The number of participants in the first year was less than that in the first half of the year. Both groups of participants were affected by this event. The respondents completed the DRPST and SF-12v2 with the help of research assistants, who received a two-week training course according to standard operating procedures. The inclusion criteria included the following: 1. survivors who lived at the disaster site when the gas explosion occurred; 2. injured survivors who were passing the road when the gas explosion occurred; and 3. rescue workers. The exclusion criteria included the following: 1. for survivors of the petrochemical gas explosion, the occurrence of insomnia, the nature of medical treatment, and a diagnosis of psychiatric illness by specialists in the previous year; 2. unrelated mental disorders and previous exposure to other disasters; and 3. not living in this study community and not witnessing the disaster victims. Finally, 486 participants were included (average age: 42.89 ± 16.05 years; M: 255, average age: 40.68 ± 15.92 years; F: 231; average age: 45.32 ± 16.520 years). However, 502 participants were included (average age: 42.90 ± 16.61 years; M: 270, average age: 40.89 ± 16.40 years; F: 232; average age: 45.25 ± 16.58 years) at six months [13]. The study was approved by the Institutional Review Board of Kaohsiung Municipal Kai-Syuan Psychiatric Hospital (KSPH-2015-05), and all participants provided informed consent.

Data analysis

After summing Likert-type scale items on the SF-12v2 survey, each scale was standardized (with scores from 0 to 100, reflecting the lowest and highest levels of functioning, respectively). All data were analyzed using statistical software (SPSS Version 17.0). Chi-square test and one-way ANOVA with Scheffé's method for post-examination were used analyze the victims' demographic data (such as sex, age, physical injuries, occupation, current marital status, education level, religious belief, and financial problems) and differences between QoL and the four respondent groups. In addition, we used logistic regression analysis to examine the demographic data of the victims, probable psychiatric impairment, and gas explosion risk factors; multiple regression analysis was used to examine relationships between the victims' demographic data, possible PTSD, possible MDE and QoL.

Results

Regarding the participants' basic attributes, there were more males than females and the age distribution mostly included individual's ≤45 years of age. Furthermore, the participants were primarily from affected households, did not have injuries, were from the working class, were mostly married, had a university-level education, and held primarily Buddhist, Taoist or of other traditional beliefs.

In total, 98 of the 486 respondents (20.2%) had at least one probable psychiatric diagnosis and were assigned to the following groups: probable PTSD (n=50) (10.3%), probable MDE (n=14)

(2.9%), and probable PTSD and MDE (n=34) (7.0%). The remaining 388 respondents (79.8%) were assigned to the non-P or M group. The socio-demographic characteristics were as follows at six and twelve months: mostly of female sex (46.2%, 47.5%, respectively), average age (42.90 ± 16.61, 40.68 ± 15.92, respectively), severe physical injuries (16.9%, 14.2%, respectively), employment (69.3%, 68.1%, respectively), married/living together (51.6%, 53.1%, respectively), college education or higher (40.0%, 43.0%), religious beliefs (69.7%, 68.3%, respectively), and financial problems (35.7%, 24.5%, respectively). The respondents who had physical injuries or financial problems after the gas explosion had significantly worse psychiatric impairment than did those who did not have these problems. By contrast, current marital status (single) was significantly different (p=0.006). The levels of physical injuries in the psychiatric diagnosis groups were significantly greater than those in the non-P or M groups (p=0.014). Additionally, financial problems were significantly more frequent in the probable MDE group than in the non-P or M group (p<0.001) (Table 1).

The risk factors of probable psychiatric disorders in post-gas explosion respondents were sex, physical injury (severe), and financial problems, which all showed significant associations with probable psychiatric disorders. The risk of probable psychiatric disorders was lower in male respondents than in female respondents (OR=0.508, p=0.013). Furthermore, the risk of probable psychiatric disorders was more severe in respondents with severe physical injuries (OR=3.831, p<0.001) and in those with financial problems (OR=3.296; p<0.001) than in those without (Table 2).

The QoL scores for RE in the non-P or M groups were significantly

higher than the scores in the different, probable psychiatric impairment groups (p<0.001). The QoL scores for PF, RP, BP, GH, VT, SF, MH, PCS and MCS in the non-P or M groups were significantly higher than the scores in the probable PTSD group and probable PTSD and MDE groups (p<0.001). In addition, the QoL scores for SF, RE and MCS in the probable PTSD group and probable MDE group were significantly higher than the scores in the probable PTSD and MDE group (p<0.001). Furthermore, the QoL scores for BP in the probable MDE group were significantly higher than the scores in the probable PTSD and MDE group (p<0.001). The QoL scores for VT and MH in the probable MDE group were significantly higher than the scores in the probable PTSD group and probable PTSD and MDE group (p<0.001) (Table 3).

Table 4 shows that religious beliefs were not associated with the QoL subscales. However, probable MDE was significantly negatively associated with the QoL subscales (all p<0.05). Additionally, female sex showed a negative association with QoL in the RE (p=0.047) subscales. Age also showed a negative association with QoL in the PF (p<0.001), RP (p<0.001), BP (p<0.001), GH (p<0.001), VT (p=0.017), SF (p=0.027), RE (p=0.007) and PCS (p<0.001) subscales. Negative associations were observed between mild or moderate physical injuries, severe physical injuries and QoL in the PF (p=0.011, p<0.001), RP (p<0.001), BP (p=0.001, p<0.001), GH (p<0.001), VT (p=0.003, p<0.001), RE (p=0.044, p<0.001) and PCS (p<0.001) subscales; severe physical injuries were negatively associated with QoL in the SF (p=0.023) subscale. However, occupation was positively correlated with QoL in the PF (p=0.001), RP (p=0.002), BP (p=0.003), GH (p=0.011), SF (p=0.023), RE (p<0.001), MH (p=0.003), PCS (p=0.004)

	Non-P or M		Probable PTSD		Probable MDE		Probable PTSD and MDE		
	n=388	Rate (%)	n=50	Rate (%)	n=14	Rate (%)	n=34	Rate (%)	p-value
Sex									0.081
Male	214	83.9	22	8.6	4	1.6	15	5.9	
Female	174	75.3	28	12.1	10	4.3	19	8.2	
Age[b]									0.529
(Mean ± SD)	42.4	16.5	44.6	17.5	45.0	15.8	45.7	9.7	
Physical Injuries									0.014*
No	249	82.5	27	8.9	8	2.6	18	6.0	
Mild or Moderate	95	82.6	8	7.0	4	3.5	8	7.0	
Severe	44	63.8	15	21.7	2	2.9	8	11.6	
Employment									0.314
No	122	78.7	21	13.5	3	1.9	9	5.8	
Yes	266	80.4	29	8.8	11	3.3	25	7.6	
Current Marital Status									0.006**
Single	184	80.7	29	12.7	8	3.5	7	3.1	
Married/Living Together	204	79.1	21	8.1	6	2.3	27	10.5	
Educational Level									0.126
Junior High School or Below	82	73.9	15	13.5	3	2.7	11	9.9	
Senior High School	126	75.9	21	12.7	6	3.6	13	7.8	
College or Higher	180	86.1	14	6.7	5	2.4	10	4.8	
Religious Beliefs									0.981
No	123	79.9	15	9.7	5	3.2	11	7.1	
Yes	265	79.8	35	10.5	9	2.7	23	6.9	
Financial Problems									<0.001***
No	314	85.6	25	6.8	11	3.0	17	4.6	
Yes	74	62.2	25	21.0	3	2.5	17	14.3	

Note: a. Chi-square Test; b. One-Way ANOVA; b. *p<0.05; **p<0.01; ***p<0.001

Table 1: Demographic data of the respondents with probable psychiatric diseases twelve months post-gas explosion.

	Odds ratio	95% CI		p-value
Sex				
Female	ref.			
Male	0.508	0.298	0.866	0.013[*]
Age [a]				
(Mean±SD)	1.005	0.985	1.026	0.600
Physical Injuries				
No	ref.			
Mild or Moderate	1.312	0.698	2.467	0.399
Severe	3.831	1.991	7.370	<0.001[***]
Employment				
No	ref.			
Yes	1.341	0.771	2.332	0.299
Current Marital Status				
Single	ref.			
Married/ Living Together	1.019	0.570	1.823	0.949
Educational Level				
Junior High School or Below	ref.			
Senior High School	1.032	0.548	1.941	0.923
College or Higher	0.577	0.279	1.196	0.139
Religious Beliefs				
No	ref.			
Yes	0.776	0.449	1.341	0.364
Financial Problems				
No	ref.			
Yes	3.296	2.009	5.406	<0.001[***]

Note: [*]p<0.05; [**]p<0.01; [***]p<0.001

Table 2: Risk factors for probable psychiatric impairment among respondents twelve months post-gas explosion (n=486).

	Non-P or M[a]		Probable PTSD[b]		Probable MDE[c]		Probable PTSD and MDE[d]		p-value	Scheffé's method
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
PF	89.6	23.2	74.0	33.1	83.9	25.2	63.2	38.1	<0.001[***]	a>b, d
RP	80.2	24.5	61.8	30.8	65.2	23.1	46.0	30.3	<0.001[***]	a>b, d
BP	88.8	19.2	71.5	25.3	82.1	15.3	63.2	24.8	<0.001[***]	a>b, d c>d
GH	54.8	25.3	31.4	27.7	36.8	20.2	25.6	22.8	<0.001[***]	a>b, d
VT	70.5	20.7	44.5	20.4	64.3	18.9	40.4	17.4	<0.001[***]	a>b, d c>b, d
SF	83.1	18.1	64.5	23.7	69.6	22.3	50.0	22.2	<0.001[***]	a>b, d b, c>d
RE	82.1	19.1	59.5	25.6	64.3	22.9	39.7	28.4	<0.001[***]	a>b, c, d b, c>d
MH	78.3	16.5	52.0	22.4	71.4	12.4	43.8	18.3	<0.001[***]	a>b, d c>b, d
PCS	49.9	8.2	45.0	10.9	46.6	7.7	42.3	11.3	<0.001[***]	a>b, d
MCS	51.6	7.8	39.4	10.3	46.0	7.1	33.6	10.5	<0.001[***]	a>b, d b, c>d

1. PCS: Physical Component Summary; MCS: Mental Component Summary; PF: Physical Functioning; RP: Role Physical; BP: Bodily Pain; GH: General Health; VT: Vitality; SF: Social Functioning; RE: Role Emotional; and MH: Mental Health

2. [*]p<0.05; [**]p<0.01; [***]p<0.001

Table 3: Comparison of quality of life for each group among respondents twelve months post-gas explosion.

and MCS (p=0.005) subscales. Current marital status (married/living together) was positively associated with QoL in the BP (p=0.045), GH (p=0.026) and PCS (p=0.020) subscales. Educational level (senior high school) showed positive correlations with QoL in the PF (p=0.005), BP (p=0.032) and PCS (p=0.004) subscales; and educational level (college or higher) showed positive associations with QoL in the PF (p=0.041), GH (p=0.016) and PCS (p=0.019) subscales. Additionally, QoL showed negative associations with financial problems in the RP (p=0.043), BP

(p=0.001), GH (p=0.001), VT (p<0.001), SF (p=0.001), RE (p=0.001), MH (p<0.001) and PCS (p<0.001) subscales. Finally, probable PTSD showed negative associations with QoL in the PF (p=0.008), RP (p<0.001), BP (p=0.004), GH (p=0.004), SF (p<0.001), RE (p<0.001), MH (p=0.004), PCS (p=0.007) and MCS (p<0.001) subscales (Table 4).

Discussion

We believe that this study has the following strengths: 1. We

	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
β	99.82***	97.29***	100.64***	65.94***	81.87***	88.86***	91.92***	82.90***	55.11***	54.18***
Sex										
Female	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Male	-0.30	-3.6	-2.01	-2.90	1.21	-2.48	-3.90*	-2.94	-0.87	-1.31
Age	-0.33***	-0.40***	-0.27***	-0.38***	-0.18*	-0.16*	-0.20**	-0.06	-0.15***	-0.03
Physical Injuries										
No	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Mild or Moderate	-6.79*	-10.11***	-7.29**	-9.54***	-6.80**	-3.99	-4.53*	-3.62	-3.56***	-1.47
Severe	-26.14***	-27.23***	-21.14***	-12.06***	-11.03***	-6.03*	-14.72***	-2.45	-9.95***	-0.92
Employment										
No	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Yes	8.17**	7.47**	5.87**	6.42*	3.78	4.56*	8.25***	5.32**	2.36**	2.46**
Current Marital Status										
Single	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Married/Living Together	3.69	5.13	4.26*	6.09*	-1.37	3.17	3.35	0.39	2.05*	0.22
Educational Level										
Junior High School or Below	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Senior High School	8.48**	5.28	5.14*	2.86	-1.41	1.43	1.22	-0.77	2.85**	-1.06
College or Higher	6.66*	3.30	1.37	8.00*	-2.90	-0.37	-0.32	-0.66	2.50*	-1.32
Religious Beliefs										
No	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Yes	-3.88	-3.77	-3.07	-0.45	1.95	-0.61	-3.67	-0.79	-1.08	-0.05
Financial Problems										
No	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Yes	-2.73	-5.12*	-6.82**	-9.02**	-7.73***	-6.92**	-6.91**	-9.69***	-1.35	-4.34***
Probable MDE (No/Yes)	-9.92**	-11.58***	-11.51***	-14.74***	-21.70***	-15.50***	-17.76***	-23.04***	-2.22*	-10.76***
Probable PTSD (No/Yes)	-10.60**	-17.30***	-9.14**	-11.81**	-4.81	-15.15***	-20.98***	-8.46**	-3.54**	-6.11***
Adjust R²	0.27	0.32	0.31	0.26	0.26	0.24	0.36	0.35	0.31	0.35

Note:1. PCS: Physical Component Summary; MCS: Mental Component Summary; PF: Physical Functioning; RP: Role Physical; BP: Bodily Pain; GH: General Health; VT: Vitality; SF: Social Functioning; RE: Role Emotional; and MH: Mental Health
2. *p<0.05; **p<0.01; ***p<0.001

Table 4: Multiple regression for the prediction of SF-12v2 subscale scores for respondents twelve months post-gas explosion (n=486).

continued to survey survivors with rapid screening scales and offered mental rehabilitation, including psychiatric treatment, for participants with psychiatric impairment, which allowed professionals to offer early intervention and provide continuous follow-up care or medical treatment. 2. We provided disaster epidemiological data, including risk factors, for public health. However, this study has the following limitations: Gas explosion survivors may be reluctant to consciously recall the situation at that time without any problems and refuse to be visited. This issue may result in underestimation of the severity of survivors' psychiatric conditions or underestimation of the proportion of survivors suffering from mental illness. We also used screening scales instead of psychiatrists to survey survivors' psychiatric disorders due to the insufficient availability of psychiatrists.

We found that survivors' psychological trauma, risk factors and QoL were similar at one year after the southern Taiwan Kaohsiung gas explosion compared with six months after the event [14]. Current marital status and probable psychiatric diagnosis were statistically significant after a year but were not significantly different compared with those within 6 months [14]. Based on the survey administered at 6 months, 161 respondents (32.1%) had at least one probable psychiatric diagnosis and were assigned to the following groups: probable PTSD (n=54) [10.8%], probable MDE (n=37) (7.4%), or probable PTSD and MDE (n=70) (13.9%) [13]. We found that probable PTSD, probable MDE, and probable PTSD and MDE were likely to decrease after a year

(Table 1), which is similar to the results following other disasters in Taiwan. After disaster burns, 55% of patients have at least one mental illness after 6 months, of which PTSD accounted for 12%. In addition, 57% of burns in patients with mental illness will occur within a year. As time increases, morbidity decreases [1,21]. The results of this study (Table 2) showed that female sex, severe physical injuries and financial problems were significant risk factors of psychiatric impairment. Age and mild or moderate physical injuries from the disaster are no longer risk factors at one year compared with six months after the event. However, body deformities and job problems can cause separate or concurrent psychiatric and emotional distress in burn patients [1]. Shalev emphasizes the importance of group cohesion, marital discord, and leadership skills as mediating factors [22]. People who have experienced or have been affected by natural disasters are able to recover with the support of their families, friends or colleagues [6]. Therefore, we infer when the duration of the traumatic experience is longer, there are more serious and relevant physical injuries as well as post-disaster financial problems; additionally, the need for a support system is very important.

When we compared QoL for each of the different groups in post-gas explosion respondents (Table 3) with that of respondents after 6 months in a previous study, we found the following results: first, only RE scores were still higher in non-P or M QoL than in probable PTSD QoL. All other groups became non-P or M and had higher QoL

than probable PTSD and probable PTSD and MDE. Second, RP and MH were no longer associated with probable PTSD, and probable MDE QoL was higher than probable PTSD and MDE QoL. Probable MDE QoL was higher than probable PTSD and MDE QoL, which increased VT and MH. The concurrent psychopathology symptoms, including depression, anxiety and PTSD symptoms, were among the factors negatively associated with QoL [10]. QoL is a dynamic multidimensional model and consists of the three following main dimensions: the physical, social, and mental dimensions of health [9]. Thus, even after a year, the probability of probable psychiatric diagnosis decreased, but probable PTSD and MDE still affected QoL, even more than 6 months after the event, which affected BP, VT and MH.

In Table 4, we found that probable MDE and QoL were still significantly negatively correlated with various dimensions of QoL at one year compared with six months after the explosion. Interestingly, there was no correlation between religious beliefs and QoL after one year, which is different from that after six months. Other altered relationships included the following: age and VT, sex and RE, physical injuries (mild or moderate) and VT, physical injuries (mild or moderate) and SF, current marital status and PF, RP and BP, RP and GH, educational level (senior high school) and PF, educational level (senior high school) and BP, education level and PCS, educational level (college higher) and RP, BP and PF, BP and PCS, financial problems and PF, and financial problems and PCS, probable PTSD and PF, probable PTSD and GH, probable PTSD and VT, and probable PTSD and PCS. Additionally, only occupation was not associated with VT. Psychological problems after a traumatic event can cause more damage than the impact of changes in material QoL [8]. Many disaster studies have found that physical injuries, work ability, financial problems, post-disaster mental illness and QoL are closely related [8,11,13]. A year after the disaster, we can not only still observe the effects of psychological problems but also see the increasing impact and inconvenience of serious physical injuries on financial problems.

Conclusion

This intervention resulted in a mild decline in the number of cases of mental illness one year later. However, more serious psychiatric diseases and worse QoL can result in worse relative recovery. Survivors still exhibited an increased prevalence of psychiatric impairment, and their quality of life was affected. Therefore, mental rehabilitation should be continued for a longer period of time. Many survivors were deeply hurt by the event, and their QoL was also affected, especially survivors with probable PTSD and MDE, severe physical injuries, and/or financial problems. Thus, the authors suggest that long-term follow-up and regular psychiatric management are needed during the reconstruction of the lives of survivors.

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