The Bouncing Effect of Long-Term Psychological Resilience Among Burn Survivors in a Three-Year Follow-Up Study

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BACKGROUND Manmade accidents and natural disasters challenge the healthcare systems. On the night of June 27, 2015, a load of flammable cornstarch-based powder exploded midair and burned 499 people, mostly young people aged under 25. The event, known as the "Formosa Fun Park Powder Explosion," wounded 484 people and killed 15 in the first six months. The Taiwan Ministry of Health and Welfare responded to the disaster efficiently with on-site triage and hospital emergency triage to treat successfully the crucially burned patients. Over the next three years, the New Taipei City Government provided integrated care via case management and medical services for the 484 burn survivors, most of whom had eventual stabilization of their physical and psychological injuries.

AIM The aim of the study was to investigate the long-term psychological reactions and resilient process of young burn survivors after the disaster in Taiwan.

METHOD Longitudinal study with follow-up interviews using standardized questionnaire was conducted. The participants comprised 484 burn survivors receiving periodical telephone contact with 4-wave follow ups conducted by trained interviewers from November 2015 to June 2018. Demographic, medical and psychosocial information were collected from respondents consistently over the four waves of follow ups.

RESULTS

The response rates were 65.1%, 74.2%, 76.9%, and 78.5%, respectively. The burn survivors were mean-aged 23.1±8.7 years with one-fourth of them having burn severity of over 60% total body surface area. The respondents at each wave were similar in gender, age and percent of total body surface area burned. In the first two years of recovery, respondents showed resilience in coping with the stress of trauma under family and social support. While the respondents had a decreasing trend of various mental symptoms, substance use with hypnotics and alcohol consumption increased slightly at the final wave of interview. The mental symptoms recurred simultaneously with increasing substance use.

Photoes showing the disaster of Formosa Fun Park Powder Explosion in Taiwan

Table 1. The respondents' demographic & health information

n(%)/ mean±SD	Total (N=484)	T0 (n=315)	T1 (n=359)	T2 (n=372)	T3 (n=380)
Gender					
Males	241(49.8)	141(44.8)	166(46.2)	176(47.3)	183(48.
Females	243(50.2)	174(55.2)	193(53.8)	196(52.7)	197(51.
Age	23.1±8.7	23.2±4.4	22.9±4.3	22.6±4.2	22.5±4
13-18	100(20.7)	34(10.8)	51(14.2)	52(14.0)	60(15.
19-24	268(55.4)	181(57.5)	199(55.4)	219(58.9)	220(57.
25-30	85(17.6)	73(23.2)	81(22.6)	74(19.9)	71(18.
31-38	31(6.4)	27(8.6)	28(7.8)	27(7.3)	29(7.
Burn area (TBSA)					
0-19%	129(26.7)	91(28.9)	89(24.8)	94(25.3)	97(25.
20-39%	96(19.8)	73(23.2)	76(21.2)	68(18.3)	75(19.
40-59%	141(29.1)	93(29.5)	104(29.0)	115(30.9)	111(29.
60-79%	87(18.0)	43(13.7)	65(18.1)	70(18.8)	72(18.
80-100%	31(6.4)	15(4.8)	25(7.0)	25(6.7)	25(6.
Service Use					
Hospitalization		275(87.3)	0	0	
Rehabilitation		184(58.4)	245(68.2)	188(50.5)	114(30.
Hypnotics use					
No		196(62.2)	253(70.5)	309(83.1)	322(84.
Remain		0	10(2.8)	5(1.3)	12(3.
Increased use		118(37.5)	96(26.7)	58(15.6)	46(12.
Alcohol use					
No		303(96.2)	327(91.1)	343(92.2)	331(87.
Remain		0	16(4.5)	14(3.8)	19(5.
Increased use		12(3.8)	16(4.5)	15(4.0)	30(7.

^TBSA: Total body surface area.

Table 2. Psychopathology of the respondents

n(%)/ mean±SD	T0 (n=315)	T1 (n=359)	T2 (n=372)	T3 (n=380)	p-value
Psychological distress (BSRS-5)$					
Insomnia	92 (29.2)	81 (22.6)	62 (16.8)	62 (16.3)	<0.001
Anxiety	33 (10.5)	32 (8.9)	28 (7.6)	37 (9.7)	0.581
Hostility	59 (18.7)	60 (16.7)	46 (12.4)	50 (13.2)	0.068
Depression	46 (14.6)	32 (9.0)	35 (9.5)	37 (9.7)	0.066
Inferiority	48 (15.2)	48 (13.4)	37 (10.0)	49 (12.9)	0.220
Total score (Q_1)	5.7±5.2	4.9±5.0	4.2±4.8	4.3±4.9	<0.001^ (T2,T3<T0)
Moderate distress ($Q_1 \geq 6$)	141(44.8)	139(38.7)	124(33.3)	127(33.4)	0.005
Severe distress ($Q_1 \geq 10$)	78(24.9)	72(20.1)	55(14.8)	68(17.9)	0.009
Depressive symptoms (PHQ-2*≥3)	88(27.9)	54(15.0)	53(14.2)	51(13.4)	<0.001
Suicide risk					
One-week suicide ideation	25(7.9)	17(4.7)	14(3.8)	13(3.4)	0.027
Lifetime suicide ideation	77(24.4)	43(12.0)	19(5.1)	25(6.6)	<0.001
Lifetime suicide attempt	5(1.6)	17(4.7)	4(1.1)	4(1.1)	0.001
Future suicide intention	15(4.8)	13(3.6)	9(2.4)	11(2.9)	0.356
CMHC-9 score at 6month (Q_2)#	3.2±2.2	2.8±2.2	2.5±2.3	2.5±2.2	<0.001^ (T2,T3<T0)
CMHC-9 high-risk ($Q_2 \geq 4$)	46(14.6)	37(10.3)	28(7.5)	31(8.2)	0.010
Post-traumatic stress symptoms: IES-6					
Intrusion-1.Thoughts about the event	90(28.5)	81(23.5)	66(17.8)	76(20.0)	0.005
Intrusion-2.Kept think about it	152(48.3)	163(45.4)	107(29.1)	140(36.8)	<0.001
Avoidance-1.Not dealing with feelings	69(21.9)	79(22.0)	77(20.7)	93(24.5)	0.652
Avoidance-2.Not to think about it	112(35.6)	114(31.8)	101(27.1)	118(31.1)	0.128
Hyperarousal-1.Felt watchful	73(23.1)	82(23.8)	64(17.2)	85(22.4)	0.161
Hyperarousal-2.Trouble concentrating	76(24.1)	58(16.1)	78(21.0)	87(20.2)	0.080
IES-6 total score	5.6±4.7	5.2±4.6	4.3±4.6	4.8±4.6	0.003^ (T2<T0)
SPAN-4					
Startle	78(24.8)	71(19.8)	49(13.2)	90(23.7)	<0.001
Physiological arousal	60(19.0)	68(18.9)	63(16.9)	69(18.2)	0.877
Anger	92(29.2)	90(25.1)	66(17.7)	77(20.3)	0.002
Numbness	44(14.0)	37(10.3)	34(9.1)	37(9.7)	0.178
SPAN-4 total score	3.5±6.6	2.7±3.3	2.1±2.9	2.5±3.1	<0.001^ (T2<T0)

$ The five-items BSRS were recoded as 0 or 1 from the original scores of 0-4 points at cutoff value of 3.

Conclusion: Young burn survivors recovered both psychologically and physically under support and personal resilience in two years after the burn event, yet post-traumatic mental distress and coping during the longer process of community reintegration should be identified and managed. Early prevention of mental health deterioration is crucial for severe burn survivors in long-term follow ups