

Long-term health and wellbeing of people affected by the 2002 Bali bombing

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The 2002 Bali bombing resulted in the deaths of over 200 people, including 88 Australians and 35 Indonesians, making it the single worst act of terrorism to have affected either country.¹ A further 209 people were injured, including 66 Australians who suffered severe burns and complex shrapnel wounds.^{2,3}

Terrorism exposure may have significant long-term effects on the mental health and wellbeing of survivors. Post-traumatic stress disorder (PTSD) is the most common psychological condition observed in the aftermath of such events, but it often coexists with depression, functional impairment or substance misuse.^{4,5} Few studies have examined the long-term effects on terrorism survivors, although one large study found increases in PTSD between 3 and 5 years after the September 11 attacks.^{6,7} Risk factors included direct exposure (proximity, injury, witnessing horror), incident-related bereavement and low social support.

Bereavement that occurs in traumatic circumstances may have a considerable long-term impact on psychological distress and appears to slow the rate of recovery.⁸ Deaths involving deliberate violence are associated with higher prevalence of trauma conditions, depression and prolonged or “complicated” grief.^{8,9} Complicated grief is characterised by continuing separation distress and bereavement-related traumatic distress. While frequently comorbid with depression or PTSD, it is increasingly recognised as a distinct condition that is associated with persistent functional impairments and negative health outcomes, particularly among those bereaved through terrorism.^{9,10}

The health and psychosocial effects of terrorism exposure have rarely been investigated beyond 3–4 years after such incidents.^{4,11} No studies have examined these effects among Australian survivors. Our aim was to examine the physical and mental health status of individuals directly affected by the 2002 Bali bombing, 8 years after the incident, and to deter-

Abstract

Objective: To examine the physical and mental health status of individuals directly affected by the 2002 Bali bombing, 8 years after the incident.

Design, setting and participants: Cross-sectional study of people directly exposed to and/or bereaved by the 2002 Bali bombing who had participated in a New South Wales Health therapeutic support program. Telephone interviews were conducted during July – November 2010. The sample was weighted to reflect the population of interest, registered participants in the program ($n = 115$).

Main outcome measures: Self-rated physical health, personal resilience (Connor-Davidson Resilience Scale), past-month psychological distress and daily functioning (Kessler Psychological Distress Scale), and traumatic stress-related symptoms (Primary Care PTSD Screen).

Results: Of 81 individuals contacted, 55 responded (68%). Mean age of respondents was 50 years (range, 20–73 years), 32 were female, and seven were physically injured in the bombing. Most (45/55) reported good physical health, but 12 were experiencing high or very high levels of psychological distress. Being injured in the attack was associated with current functional impairment ($P = 0.04$) and very high levels of distress ($P = 0.005$). Lower distress was associated with perceived family support ($P = 0.03$) and being in a marital or de facto relationship ($P = 0.02$). Complicated grief factors were consistently associated with high psychological distress, traumatic stress-related symptoms and lower personal resilience.

Conclusions: Eight years after the bombing, directly affected individuals had good physical health but relatively high rates of psychological distress. Marital or de facto relationships and perceived family support appear to be protective factors against long-term distress. Bereavement factors were the strongest correlates of trauma symptoms and distress. Outreach and screening programs incorporating complicated grief items may be useful in the longer-term support of such individuals.

mine demographic, exposure and loss-related correlates of these health outcomes.

Methods

Participants constituted a cross-sectional convenience sample of individuals who had experienced personal exposure and/or loss related to the 2002 Bali bombing and had current contact details listed with a New South Wales Ministry of Health therapeutic support program (Bali Recovery Program), where they had attended at least one consultation. Those who registered interest in response to a written invitation were contacted, given a description of the study, and asked for verbal consent. Professional interviewers from the NSW Health Survey Program completed computer-assisted telephone interviews between 9 July and 22 November 2010, excluding a period around the bombing anniversary (1–23 October). The validity of telephone-based interviews to assess

stress and anxiety conditions has been demonstrated.¹²

Measures

We examined demographic and exposure factors to determine their relationship with physical and mental health outcomes. Exposure variables were: lifetime traumatic incident exposure,¹³ presence in Bali during/after the bombing, involvement in the search for missing friends/relatives (first 48 hours), and bereavement circumstance (eg, multiple loss, family). Perceived social support from family and friends was assessed with two items from the Perceived Social Support Scale,¹⁴ as well as single items regarding neighbourhood social connectedness¹⁵ and overall support since the bombing.

Current bereavement experience (“experiential” grief) was measured using six items from the Inventory of Complicated Grief-Revised (ICG-R): separation distress (longing/yearning) and cognitive, affective or behavioural items (anger, acceptance, detach-

1 Demographic, exposure and bereavement-related variables of the respondents

Variable	Unweighted (n = 55)	Weighted (n = 115)
Mean age (range)	50 (20–73)	50 (42–53)
Male	23 (41.8%)	48 (41.8%)
Education		
University degree	15 (27.2%)	31 (27.3%)
TAFE certificate or diploma	17 (30.9%)	36 (30.9%)
Higher school certificate	11 (20.0%)	23 (20.0%)
School certificate	9 (16.4%)	19 (16.4%)
Other	3 (5.5%)	6 (5.5%)
Marital status		
Married or de facto	40 (72.7%)	84 (72.7%)
Widowed	3 (5.5%)	6 (5.5%)
Separated or divorced	4 (7.3%)	8 (7.3%)
Never married	8 (14.5%)	17 (14.5%)
Location during/after bombing		
Bali, in club*	6 (10.9%)	13 (10.9%)
Bali, near club*	3 (5.5%)	6 (5.5%)
Bali, not nearby	3 (5.5%)	6 (5.5%)
Bali, arrived after bombing	9 (16.4%)	19 (16.4%)
Not in Bali	34 (61.8%)	71 (61.8%)
Injured during bombing		
No	48 (87.3%)	100 (87.3%)
Yes	7 (12.7%)	15 (12.7%)
Involved in search (first 48 hours)		
No	39 (70.9%)	84 (72.7%)
Yes	16 (29.1%)	31 (27.3%)
Primary bereavement type[†]		
Child	21 (38.2%)	44 (38.9%)
Sibling	11 (20.0%)	23 (20.4%)
Spouse	3 (5.5%)	7 (5.6%)
Other family member	4 (7.3%)	9 (7.4%)
Non-family member(s)	15 (27.3%)	32 (27.8%)
Loss[†]		
Single family member	29 (52.7%)	61 (53.7%)
Multiple family members	4 (7.3%)	9 (7.4%)
Multiple family and non-family	6 (10.9%)	13 (11.1%)
Multiple non-family	15 (27.3%)	32 (27.8%)

TAFE = technical and further education. * Bomb site.
[†] Bereaved respondents (n = 54).

ment, emptiness/meaninglessness, difficulty moving on). High factor loadings related to the single underlying complicated grief factor and elapsed time since bereavement guided item selection.¹⁶

Self-rated physical health in the previous month was measured with a single validated item from the NSW Population Health Survey.¹⁵ We used the short form of the Connor-Davidson Resilience Scale (CD-RISC2) to measure current perceived personal adaptability and ability to continue to function effectively in stressful circumstances.¹⁷ A score of 7–8 indicates high personal resilience.

Anxiety, depression, agitation, psychological fatigue and associated functional impairment (ie, full days unable to manage day-to-day activities due to symptom effects) in the past month were measured using the Kessler Psychological Distress Scale (K10+). Individual scores range from 10 to 50, indicating low (10–15), moderate (16–21), high (22–29) and very high (30–50) psychological distress. The latter is indicative of a significant mental health condition.¹⁸

We used the Primary Care PTSD Screen (PC-PTSD) to measure past-month traumatic stress-related symptoms (TSRS) specific to Bali-related experiences. Single items relate to one underlying characteristic specific to PTSD: re-experiencing, numbing, avoidance and hyper-arousal. The endorsement of 3–4 symptoms indicates “probable” PTSD and the need for specialist assessment.¹⁹

Statistical analysis

The dataset was weighted by age and sex to reflect registered participants in the Bali Recovery Program (n = 115). Current physical and mental health were analysed as outcome measures, with demographic, traumatic incident exposure, perceived support and bereavement factors used as independent variables.

Responses to the support and bereavement questions were expressed as dichotomous variables, with a value of 1 assigned to responses “agree” or “strongly agree”, and 0 to “disagree”, “strongly disagree” and “don’t know”. The outcome variables of physical health, personal resilience and functional loss were dichotomised into high and low (or good and poor) outcomes. Three outcome categories based on established clinical cut-offs were adopted for psychological distress (low–moderate, high and very high) and TSRS (low, moderate and high).^{18,19}

Analyses were performed using Stata statistical software, version 12.0 (StataCorp), with “Svy” commands to allow for adjustments for sampling weight. We used the Taylor series linearisation method to determine prevalence estimates, and χ^2 tests to test for significant differences in the prevalence of physical and mental health outcomes. Due to the relatively small sample size, an α significance level

($P < 0.15$) was adopted, as it is a commonly used threshold for entry into multiple logistic regression analyses,²⁰ and could provide indicative findings in the context of this exploratory study. Multiple testing using the Bonferroni correction was also carried out by dividing the target α level by the number of tests being performed. The significant adjusted P values are reported.

Ethics approval

All study protocols were approved by the ethics committees of the Northern Sydney Local Health District and the University of Western Sydney (H7143).

Results

Of 81 individuals contacted, 55 agreed to participate (68% of eligible respondents). The mean interval between the 2002 bombing and the interview was 7 years and 11 months (range, 7 y 9 m – 8 y 1 m). There were no significant differences between the respondents and the total Bali Recovery Program population in terms of mean age ($P = 0.38$) or male sex ($P = 0.39$).

Respondent characteristics

Demographic, exposure and bereavement characteristics of the respondents are shown in Box 1. Of the 55 respondents, 21 were present in Bali during or shortly after the bombing. Almost three-quarters (39/54) experienced at least one family bereavement due to the bombing. The loss of children (of adult age) was predominant (21/54). Fifteen respondents experienced multiple losses of exclusively non-family members (average of seven friends and acquaintances killed).

Physical health and personal resilience

Physical and mental health prevalence estimates for the weighted sample are presented in Box 2 and Box 3. Good physical health in the past month and high personal resilience were reported by 45 and 30 of the 55 respondents, respectively. Respondents had an aggregate resilience score on the CD-RISC2 of 6.45. Poor self-rated health showed a significant relationship with current yearning for

the deceased ($P=0.04$) and perceived current difficulties moving on with life after the loss ($P=0.02$). Experiential bereavement factors were the only variables associated with low personal resilience: current yearning ($P=0.02$); perceived detachment from others ($P=0.04$); life feeling empty without the deceased ($P=0.02$); and perceived difficulty moving on ($P=0.003$).

Psychological distress and daily functioning

Current high and very high psychological distress was reported by seven and five respondents, respectively. High distress was significantly associated with difficulty accepting the loss ($P=0.03$); feeling detached ($P=0.001$); and anger ($P=0.04$). Very high distress was associated with bombing-related injury ($P=0.005$); current yearning ($P=0.004$); difficulty moving on ($P=0.003$); and life feeling empty ($P<0.001$). Very high distress also showed significant inverse relationships with current marital or de facto relationship ($P=0.02$); perceived family support ($P=0.03$); and better neighbourhood connectedness ($P=0.02$). Loss of at least one full day of functioning in the past month was reported by nine respondents (range, 0–16 days; mean, 0.74). Significantly greater functional loss was associated with bombing-related injury ($P=0.04$) and not being in a current marital or de facto relationship ($P=0.04$).

Traumatic stress-related symptoms

Moderate TSRS (two symptoms) and high TSRS (three or more symptoms) in the past month were reported by 11 and 15 respondents, respectively. High TSRS was positively associated with all assessed features of bereavement but no other outcome variables: current yearning ($P=0.007$); difficulty accepting the loss ($P=0.005$); feeling detached ($P=0.01$); anger ($P=0.002$); life feeling empty ($P=0.02$); and difficulty moving on ($P<0.001$).

Comparisons with the NSW general population

Compared with NSW population estimates, the respondents reported greater rates of high (12.7% v 8.2%) and very high (9.1% v 2.9%) psychological distress (Box 4) and functional

2 Prevalence estimates of individual health and wellbeing indicators in the weighted sample, by sociodemographic and perceived support factors

Covariate	Good self-rated health	High resilience*	Functional loss†	High distress‡	Very high distress‡	Moderate TSRS‡	High TSRS‡
Sex							
Male	78.3%	60.9%	17.4%	8.7%	4.3%	13.0%	21.7%
Female	84.4%	53.1%	15.6%	15.6%	12.5%	25.0%	34.4%
Age							
18–40 years	73.3%	57.9%	26.3%	10.5%	10.5%	26.3%	26.3%
> 40 years	86.1%	55.6%	11.1%	13.9%	8.3%	16.7%	30.6%
Education							
University	86.7%	66.7%	20.0%	13.3%	6.7%	20.0%	26.7%
High school/other	80.0%	52.5%	15.0%	12.5%	10.0%	20.0%	30.0%
Employed							
No	75.0%	41.7%	25.0%	16.7%	8.3%	8.3%	50.0%
Yes	83.7%	60.5%	14.0%	11.6%	9.3%	23.3%	23.3%
Household income							
≤ \$60 000	77.8%	44.4%	27.8%	22.2%	11.1%	16.7%	22.2%
> \$60 000	82.9%	62.9%	11.4% [§]	8.6%	5.7%	20.0%	31.4%
Marital status							
Married or partnered	85.0%	52.5%	10.0%	12.5%	2.5%	17.5%	30.0%
Not married or partnered	73.3%	66.7%	33.0%**	13.3%	26.7%**	26.7%	26.7%
Have children							
No	75.0%	58.3%	16.7%	8.3%	16.7%	33.3%	33.3%
Yes	83.7%	55.8%	16.3%	14.0%	7.0%	16.3%	27.9%
Perceived support, family							
Low	80.0%	60.0%	20.0%	20.0%	40.0%	40.0%	20.0%
High	82.0%	56.0%	16.0%	12.0%	6.0%**	18.0%	30.4%
Perceived support, friends							
Low	85.7%	42.9%	14.3%	14.3%	14.3%	0.0%	42.9%
High	81.3%	58.3%	16.7%	12.5%	8.3%	22.9%	27.1%
Social connections, neighbourhood							
Low	88.9%	66.7%	33.3%	11.1%	33.3%	33.3%	22.2%
High	80.4%	54.3%	13.0% [§]	13.0%	4.3%**	17.4%	30.0%
Long-term support, all sources							
Low	75.0%	75.0%	0.0%	25.0%	12.5%	0.0%	37.5%
High	83.0%	53.2%	19.1%	10.6%	8.5%	23.4%	27.7%
Total respondent group (95% CI)	81.8% (68.9%–90.1%)	56.4% (42.7%–69.1%)	16.4% (8.6%–29.0%)	12.7% (6.0%–24.8%)	9.1% (3.7%–20.5%)	20.0% (11.2%–33.1%)	29.1% (18.4%–42.8%)

TSRS = traumatic stress-related symptoms. * Score of 7–8 on the short form of the Connor–Davidson Resilience Scale. † Unable to complete usual activities on 1 or more days in previous month. ‡ Score of 22–29 on the Kessler Psychological Distress Scale indicates high psychological distress; 30–50 indicates very high distress. § Two symptoms on Primary Care PTSD Screen indicates moderate TSRS; 3–4 symptoms indicates high TSRS. ¶ $P < 0.15$. ** $P < 0.05$.

impairment (mean, 0.74 v 0.60 days lost in the past month).¹⁵ Respondents were significantly less likely to report low levels of psychological distress ($P<0.05$). Good self-reported health was slightly higher among respondents than the population mean (81.8% v 80.4%).

Discussion

Eight years after the first Bali bombing, a substantial proportion of this directly affected group were experiencing high levels of psychological distress and

TSRS. These individuals, who had sought help, were also experiencing near-normal physical health, and their aggregate resilience score fell within a “high resilience” range observed in United States population estimates.¹⁷ Although a specific comparison group is not available, access to modern treatment methods and support may have promoted these positive long-term outcomes. Notably, experiential features of grief (eg, emptiness, difficulty moving on) were the only factors associated with reduced resilience, suggesting that early intervention with

3 Prevalence estimates of individual health and wellbeing indicators in the weighted sample, by incident exposure and bereavement factors

Covariate	Good self-rated health	High resilience*	Functional loss†	High distress‡	Very high distress‡	Moderate TSRS§	High TSRS§
Lifetime exposure¶							
Low	84.0%	60.0%	16.0%	16.0%	4.0%	32.0%	32.0%
High	80.0%	53.3%	16.7%	10.0%	13.3%	10.0%	26.7% ^{††}
In Bali during or after bombing							
No	88.2%	55.9%	11.8%	11.8%	2.9%	20.6%	20.6%
Yes	71.4% ^{††}	57.1%	23.8%	14.3%	19.0% ^{††}	19.0%	42.9%
Injured during bombing							
No	83.3%	58.3%	12.5%	12.5%	4.2%	18.8%	27.1%
Yes	71.4%	42.9%	42.9% ^{§§}	14.3%	42.9% ^{§§}	28.6%	42.9%
Involved in search (first 48 hours)							
No	87.5%	60.0%	12.5%	12.5%	5.0%	22.5%	22.5%
Yes	66.7% ^{††}	46.7%	26.7%	13.3%	20.0%	13.3%	46.7%
Bereavement**							
Non-family member(s)	80.0%	46.7%	20.0%	13.3%	13.3%	20.0%	40.0%
Family member(s)	84.6%	61.5%	12.8%	10.3%	7.7%	20.5%	23.1%
Bereavement involved child^{***††}							
No	81.8%	57.6%	15.2%	9.1%	9.1%	21.2%	30.3%
Yes	85.7%	57.1%	14.3%	14.3%	9.5%	19.0%	23.8%
Current yearning for loved one(s)**							
No	93.1%	72.4%	10.3%	3.4%	0.0%	20.7%	10.3%
Yes	72.0% ^{§§}	40.0% ^{§§}	20.0%	20.0%	20.0% ^{§§}	20.0%	48.0% ^{§§}
Difficulty accepting loss**							
No	90.6%	62.5%	15.6%	3.1%	6.3%	18.8%	12.5%
Yes	71.4% ^{††}	47.6%	14.3%	23.8% ^{§§}	14.3%	19.0%	52.4% ^{§§}
Feel detached from others**							
No	84.3%	60.8%	15.7%	7.8%	7.8%	21.6%	23.5%
Yes	66.7%	0.0% ^{§§}	0.0%	66.7% ^{§§}	33.3%	0.0%	100.0% ^{§§}
Feel angry about loss**							
No	92.0%	60.0%	16.0%	0.0%	8.0%	24.0%	4.0%
Yes	75.9% ^{††}	55.2%	13.8%	20.7% ^{§§}	10.3%	17.2%	48.3% ^{§§}
Life feels empty without loved one(s)**							
No	86.4%	65.9%	11.4%	6.8%	2.3%	22.7%	20.5%
Yes	66.7%	22.2% ^{§§}	22.2%	33.3%	33.3% ^{¶¶}	11.1%	66.7% ^{§§}
Moving on remains difficult**							
No	87.5%	64.6%	12.5%	8.3%	6.2%	22.9%	18.8%
Yes	50.0% ^{§§}	0.0% ^{§§}	21.4%	33.3%	33.3% ^{§§}	0.0%	100.0% ^{¶¶}
Total respondent group (95% CI)	81.8% (68.9%–90.1%)	56.4% (42.7%–69.1%)	16.4% (8.6%–29.0%)	12.7% (6.0%–24.8%)	9.1% (3.7%–20.5%)	20.0% (11.2%–33.1%)	29.1% (18.4%–42.8%)

TSRS = traumatic stress-related symptoms. * Score of 7–8 on the short form of the Connor-Davidson Resilience Scale. † Unable to complete usual activities on 1 or more days in previous month. ‡ Score of 22–29 on the Kessler Psychological Distress Scale indicates high psychological distress; 30–50 indicates very high distress. § Two symptoms on Primary Care PTSD Screen indicates moderate TSRS; 3–4 symptoms indicates high TSRS. ¶ Lifetime exposure to potentially traumatising events: low = 1–2 events; high ≥ 3 events (excluding Bali exposure). ** Bereaved respondents (n = 54). †† Non-dependent child. ‡‡ P < 0.15. §§ P < 0.05. ¶¶ P < 0.001 (Bonferroni adjusted).

remain substantial risk factors at this extended time point.

Social support has a positive role in mental health and may foster recovery from trauma over time.²¹ We found that being in a marital or de facto relationship was the only demographic factor associated with distress in the respondent group, showing an inverse relationship with high psychological distress. Inverse relationships were also observed with the broader social support factors of high perceived family support and neighbourhood social connectedness.

The strength of our findings in relation to complicated grief variables appears to highlight important aspects of grief, as it relates to terrorism violence and loss. The ability to “make sense” of a loved one’s death is considered a central process of grieving.⁸ However, the irrational or meaningless nature of violent death, particularly through terrorism, has been found to interfere with this cognitive process for many survivors.²² Moreover, it is associated with more severe complicated grief, higher psychological distress and poorer physical health.²³ While such mediating variables cannot be inferred in relation to our data, it is notable that complicated grief symptoms in this study were also associated with distress and poor physical health, as well as TSRS. Similarly, grief symptoms were also the only factors associated with significantly lower personal resilience. This suggests that among bereaved survivors of terrorism, grief maladaptation may represent a more significant long-term risk factor for health outcomes than incident exposure or post-event variables.

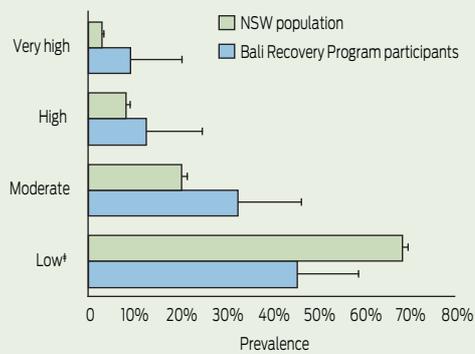
Our findings have implications for the support of people directly affected by terrorism. Complicated grief factors emerged as the strongest correlates of adverse physical and mental health status. Longer-term monitoring of survivor groups is indicated, including screening programs that incorporate grief-specific items. Previous short-term screening has effectively linked survivors with evidence-based care.^{10,24} However, case-finding from primary care pathways was poor, suggesting that outreach is required for longer-term initiatives.²⁴ Significantly, 7 years after the September 11 attacks, registered individuals who had

a specific focus on these factors may be indicated for such groups.¹⁰

Direct exposure to disasters is considered to have a dose-response effect. Factors such as proximity, injury and perceived threat to life are consistently associated with adverse mental health effects, but they are rarely examined beyond 3–4 years after terrorism incidents because of

difficulty accessing affected cohorts.¹¹ Eight years after the Bali bombing, a significant association was observed between incident-related physical injury and both psychological distress and functional impairment. These findings extend the current literature, showing that some of the most direct forms of exposure (proximity and injury)

4 Population comparison of prevalence estimates* of psychological distress† in the past month



* Bali Recovery Program 2010 weighted sample and New South Wales population weighted prevalence estimates (2010).¹⁵ † Measured using the Kessler Psychological Distress Scale. ‡ $P < 0.05$.

escaped the World Trade Center reported difficulty accessing physical and mental health care and often failed to connect long-term symptoms with their September 11 exposures.²⁵

Our study has some notable strengths and several limitations. The sample ostensibly constitutes a traumatically bereaved population, with varying levels of direct incident exposure and use of clinical services. Respondents may represent a more seriously affected, but possibly better supported cohort than those who did not seek services from the program. This may limit generalisability of these findings to other survivor groups. This cross-sectional study can only determine significant associations at a single time point. No conclusions can be drawn regarding longitudinal health effects or their causes.

The response rate had the potential to introduce responder bias, although no significant differences in sex or age were found between the respondent sample and the total program population. Items from the complicated grief measure (ICG-R) examined a subset of symptoms only and cannot be considered to indicate syndrome-level complicated grief.

Importantly, this analysis presents the largest study sample to date of Australians directly affected by a single terrorist incident. In completing a quantitative analysis of their health status 8 years after a major bombing, it also represents, to our knowledge, the longest follow-up period of a terrorism-affected population reported in the literature.

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