Psychiatry Research 273 (2019) 1–8

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

The trajectory of bombing-related posttraumatic stress disorder among Iraqi civilians: Shattered world assumptions and altered self-capacities as mediators; attachment and crisis support as moderators

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ARTICLE INFO

Key words:
Bombing
PTSD
World assumptions
Self-capacities
Attachment
Crisis support

ABSTRACT

This study examined the impact of bombing on posttraumatic stress disorder (PTSD) and psychiatric co-morbidity over time, whether this relationship was mediated by shattered world assumptions and altered self-capacities, and whether the mediational effects were moderated by attachment style and crisis support among Iraqi civilians. One hundred and fifty-nine Iraqi civilians completed questionnaires measuring the aforementioned psychological constructs. Bombing exposure was associated with PTSD and psychiatric co-morbidity over time; 87% and 77% met the criteria for PTSD at baseline and five months respectively. Shattered world assumptions and altered self-capacities mediated the impact of bombing exposure on PTSD and psychiatric co-morbidity over time. The mediational effect for shattered world assumptions was not moderated by attachment style and crisis support. However, the mediational effect for altered self-capacities was moderated by fearful attachment and a medium level of crisis support. To conclude, following bombing, Iraqi civilians' assumptions about the world and others can change. These changes can have long term effects on psychological distress but are not influenced by childhood attachment experiences or the amount of crisis support received. Bombing can also change civilians' perceptions of internal capacities like emotional regulation, particularly those with fearful attachment who rely on crisis support to some extent.

1. Introduction

It has been documented that civilians exposed to bombing in, for instance, Oklahoma and Nairobi, can develop posttraumatic stress disorder (PTSD) along with psychiatric co-morbidity such as anxiety, depression, substance abuse, and functional impairment (Bryant, 2010; Njenga et al., 2004; Norris et al., 2002; North et al., 1999; Pfefferbaum, 2001; Pfefferbaum et al., 2002; Solberg et al., 2015; Tucker et al., 1997, 2017; Zhang et al., 2013). The prevalence rates for PTSD after bombing can range from 34% to 58.5% (Duffy et al., 2013; North, 2001, 2004; North et al., 1999, 2011; Zhang et al., 2013) with symptom severity declining over time, albeit with less pace for those who met the criteria for full-PTSD (North et al., 2011; Zhang et al., 2013). Trauma exposure at time of bombing predicts distress (Birkeland et al., 2017a; Tucker et al., 2017; Zhang et al., 2013), and maintains PTSD over time (Birkeland et al., 2017a; Duffy et al., 2013; Miller et al., 2013). Victims of direct exposure are six to eight times more likely to develop it (Hansen et al., 2017; Neria et al., 2007). A dose-response effect was evident in that PTSD severity was related to degree of exposure, proximity to the event (North et al., 2011), witnessing the blast and injury sustained (Njenga et al., 2004).

Studies focusing on the bombing effect among Iraqi civilians are limited despite the devastation that has been taking place since 2003. Approximately one month following bombing, 57% of civilians in one study met the criteria for PTSD; 5 months after the baseline assessment, the rate dropped to approximately 43% with a significant decline in psychiatric co-morbidity. Shattered world assumptions and altered self-capacities influenced the impact of bombing on distress outcomes (Freh et al., 2013a,b). The former is pertinent to feelings of vulnerability or safety resulting from changes in basic assumptions about the benevolence, meaningfulness and predictability of the world, and the goodness of people (Janoff-Bulman, 1992). The latter is concerned with the impact of trauma on affect regulation; tolerating and controlling overwhelming emotions, the maintenance of personal identity and self-awareness across situations, and forming and maintaining meaningful relationships (Briere and Runtz, 2002).

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https://doi.org/10.1016/j.psychres.2019.01.001
Received 18 April 2018; Received in revised form 1 January 2019; Accepted 1 January 2019
Available online 03 January 2019
0165-1781/

These studies (Freh et al., 2013a,b) need further exploration, however. They focused mainly on intrapsychic factors characterized by distorted cognitions and self-capacities while neglecting interpersonal factors. Facing a trauma (bombing in this case) can activate the attachment behavioural system, an innate psychobiological system (Mikulincer et al., 2015) which motivates individuals to seek proximity to and interact with supportive others (attachment figures) with the hope that they can gain a sense of safety, protection and security. The history of interactions with attachment figures determines attachment style (Bowlby, 1969). Victims with a secure attachment style tend to protect themselves against the trauma-related feelings of vulnerability, helplessness or hopelessness by accessing internalized security-providing attachment figures and/or external social support. In so doing, adaptive emotional regulatory strategies are activated to manage traumatic emotion, thereby maintaining psychological well-being and reducing the likelihood of developing PTSD. On the contrary, those with attachment insecurities (e.g. fearful or insecure) fail to locate internalized security attachment figures, external support and comfort. Regulation of distressing emotion is affected, leading to maladaptive coping, negative feelings, the maintenance of negative working models of self and others, and ultimately to prolonged PTSD. In other words, attachment insecurities can be a predisposition to PTSD (Mikulincer et al., 2015). Among Israeli college students exposed to missile attacks and victims of war and partner violence, individuals with anxious attachment (a form of attachment insecurities) and low levels of perceived social support were more likely to report elevated PTSD and depression over time than their counterparts (Besser and Neria, 2010, 2012; Woodward et al., 2013).

Given that victims with attachment insecurities have difficulty accessing internalized security-providing attachment figures and external support, feelings of safety are likely to be compromised, while vulnerability or uncontrollability is heightened. These are some of the characteristics of shattered world assumptions. As was mentioned, victims who have attachment insecurities tend to adopt maladaptive emotional regulation strategies and have negative working models of others: They might also experience altered self-capacities in terms of regulating internal experience by tolerating, controlling or regulating negative emotions (Briere and Runtz, 2002; Briere and Spinazzola, 2005). This is in line with the claim that disrupted early parent-child attachment is associated with altered self-capacities (Cole and Putnam, 1992; Herman and van der Kolk, 1987).

Shattered world assumptions, altered self-capacities and distress outcomes have been explored among Iraqi civilians, but the extent of the influence of, jointly, attachment styles and external support is unknown. The current study aimed to address this knowledge gap. Based on the literature, we hypothesized that 1) bombing exposure would be associated with the severity of PTSD and psychiatric co-morbidity over time, 2) shattered world assumptions and altered self-capacities would mediate that association, and 3) attachment styles and crisis support would jointly moderate mediational effects (see Fig. 1).

2. Method

2.1. Procedure

Ethical approval for the current study was obtained from the Ministry of Health-Iraq (MOH). This study was a self-report study using a convenience sampling method. Computerized medical files of bombing victims in MoH-Iraq over a 12-month period were used to identify participants. The files consisted of demographic information such as name, marital status, date of birth, gender, time and place of the incident of 500 patients who received medical consultation from hospitals. The consultation aimed to provide advice on managing physical health problems or injury resulting from the bombing. No psychotherapeutic intervention was provided. Patient information was passed onto the Ministry from hospitals. Using the inclusion and exclusion criteria below, the researcher (the second author) identified 206 individuals who met the criteria and were invited to a local university for assessment. Forty-three did not wish to participate. Of those remaining, 163 agreed to participate; 4 were subsequently excluded because they were unable to read and write, yielding a final total of 159 participants. Upon giving consent, they were invited to complete a package of questionnaires described in the measures section (Time 1). Approximately five months (Time 2) after the baseline assessment, they were invited to the Ministry again to complete the PDS and GHQ-28. The selection criteria were: 1) 18+ in age, 2) Iraqi in nationality, 3) civilians exposed directly to a first bombing experience, and 4) civilians living in Baghdad and outer regions.

The questionnaires were first translated into Arabic, then back-translated with the help of professional interpreters whose first language was Arabic and who were proficient in English. All translated items were discussed with the authors and discrepancies were noted and agreed upon. Participants were offered 10,000 Iraqi Dinars (approximately £4) in appreciation of their time and effort; No one dropped out of the study. The financial incentive might have played a role in maintaining their continuous participation. Also, since the researcher who collected the data is himself Iraqi and the Arabic culture is collectivistic in nature, helping each other within their own community is seen as a virtue.

With the sample size of $n = 159$ set at $p = 0.05$, the study generated a power of 0.95 (critical $F = 3.19$). A small effect size ($f^2 = 0.09$) was chosen for this power calculation and was based on a study among bombing victims (North, 2004).

2.2. Measures

The bombing experience questionnaire is self-constructed, aiming to collect information on objective and subjective experiences of bombing. It records information on perceived life threat prior to the bombing (whether they anticipated their own involvement in a bombing attack one day and knew anyone who had died or sustained injury in a bombing attack, 0 = no, 1 = yes), and during the bombing (whether they were with anyone when the bomb exploded, covered with dark and dusty smoke, unconscious, saw people being hit by a bomb, sustained injury or felt they were going to die, 0 = no, 1 = yes). They were also asked to rate the degree of physical injury, confusion, loss of control, isolation and horror (0 = not at all to 3 = completely/a great deal), and indicate whether they saw body remains or people severely injured, knew anyone who died or sustained injury in the bombing, and tried to rescue other victims (0 = no, 1 = yes). For the aftermath experience, participants were asked to indicate whether they were taken to hospital (0 = no, 1 = yes) and rate the degree of anger, anxiety about further bombing, danger in the current environment, deliberate effort to avoid leaving the house in case of further bombing, and change their personality following the bombing (0 = not at all to 3 = a great deal/very often).

The Posttraumatic Stress Diagnostic Scale (PDS) (Foa et al., 1993) measures PTSD symptoms focusing on the experience of bombing. Participants respond to 17 items of trauma symptoms corresponding to DSM-IV criteria for PTSD from which three subscales are derived: re-experiencing symptoms, avoidance, and hyperarousal. The Scale can generate a diagnosis of PTSD and a total by the summation of all items. The mean of this total score was used in the analysis. The items are rated using the Likert scale: 0 = not at all or only one time, 1 = once in a while/once a week or less, 2 = half the time/2 to 4 times a week, 3 = almost always/5 or more times a week. The scale has shown good concurrent validity (0.81) and significant correlations with the Impact of Event Scale's intrusion and avoidance subscales (Foa et al., 1993). Based on the current sample, the Cronbach's α was 0.84 for the total PDS.

The General Health Questionnaire (GHQ-28) (Goldberg and Hillier, 1979) is a 28-item questionnaire aiming to assess psychiatric co-

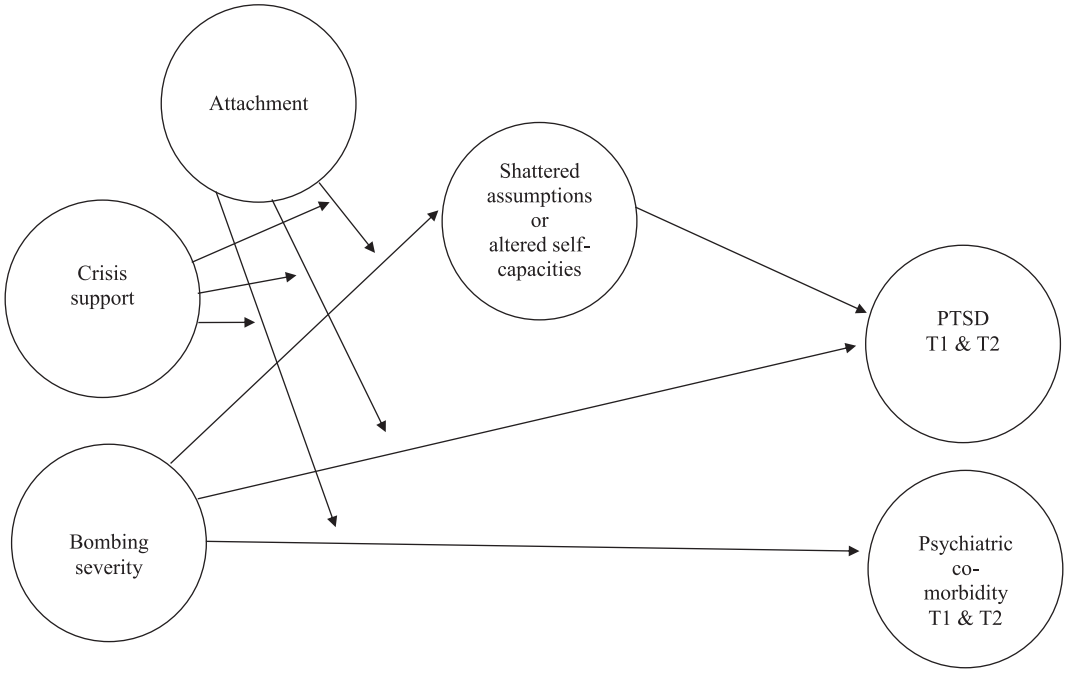

Fig. 1. The hypothesized model.

morbid symptoms: somatic problems, anxiety, social dysfunction, and depression using the Likert scale (0 = not at all, 1 = no more than usual, 2 = rather more than usual, 3 = much more than usual). A total score is generated by the summation of all items, the mean of which was used in the analysis. The GHQ-28 has been validated (Dowell, 2006) with the Cronbach's α being 0.91 and split half 0.88. The Cronbach's α for the total GHQ-28 of the current sample was 0.91.

The Inventory of Altered Self-Capacities (IASC) (Briere and Runtz, 2002) is a 63-item questionnaire measuring the disturbance functioning in relation to the self and others. It measures seven types of self-capacities disturbance: affect dysregulation, identity impairment, idealization disillusionment, abandonment concerns, susceptibility to influence, interpersonal conflict, and tension reduction activities using the Likert scale from 1 = never to 5 = very often. A total score is generated by the summation of all items and its mean was used in the analysis. The Cronbach's α coefficients for IASC subscales range from 0.78 to 0.93 with an average of 0.89. Based on the current sample, they ranged from 0.81 to 0.94.

The World Assumptions Scale (WAS) (Kaler, 2009) is composed of 22 items measuring the effect of the bombing attack on victims' fundamental assumptions about the world using the Likert scale from 1 = strongly agree to 6 strongly disagree. It yields 4 subscales: controllability of events, comprehensibility and predictability of people, trustworthiness and goodness of people, and safety and vulnerability. A total score is generated by the summation of all items and the mean of this total was used in the analysis. Cronbach's α ranged from 0.74 to 0.82 in literature (Kaler, 2009) and 0.72 to 0.86 for the current study.

Crisis Social Support (CSS) (Andrews and Brown, 1988) has been shown to be a valid, robust scale (Elklit et al., 2001) measuring perceived crisis support after exposure to a traumatic event (bombing attack in this case). It has 12 items rated using the Likert scale: 1 = never to 7 = always. Each item is asked twice, once following the disaster and again at the present time (i.e. at the time of study). High scores on CSS represent a high level of crisis support. The total responses following the disaster and at the present time have a high internal consistency (Cronbach's α = 0.80) (Joseph et al., 1992). This total score was used in the analysis. The current sample yielded a Cronbach's α of 0.91.

The Relationship Scales Questionnaire (RSQ) (Griffin and Bartholomew, 1994) is a 30-item questionnaire aiming to measure four attachment styles: Secure, preoccupied, fearful and dismissive, using the Likert scale: 1 = not at all like me to 5 = very much like me. Alphas for the four attachment styles ranged from 0.61 to 0.70; a total score is generated by the summation of all items, the mean of which was used in the analysis. It has adequate convergent and divergent validity as well as moderate to high test-retest reliability and stability over an eight-month period (Scharfe and Bartholomew, 1994). The Cronbach's α of the total RSQ for the current sample was 0.72.

2.3. Data analysis

Normality of the data was checked using information from skewness, kurtosis and normal *P-P* pilot followed by Kolmogorov–Smirnov and Shapiro–Wilk tests. Due to non-normality, PTSD and psychiatric co-morbidity totals were log-transformed. No outliers were detected during the exploration of casewise diagnostics (Mahalanobis distance = 3 SD). Levene's test and linear regression plots were used to check assumptions relating to equality of variance and homoscedasticity respectively. Expectation Maximization (EM) algorithm (Enders, 2011) was used to replace missing data. It has been shown to be a valid method (Schafer and Graham, 2002) when less than 5% of responses are missing due to participants omitting questionnaire items.

Descriptive statistics were used to describe demographic information, bombing exposure characteristics, and those meeting the diagnostic criteria for PTSD among Iraqi civilians. Correlation coefficients were used to establish associations between bombing exposure characteristics, demographic information and distress outcomes over time. McNemar and paired *t* test were used to examine significant changes in the trajectory of PTSD prevalence and mean differences between times 1 and 2 in psychiatric co-morbid symptoms.

PROCESS was used to examine mediational (shattered world assumptions and altered self-capacities) and moderated mediational effects (attachment and crisis support) (Hayes, 2017). Bias-corrected bootstrapping was used to generate confidence intervals (BootLLCI, BootULCI) which address the problem of power resulting from the asymmetric and non-normal sampling distributions of an indirect effect (MacKinnon et al., 2004). The bootstrapping sampling (n = 1000) distributions of the indirect effects were produced by selecting a sample of cases from the complete data set and calculating the indirect effects

Table 1
Bombing exposure characteristics.

Trauma exposure	N (159)	%
Before bombing		
Anticipated bombing	69	43
Knew someone died from bombing	111	70
During bombing		
With someone	81	51
Sustained injury	115	72
Covered with smoke	111	70
Unconscious	36	23
Saw people exploded	57	36
Thought of dying	121	76
Saw body remains	91	57
Saw people severely injured	117	74
Knew someone died	40	25
Knew someone injured	58	37
Rescued someone	14	9
	Mean	SD
Pain severity	1.94	0.87
Felt confused	2.07	0.80
Lost control	1.98	0.86
Felt isolated	1.80	0.91
Felt horrified	2.31	0.81
After bombing		
	N	%
Taken to hospital	116	73
Left the site without medical attention	39	25
	Mean	SD
Angry	2.44	0.74
Worried about another bombing	1.93	0.78
Life is currently in danger	1.94	0.80
Stayed home deliberately	1.53	0.97
Bombing has changed you	1.82	0.88

in the resamples. Point estimates and confidence intervals (95%) were estimated for the indirect and moderated mediation effects. When zero was not contained in the confidence interval, point estimates of indirect and moderated mediation effects were then considered to be significant.

3. Results

One hundred and fifty-nine Iraqi civilians (F = 83, M = 76) with an average age of 30 years (mean = 29.74, SD = 8.70, age range: 18–53) participated in this study. They had all been directly exposed to bombing for the first time, although they were not necessarily exposed to the same bombing. On average, they had experienced the bombing 5 months prior to the study (mean = 4.76, SD = 1.55). Most were either married (54%) or single (42%); all were Arab in ethnicity and identified themselves as Muslim; 21% had received education up to primary school level and 39% high school level; 40% were university graduates. Judging from their occupations, 62% had a low level of income.

Table 1 shows information on bombing exposure characteristics. Prior to the bombing, less than half of the total sample anticipated that they would experience such an event, although over two thirds knew someone who had been killed in this way. When the bombing occurred, just over half were with someone. A large majority sustained injury as a result of the bombing. On average, moderate levels of severity were reported in pain, injury, confusion, loss of control, isolation and horror. More than two thirds were covered in dark smoke during the bombing; about a quarter went unconscious; more than a third saw people exploded; a large majority thought that they were going to die. Over half saw body remains and a large majority saw people injured. Over a quarter knew someone who died and over a third knew someone who sustained injury during the bombing. Most people did not try to rescue anyone. In terms of the aftermath of the bombing, most were taken to hospital and the rest left the site without medical attention. On average, moderate levels of anger, worry about another bombing, and feeling in danger were reported. Some deliberately stayed at home in order to avoid the possibility of another bombing and felt that the bombing had changed them.

Table 2
The trajectory of psychiatric co-morbid symptoms overtime.

	T1		T2		*t*	Cohen's d
	Mean	SD	Mean	SD		
Somatic problems	12.25	4.55	8.71	3.78	1154*	0.91
Anxiety	13.05	3.60	10.01	3.19	10.63*	0.84
Social dysfunction	12.49	3.90	8.59	3.35	12.55*	0.99
Depression	11.15	4.91	8.29	3.96	8.36*	0.66
Total	48.96	14.30	35.58	11.79	15.41*	0.93

*$p < 0.001$

Individual items from the bombing experience questionnaire were summated to compute variables depicting before, during and aftermath bombing exposure which were then correlated with PTSD and psychiatric co-morbidity totals at T1 and T2. The results showed that during and aftermath variables were significantly correlated with distress outcomes at both time points even with the new level of significance ($p < 0.003$) generated by Bonferroni correction. The correlational values ranged from 0.30 to 0.60.

Using the PDS, 87% and 77% met the diagnostic criteria for PTSD at T1 and T2 respectively. The decline in the proportion of diagnosis was significant (McNemar $\chi^2 = 4.64$, $p < 0.05$). All psychiatric co-morbid symptoms also declined significantly over time with mostly large effect sizes (see Table 2).

As was mentioned, a group of the participants knew someone who had been killed by bombing prior to their own. Arguably, they had both direct and indirect exposure experiences. However, no significant differences between this group and the group with direct exposure only were found in the severities of PTSD (T1, t = −0.63, df = 178, ns; T2, t = 0.06, df = 78, ns) and psychiatric co-morbidity (T1, t = 0.40, df = 178, ns; T2, t = 0.88, df = 178, ns).

The sample was also divided into low, medium and high exposure to calculate the bombing exposure severity. This procedure was in line with literature (Chung et al., 2004; Handley et al., 2009). The division was based on the median split of the total scores of dichotomous as well as continuous variables from the bombing experience questionnaire. Those who scored above the median for both types of variables were allocated into the high exposure group; those who scored below the median for both types were allocated into the low exposure group; those who scored above or below the median of the two variable types were allocated into the medium exposure level. Significant differences between groups in PTSD [F(2156) = 21.65, $p < 0.001$] and psychiatric co-morbidity at T1 [F(2156) = 11.19, $p < 0.001$] and T2 [PTSD: F(2156) = 13.20, $p < 0.001$; psychiatric co-morbidity: F(2156) = 8.05, $p < 0.001$] were found. Pairwise comparisons showed that those with a severe level of bombing reported significantly ($p < 0.01$) higher levels of PTSD at T1 than the other two groups. They reported significantly ($p < 0.01$) higher levels of PTSD at T2 than the low bombing severity group only. The same pattern of results was also found in psychiatric co-morbidity.

Prior to the PROCESS analysis, correlation coefficients including point-biserial correlation were carried out to identify whether demographic variables would relate to outcomes given that gender, age, marital status, and education have been associated with long term PTSD following bombing. In the present study, only age was significantly correlated with PTSD at baseline (r = −0.21, $p < 0.01$).

After controlling for age, shattered world assumptions and altered self-capacities mediated the impact of bombing exposure on PTSD and psychiatric co-morbidity at T1 and T2. The total amount of shattered world assumptions mediated the impact of bombing exposure on distress outcomes over time, while affect dysregulation, one domain of altered self-capacities, played a key role in mediating the impact of the

Table 3
Results on mediation and moderated mediation.

	Index	Effect	Boot SE	Boot LLCI	Boot ULCI
Indirect effects of *X* (bombing) on *Y* (PTSD at T1 & T2) with shattered world assumptions as mediator					
PTSD T1	——	−0.0294	0.0116	−0.0547	−0.0960
PTSD T2	——	0.0252	0.0108	0.0072	0.0494
Indirect effects of *X* (bombing) on *Y* (psychiatric co-morbidity at T1 & T2) with shattered world assumptions as mediator					
Psy. Co-morbidity T1	——	0.0215	0.0088	0.0069	0.0414
Psy. Co-morbidity T2	——	0.0224	0.0096	0.0067	0.0444
Indirect effects of *X* (bombing) on *Y* (PTSD at T1 & T2) with altered self-capacities as mediator					
PTSD T1	——	−0.0365	0.0143	−0.0084	−0.0128
PTSD T2	——	0.0323	0.0131	0.0103	0.0609
Indirect effects of *X* (bombing) on *Y* (Psychiatric co-morbidity at T1 & T2) with altered self-capacities as mediator					
Psy. Co-morbidity T1	——	0.0275	0.0990	0.0100	0.0488
Psy. Co-morbidity T2	——	0.0235	0.0992	0.0075	0.0433
Indirect effect: bombing → shattered assumptions → PTSD at T1 & T2 Indices of conditional moderated mediation by W (attachment)					
PTSD T1					
Crisis support					
−13.55	0.0015	——	0.0015	−0.0012	0.0048
0.0000	−0.0001	——	0.0009	−0.0019	0.0017
13.55	−0.018	——	0.0015	−0.0049	0.0008
PTSD T2					
-13.55	−0.0017	——	0.0016	−0.0052	0.0012
0.0000	0.0002	——	0.0010	−0.0020	0.0021
13.55	0.0020	——	0.0017	−0.0011	0.0056
Indirect effect: bombing → shattered assumptions → Psy. Co-morbidity at T1 & T2 Indices of conditional moderated mediation by W (attachment)					
Psy. Co-morbidity T1					
Crisis support					
−13.55	−0.0010	——	0.0010	−0.0033	0.0009
0.0000	0.0001	——	0.0006	−0.0010	0.0016
13.55	0.0012	——	0.0011	−0.0005	0.0039
Psy. Co-morbidity T2					
Crisis support					
−13.55	−0.0016	——	0.0015	−0.0005	0.0012
0.0000	0.0002	——	0.0009	−0.0017	0.0021
13.55	0.0019	——	0.0015	−0.0008	0.0051
Indirect effect: bombing → altered self-capacities → PTSD at T1 & T2 Indices of conditional moderated mediation by W (attachment)					
PTSD T1					
Crisis support					
−13.55	−0.0021	——	0.0015	−0.0055	0.0002
0.0000	−0.0018	——	0.0011	−0.0043	−0.0001
13.55	−0.0015	——	0.0014	−0.0045	0.0010
PTSD T2					
Crisis support					
−13.55	0.0026	——	0.0017	−0.0002	0.0065
0.0000	0.0022	——	0.0012	0.0002	0.0049
13.55	0.0018	——	0.0016	−0.0012	0.0051
Indirect effect: bombing → altered self-capacities → Psy. Co-morbidity at T1 & T2 Indices of conditional moderated mediation by W (attachment)					
Psy. Co-morbidity T1					
Crisis support					
−13.55	0.0017	——	0.0011	−0.0002	0.0041
0.0000	0.0014	——	0.0008	0.0001	0.0033
13.55	0.0012	——	0.0011	−0.0007	0.0034
Psy. Co-morbidity T2					
Crisis support					
−13.55	0.0019	——	0.0013	−0.0002	0.0049
0.0000	0.0016	——	0.0010	0.0001	0.0038
13.55	0.0014	——	0.0012	−0.0008	0.0039

bombing exposure on distress outcomes (PTSD at T1, effect = −0.0216, BootSE = 0.0141, BootLLCI = −0.0545, BootULCI = −0.0007; PTSD at T2, effect = 0.0194, BootSE = 0.0106, BootLLCI = 0.0015, BootULCI = 0.0426; Psychiatric co-morbidity at T1, effect = 0.0240, BootSE = 0.0112, BootLLCI = 0.0065, BootULCI = 0.0492). Contrary to our hypothesis, the mediational effect of shattered world assumptions on the impact of the bombing exposure on distress outcomes over time was not moderated by attachment styles and crisis support. However, the mediational effects of altered self-capacities on the path between the bombing exposure and distress outcomes over time were moderated by attachment styles and the medium amount of crisis support that victims received. Specifically, fearful attachment played a major role here (PTSD at T2, crisis support = 0.0000, index = 0.0029, BootSE = 0.0022, BootLLCI = 0.0000, BootULCI = 0.0085; Psychiatric co-morbidity at T1, crisis support = 0.0000, index = 0.0018, BootSE = 0.0013, BootLLCI = 0.0000, BootULCI = 0.0048; Psychiatric co-morbidity at T2, crisis support = 0.0000, index = 0.0022, BootSE = 0.0015, BootLLCI = 0.0000, BootULCI = 0.0058) (see Table 3).

4. Discussion

This study examined the impact of bombing on posttraumatic stress disorder (PTSD) and psychiatric co-morbidity over time among Iraqi civilians exposed to bombing. It examined whether this relationship was mediated by shattered world assumptions and altered self-capacities, and whether the mediational effects were moderated by attachment style and crisis support. The hypotheses were partially supported in that bombing exposure was related to PTSD and psychiatric co-morbidity over time, and that shattered world assumptions and altered self-capacities, affect dysregulation in particular, mediated the impact of bombing exposure on distress outcomes over time. Attachment style and crisis support did not moderate the mediational effects of shattered world assumptions. On the other hand, the mediational effect of altered self-capacities was moderated by attachment style, fearful attachment in particular, and the medium level of crisis support that victims received.

The prevalence rate of PTSD in our sample was higher than that reported in the literature. This could have resulted from the differences in the measures used to assess PTSD including screening (e.g. Posttraumatic Stress Diagnostic Scale) and structured interview assessments (e.g. Diagnostic Interview Schedule). Also, self-report assessment tools including the one used in the current study might have produced over-estimation compared to structured clinical interviews, although self-report assessments can be good proxy for structural assessments such as the gold standard clinician administered PTSD scale (CAPS) (Griffin et al., 2004). Non-random sampling and sample size could have also contributed to the difference in the prevalence rate (Steel et al., 2009). Notwithstanding this, the volatile political instability in Iraq would have consistently reminded participants of further bombing. Such chronic distress could have heightened PTSD symptoms.

In line with literature, bombing exposure predicted PTSD and psychiatric co-morbid symptoms e.g. (Birkeland et al., 2017b; Duffy et al., 2013; Miller et al., 2013; North et al., 1999; Tucker et al., 2007; Zhang et al., 2013). The lack of correlation between prior exposure to bombing variables and distress outcomes over time highlights the fact that anticipation of what might happen to them or knowing someone who was killed in a bombing prior to their own bombing experience had a limited impact on distress over time. Contrary to literature, an anticipatory reaction to unpredictable aversive stimulus has not increased distress among trauma victims (Simmons et al., 2013). Instead, actual events influenced long term negative impacts on psychological well-being. This confirms a recent study suggesting that trauma exposure or exposure to life threat is significantly correlated with PTSD and psychiatric co-morbidity among refugees fleeing war (Chung et al., 2018).

Bombing exposure affected distress outcomes indirectly through changes in world assumptions and self-capacities. This perhaps reflects the fact that a bomb attack can modify the structure of personality–one's self-configurations–and ultimately lead to changes in systems of meaning and ideology (e.g. beliefs or values about the world and people in general), systems of emotion regulation, and patterns of resilience and coping (Wilson, 2006). Two psychological processes appear to have emerged and type of mediator might have played a pivotal role in distinguishing them.

Focusing on the impact of bombing on distress over time, indirectly, with shattered world assumptions as the mediator, bombing impacted on distress largely through the "overall" changes in these assumptions, as opposed to changes in specific world assumptions. Also, whilst the cross-product variable (bombing x attachment *x* crisis support) moderated shattered world assumptions, it did not mitigate the mediational effects that shattered world assumptions had on the relationship between bombing exposure and distress outcomes.

Bombing is not only a sudden, unexpected, life-threatening experience but, in the eyes of many Iraqis, an act of evil or terrorism which is against religious values. Its occurrence would have been a major assault to their schema and may therefore have created general, pervasive, as opposed to specific, effects on all the world assumptions considered in the current study. A terrorist act such as this would have led victims to cast doubt on the controllability of events in their lives, the predictability of others' actions, the trustworthiness and goodness of people, personal safety and vulnerability. These schematic changes would inevitably have emerged, regardless of prior experiences, attachment type and whether or not crisis support was available. That said, the notion of support measured in the current study focused on social support after a crisis. Had one looked at, for example, perceived general social support, the results could have been different.

The finding with regard to bombing affecting distress through altered self-capacities lies in stark contrast to this, with bombing exposure being mainly associated with a specific altered self-capacities domain, namely, affect dysregulation. Attachment type and the amount of crisis support received did moderate how altered self-capacities influenced the relationship between bombing and distress. The results suggest that difficulty in regulating negative affect influences the impact of bombing on distress, especially for those victims who had a fearful attachment style and tended to receive a medium level of crisis support.

Three observations are worth noting. Firstly, the fact that fearful attachment was a key moderator contradicts literature mainly emphasizing the impact of insecure, dismissive or anxious attachment styles on victims exposed to war, the World Trade Center attack or rocket and mortar fire (Andersen et al., 2015; Besser and Neria, 2010, 2012; Besser et al., 2009; Dieperink et al., 2001; Fraley et al., 2006; Mikulincer et al., 2011; Mikulincer et al., 2014; Woodward et al., 2013). Neither did the results reveal secure attachment as a buffer against PTSD (Wisco et al., 2014).

Secondly, for the current sample, it was not the case that disrupted attachment style (fearful attachment) led to failure in seeking external support. Crisis support was sought but on a medium level. This might be pertinent to the Arabic culture characterized by collectivism, interdependence, harmonious relationships, mutual or social obligation and social support (Jayawickreme et al., 2013; Oyserman and Lee, 2008). The distress of one family member is shared by other family members. Emotional distress within each family member will, at the dyadic level, influence the relationship and emotion with the other. This might explain why even those with a fearful attachment sought a medium level of crisis support.

Thirdly, civilians likely found themselves in a chronically anxious or frightened mental state because, in reality, another bombing experience was a real possibility. According to the theoretical framework depicted in the introduction, people with a fearful attachment style adopt maladaptive coping techniques such as avoidance to control, regulate or inhibit these negative, distressing or intolerable affects (Briere, 1996, 2002; Busch, 2014; Helmes et al., 2008; Herman and van der Kolk, 1987; Meganck et al., 2013). This coping process corresponded to affect dysregulation as one domain of altered self-capacities. However, as victims inhibited emotional expressive behaviour (Gross, 1998) by avoiding distressing affects e.g. (Declercq et al., 2010; Kupchik et al., 2007), they maintained psychological distress over time e.g. (Amir et al., 1997; Amstadter and Vernon, 2008; Clohessy and Ehlers, 1999; Gross and John, 2003; Pennebaker, 1995). This echoes a meta-analysis suggesting a consistent employment of avoidance coping following a traumatic event (Littleton et al., 2007).

Several limitations of the research are noteworthy. First, to obtain a complete sample frame from which victims could be selected randomly was difficult. The non-randomization process might have cast doubt onto the generalizability of the findings. Secondly, some attempt should have been made to measure the degree of social attachment, given the collectivist Arabic culture. Also, being socially attached in giving and receiving social support is one factor towards recovery from war-related PTSD (Ajdukovic et al., 2013). Attachment style such as avoidant or anxious, along with type of support (instrumental vs emotional) could have been included, having been found to be related to PTSD among veterans involved in Iraq and Afghanistan (Clark and Owens, 2012; Currier et al., 2012). Secondly, longitudinal data on shattered world assumptions and altered self-capacities were not collected leading to bias in mediational analysis due to the lack of temporal precedence (Cole and Maxwell, 2003). Thus, our interpretation of "mediational" results should mainly be about the exploration of indirect effects (i.e. the structural relationship of the model) rather than causality inference (Holland, 1986). Thirdly, data were not collected on how past non-bombing related traumas might have influenced the present results. Prior trauma has been associated with physiological and emotional responses and later bombing-related PTSD (Trautman et al., 2002). That is, the present study has not examined the impact of cumulative trauma among Iraqi civilians.

To conclude, bombing exposure can change civilians' assumptions about the world and others which in turn affects distress. This psychological reaction seems to be independent of the influence from their past experience with significant others and the amount of crisis support received. The bombing experience can also change internal capacities especially in terms of regulating distressing emotions. This psychological process however can vary depending on whether civilians have endorsed a fearful attachment style and feel a need to rely on some level of crisis support.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.01.001.

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