

ORIGINAL ARTICLE

The psychological effects of improvised explosive devices (IEDs) on UK military personnel in Afghanistan

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Received 30 September 2013

Revised 18 December 2013

Accepted 22 December 2013

ABSTRACT

Objective To explore the psychological consequences of improvised explosive device (IED) exposure as IEDs have been the greatest threat to UK military personnel in Afghanistan though the mental health consequences of IED exposure are largely unknown.

Method Deployed UK military personnel completed a survey while deployed in Afghanistan. Combat personnel and those dealing specifically with the IED threat were compared with all other deployed personnel; the relationship between IED exposure, general combat experiences, Post Traumatic Stress Disorder (PTSD) Checklist-Civilian Version (PCL-C) and General Health Questionnaire scores were evaluated.

Results The response rate was 98% (n=2794). Half reported IED-related concerns, a third experienced exploding IEDs and a quarter gave medical aid to IED casualties. Combat and counter-IED threat personnel had higher levels of IED exposure than other deployed personnel. 18.8% of personnel who witnessed exploding IEDs scored positive for common mental disorder (General Health Questionnaire-12 scores ≥ 4) and 7.6% scored positive for probable PTSD symptoms (PTSD Checklist-Civilian Version scores ≥ 44). After adjusting for general combat exposure and other observed confounders, PTSD symptoms were associated with IED exposure whereas common mental disorder symptoms were not. IED exposure, IED-related concerns and functional impairment accumulated during deployment but functional impairment was related to factors other than IED exposure alone.

Conclusions In Afghanistan, a substantial proportion of personnel were exposed to exploding IEDs however, the majority of exposed personnel were psychologically healthy. Psychological effects were similar for combat personnel and those dealing specifically with the IED threat but both groups were at greater psychological risk than other deployed personnel.

INTRODUCTION

Improvised explosive devices (IEDs) are makeshift but often sophisticated weapon systems featuring as significant threats to military personnel deployed in Iraq and Afghanistan¹; blast is a leading cause of death on the modern battlefield.² Research suggests that post-traumatic stress disorder (PTSD) symptoms in those sustaining serious injury from IED blast is substantial³ although most published studies focus upon traumatic brain injury rather than mental health effects.⁴ IED exposure is frequently assessed after return from deployment often using

What this paper adds

- ▶ The psychological effects of improvised explosive devices (IEDs) in military personnel are not well researched.
- ▶ The paucity of research limits our ability to judge how best to support military personnel encountering IEDs.
- ▶ In a large deployed sample, most IED-exposed personnel were psychologically healthy, though post-traumatic stress disorder symptoms were specifically associated with exposure and some IED types had greater psychological effects.
- ▶ Although widespread, exposure to IEDs in Afghanistan is more common among combat and counter-IED personnel.
- ▶ IED exposure is likely to be associated with psychological symptoms rather than deployed role, therefore exposure rather than role should determine any focused psychological support.

a single question embedded in a scale or survey such as the Deployment Risk and Resilience Inventory combat experiences module.⁵ Although therapies for treating psychological disorder resulting from IEDs and other battlefield exposures continue to be developed,⁶ there has been scant research about how best to support deployed personnel facing IEDs.

Some operational roles lead to greater exposure to IEDs overall and varying levels of exposure to different aspects of the IED threat. Combat personnel have increased adverse mental health effects following deployment⁷ and although specific counter-IED teams are deployed for operations such as route clearance,⁸ Combat Arm personnel are often the first to encounter IEDs while conducting patrols. Recent conflicts have seen the emergence of the Counter IED Task Force (C-IED TF) consisting of various support personnel not limited to those who are known colloquially as 'bomb disposal officers'. Their mission is to enable, support and coordinate counter-IED operations and to find ways of preventing enemy forces from conducting successful IED attacks. Such tasks are generally regarded as stressful and potentially psychologically damaging, although those selected as operators may be more resilient and may have psychological

To cite: Jones N, Thandi G, Fear NT, et al. *Occup Environ Med* Published Online First: [please include Day Month Year] doi:10.1136/oemed-2013-101903

characteristics suited to the task.^{9–12} Despite this, senior UK Armed Forces (AF) commanders have voiced concern that the C-IED TF may be at heightened psychological risk as a result of their battlefield exposure to IEDs. Given the dearth of available evidence, we sought to evaluate IED exposure among deployed UK AF in Afghanistan. Our research questions were first; are symptoms of PTSD and common mental disorder (CMD) associated with IED exposure? Second; do IEDs function as effective terror weapons by causing traumatic stress symptoms? Third; is the C-IED TF more at risk of developing psychological symptoms than other deployed personnel? Fourth; does IED exposure give rise to substantial functional impairment that might interfere with operational effectiveness?

METHOD

Procedure and participants

The final sample size was 2844 personnel. Fifty personnel refused to participate or returned unusable questionnaires giving a final response rate of 98%. UK military personnel volunteered to complete an anonymous comprehensive mental health survey, piloted in Iraq in 2009.¹³ Participants were given a verbal, detailed, preprepared brief on the voluntary nature of the study and were told that they could refuse to participate without penalty or sanction. Personnel completed the survey while at work towards the end of a 6-month deployment in Afghanistan in 2010¹⁴ or 2011. Data capture took place in a range of operational bases including front-line locations such as patrol bases and checkpoints. A decision was taken a priori to oversample groups theoretically at increased psychological risk or at the request of senior commanders, including the C-IED TF. To gauge the different levels of exposure to various aspects of the prevailing IED threat, C-IED TF personnel and Combat Arm personnel (fighting forces) were compared with a reference group comprising Combat Support Arm and Combat Service Support Arm (logistic, enabling and fighting support) personnel. Theoretically, C-IED TF personnel should experience high levels of IED exposure but lower levels of detection failure as a result of their technical knowledge.

Measures

The IED-related questions formed a discrete subsection of the survey. IED related concerns were assessed using a 3-point Likert scale; 'slight', 'somewhat' and 'very concerned'. Involvement in an exploding IED incident was endorsed using a 5-point Likert scale ranging from no exposure through to ≥ 10 times. Personnel provided details of what form of IED device had caused the explosion; suicide device, victim operated pressure plate, command wire, remote control device and unknown type; more than one device could be endorsed in the case of multiple exposure. Personnel stated if they had led a foot patrol or were in the lead vehicle during counter-IED drills. This was endorsed using a 5-point Likert scale ranging from no exposure through to ≥ 10 times. Using a yes or no response scale, personnel reported if they had ever been in lead position during IED drills and missed a device which subsequently seriously injured or killed friendly forces and involvement in a friendly forces IED casualty incident.

Symptoms of PTSD were assessed using the PTSD Checklist Civilian Version (PCL-C).¹⁵ For research question 1, we were not concerned with establishing the prevalence of PTSD, therefore PCL-C scores ≥ 44 were used to provide an estimate of substantial PTSD symptoms. This cut point is robust in systematic reviews of PCL-C performance as a screening instrument.¹⁶ To evaluate our second research question regarding terror/distress effects, we assessed lower levels of traumatic stress in IED

exposed personnel; scores ≥ 30 on the PCL-C were used to indicate a subthreshold level of PTSD symptoms¹⁷ which we conceptualised as 'traumatic stress'. Given that PTSD is relatively rare in deployed UK personnel we sought to establish whether exposure to IEDs would produce a detectable increase in traumatic stress symptoms rather than disorder per se. Symptoms of CMD were assessed with the 12-item General Health Questionnaire^{18 19} using a cut-off score ≥ 4 to indicate 'case-ness'. To assess research question 4 regarding functional impairment, we used a single question: "If you experienced any [PTSD symptoms], how difficult have these made it for you to do your work, take care of things or get along with other people?" This question correlates well with standard measures of functional impairment in mental disorder²⁰ and predicts depression²¹; it has been used in previous studies of UK AF personnel.²² Those reporting that they were somewhat, very or extremely functionally impaired were compared with those reporting no functional impairment. To compare IED exposure alone with general combat exposure, a 17-item combat experiences scale²³ was modified by removing the IED strike item. The scale was summated, and tertiles were computed and used as confounding variables in adjusted analyses.

The survey enquired about a range of sociodemographic factors. Those that have been shown to be important predictors of deployment mental health were selected a priori to be used as additional confounding variables in adjusted regression analyses. These were: time deployed on the current operation²⁴ to account for the effects of cumulative fatigue; regular or reserve engagement type²⁵ as reservists may be less well integrated into the deployed unit; service length^{26 27} as a proxy for age and rank and previous deployment which may have positive²⁸ or negative effects²⁹ and is linked to wider military experience and competence. Leadership was assessed using four items; 'my seniors embarrass juniors in front of other unit members' (reverse scored), 'my leaders accept extra duties or tasks for the unit in order to impress their superiors' (reversed scored), 'my leaders treat all members of the unit fairly' and 'my leaders show concern about the safety of unit members'. The items were rated, never, seldom, sometimes and always. The four items were summated to produce a continuous measure; tertiles were then generated indicating lower, intermediate and higher levels of perceived leadership.

Analyses

The survey was powered on the 12-item General Health Questionnaire to detect a CMD prevalence of between 18% and 22% with a confidence level of 95% among 10 000 personnel deployed in Afghanistan in 2010 and 2011, giving a target sample size of 1332 on each occasion. All analyses were conducted using the Statistical Package for Social Sciences V20 (SPSS V.20). Categorical variables were examined with unadjusted and adjusted logistic regression. Trends in the data were examined using χ^2 test for trend. Significance was defined as $p \leq 0.05$ throughout. Percentages and numbers stated throughout this paper may not add up to sample or subsample totals due to missing data.

RESULTS

During deployment, 1061 personnel (38.0%) reported exposure to an exploding IED at least once; of these, 497 (17.8%) reported two or more exposures, 57.5% ($n=1525$) reported moderate to strong concerns about potential IED exposure, 27.7% ($n=743$) reported medium or high levels of engagement in counter-IED operations, 3.1% ($n=84$) took part in patrols

Table 1 Exposure to various aspects of the IED threat by role (ORs and 95% CIs)

Exposure (total exposed)	Proportional exposure*				
	Non-combat armst (n=1300)	C-IED TF (n=116)	OR 95% CI	Combat arms (n=1378)	OR 95% CI
Exploding IED (1061 of 2792)‡	277 (21.3)	58 (50.0)	3.69 (2.50 to 5.43)	726 (52.7)	4.10 (3.46 to 4.86)
IED concerns (1525 of 2650)§	470 (39.4)	84 (73.0)	4.17 (2.72 to 6.40)	971 (72.4)	4.04 (3.42 to 4.78)
Counter IED operations (743 of 2687)¶	101 (8.2)	55 (47.4)	10.04 (6.62 to 15.25)	587 (43.6)	8.63 (6.85 to 10.86)
IED detection failure (84 of 2690)**	15 (1.2)	2 (1.7)	1.45 (0.32 to 6.32)	67 (5.0)	4.21 (2.39 to 7.40)
IED casualty incident (625 of 2703)‡‡	156 (12.7)	28 (24.3)	2.22 (1.40 to 3.51)	441 (32.5)	3.32 (2.71 to 4.06)

*n's and percentages may not sum to subsample totals due to missing data.

†Reference group.

‡Exposed to an exploding IED incident ≥ 1 occasion.

§Moderate or strong concerns about potential exposure to IEDs.

¶Engaged in counter-IED operations as lead or point man sometimes or many times.

**Lead or point man when a patrol failed to detect an IED that subsequently caused death or injury.

‡‡Responded to a friendly forces IED casualty incident.

C-IED TF, counter improvised explosive device task force; IED, improvised explosive device.

where they failed to detect an IED that subsequently exploded and killed or seriously injured someone, and 23.1% (n=625) had responded to an IED incident involving a friendly forces IED casualty. Combat personnel were significantly more likely than non-combat personnel (the reference group) to encounter all IED-related incidents and most frequently encountered exploding IEDs, detection failures resulting in injury or death and IED-related casualty incidents. C-IED TF personnel were significantly more likely than the reference group to report all IED-related events, were overall most likely to engage in counter-IED operations and to experience IED-related concerns at similar levels to Combat Arm personnel (table 1).

Overall, exposure to an exploding IED on ≥ 1 occasion was significantly associated with subthreshold PTSD symptoms (23.6% (n=249) in the exposed, 10.5% (n=181) in the non-exposed, OR 2.39, 95% CI 1.98 to 2.90) which remained statistically significant following adjustment for sociodemographic and military factors, combat exposure and leadership. A victim-operated IED which used a pressure plate trigger was most frequently reported (n=355, 13.2%) followed by multiple forms of device (n=286, 10.6%); 0.6% (n=17) encountered a remote controlled device and 0.1% (n=3) a suicide IED. Traumatic stress symptoms (PCL-C score ≥ 30) were most frequently associated with multiple and command wire initiated IEDs (n=30, 27.5%) and least frequently with remote or radio controlled devices (n=2, 11.8%). Suicide bombers were encountered infrequently and we were unable to adequately assess associated mental health effects. Compared with unexposed personnel, the odds of reporting traumatic stress

symptoms were significantly raised for exposure to all device types including unknown forms and multiple devices but not to remote control devices. Following adjustment for sociodemographic, operational factors and leadership, the association of exposure with traumatic stress symptoms remained, however when adjusted for combat exposure excluding the IED component, the association with pressure plate devices became borderline non-significant (table 2).

Compared with non-exposed personnel, exposure to an exploding IED on one or more occasion was significantly associated with probable PTSD symptoms (PCL-C scores ≥ 44); this remained significant after adjusting for potential confounding variables (adjusted OR (AOR) 1.83 95% CI 1.15 to 2.90). Reporting greater levels of concern about the IED threat was also associated with probable PTSD symptoms following adjustment (AOR 2.89 95% CI 1.57 to 5.32) as was involvement in an IED incident resulting in a friendly forces casualty (AOR 2.10 95% CI 1.34 to 3.28) and failing to detect an IED that subsequently triggered and killed or seriously injured another person (AOR 2.41 95% CI 1.16 to 5.00). Although statistically significant prior to adjustment, participation in counter-IED operations was not significantly associated with probable PTSD symptoms following adjustment (AOR 1.29 95% CI 0.83 to 2.00). With the exception of participation in counter-IED operations which was borderline non-significant, all exposures were significantly associated with symptoms of CMD prior to adjustment; all became non-significant or borderline non-significant following adjustment (table 3).

Table 2 Type of IED, exposure and traumatic stress symptoms (PCL-C scores ≥ 30)

IED type (n=2691)	n (%)	PCL-C ≥ 30		OR 95% CI	AOR 95% CI*	AOR 95% CI†	AOR 95% CI‡
		No case	Case				
No exposure	1698 (63.2)	1512 (89.0)	186 (11.0)	1	1	1	1
Remote control	17 (0.6)	15 (88.2)	2 (11.8)	1.08 (0.25 to 4.78)	1.41 (0.26 to 5.07)	0.94 (0.21 to 4.21)	0.97 (0.22 to 4.33)
Pressure plate	355 (13.2)	286 (80.6)	69 (19.4)	1.96 (1.45 to 2.66)	1.86 (1.34 to 2.60)	1.32 (0.96 to 1.81)	1.80 (1.32 to 2.46)
Unknown type	223 (8.3)	178 (79.8)	45 (20.2)	2.06 (1.43 to 2.95)	2.12 (1.44 to 3.11)	1.57 (1.09 to 2.28)	1.79 (1.24 to 2.59)
Multiple exposure	286 (10.6)	213 (74.5)	73 (25.5)	3.92 (2.93 to 5.24)	3.83 (2.77 to 5.29)	2.40 (1.76 to 3.28)	3.52 (2.62 to 4.75)
Command wire	109 (4.1)	79 (72.5)	30 (27.5)	3.09 (1.97 to 4.83)	2.95 (1.81 to 4.82)	2.06 (1.30 to 3.27)	2.95 (1.87 to 4.64)
Suicide	3 (0.1)	3 (100.0)	0 (0.0)	Not analysed—insufficient exposures			

*Regular versus reserve engagement, short versus longer service length, sex, previous deployment and time deployed on current operation.

†Adjusted for combat exposure excluding the IED exposure item (low, medium and high).

‡Adjusted for leadership (high, moderate and poorer leadership).

AOR, adjusted OR; IED, improvised explosive device, PCL-C, post-traumatic stress disorder checklist, civilian version.

Workplace

Table 3 Probable PTSD, common mental disorders and exposure to various aspects of the IED threat (ORs and 95% CIs)

Exposure	PTSD (PCL-C Scores ≥ 44)				Common mental disorders (GHQ-12 ≥ 4 items endorsed)			
	No case	Case	OR (95% CI)	AOR (95% CI)*	No case	Case	OR (95% CI)	AOR (95% CI)*
No exploding IED exposure	1680 (97.7)	40 (2.3)	1	1	1462 (84.8)	262 (15.2)	1	1
Exploding IED ≥ 1 occasion	975 (92.4)	80 (7.6)	3.45 (2.34 to 5.08)	1.83 (1.15 to 2.90)	856 (81.2)	198 (18.8)	1.29 (1.05 to 1.58)	1.00 (0.78 to 1.28)
None or mild concerns about IEDs	1107 (98.7)	15 (1.3)	1	1	958 (85.3)	165 (14.7)	1	1
Moderate or strong concerns about IEDs	1415 (93.4)	100 (6.6)	5.22 (3.01 to 9.03)	2.89 (1.57 to 5.32)	1240 (81.8)	275 (18.2)	1.29 (1.04 to 1.59)	1.08 (0.84 to 1.39)
Counter IED operations never/once	1874 (96.7)	63 (3.3)	1	1	1627 (84.0)	311 (16.0)	1	1
Counter IED operations sometimes/many times	684 (92.7)	54 (7.3)	2.35 (1.62 to 3.41)	1.29 (0.83 to 2.00)	599 (81.2)	139 (18.8)	1.21 (0.97 to 1.51)	1.08 (0.83 to 1.39)
Detected IED or not exposed	2491 (96.0)	104 (4.0)	1	1	2173 (83.7)	422 (16.3)	1	1
Failed to detect an IED that caused death	69 (84.1)	13 (15.9)	4.51 (2.42 to 8.42)	2.41 (1.16 to 5.00)	61 (73.5)	22 (26.5)	1.86 (1.13 to 3.06)	1.62 (0.94 to 2.79)
Not involved in an IED casualty incident	2007 (97.1)	60 (2.9)	1	1	1747 (84.5)	321 (15.5)	1	1
Responded to an IED casualty incident	565 (90.8)	57 (9.2)	3.38 (2.32 to 4.91)	2.10 (1.34 to 3.28)	497 (79.9)	125 (20.1)	1.37 (1.09 to 1.72)	1.25 (0.95 to 1.64)

*Adjusted for: regular versus reserve engagement, short versus longer service length, sex, previous deployment, time deployed on current operation, combat exposure excluding the IED incident item and leadership.

AOR, adjusted OR; GHQ-12, 12 item General Health Questionnaire; IED, improvised explosive device; PCL-C, post-traumatic stress disorder checklist; PTSD, post-traumatic stress disorder.

Combat Arm and C-IED TF personnel were no more likely than non-Combat Arm personnel to score positive for possible PTSD symptoms (PCL-C ≥ 44) after encountering any of the IED exposures (IED-related concerns excluded). C-IED TF and Combat Arm personnel were less likely than the reference group to report probable CMD symptoms following exposure and the difference was significant for Combat Arm personnel (AOR 0.69 95% CI 0.52 to 0.93) (table 4).

There was a significant linear trend in reporting increasing concerns about the prevailing IED threat as time in theatre increased (χ^2 test for trend=74.79, $p \leq 0.0001$), also a significant increasing cumulative level of exposure to exploding IEDs (χ^2 test for trend=198.77, $p \leq 0.0001$) and increasing functional impairment (χ^2 test for trend=8.47, $p \leq 0.01$) (table 5). There was an increased odds of reporting functional impairment when exposed to exploding IEDs on one or more occasion (OR 1.53, 95% CI 1.26 to 1.86) that remained significant when adjusted for time in theatre (OR 1.45, 95% CI 1.19 to 1.78) but which was non-significant when adjusted for combat exposure excluding the IED component (AOR 1.14, 95% CI 0.91 to 1.43).

DISCUSSION

This is the first study to examine the impact of IEDs on military personnel during, as opposed to after, their deployment. The main findings were that over a third of personnel reported contact with an exploding IED during their deployment. Predictably, combat and C-IED TF personnel had greater levels of exposure than non-combat personnel. Scoring positive for probable PTSD but not CMD symptoms was associated with IED exposure; PTSD symptoms affected 7.6% of IED exposed personnel. Combat and C-IED TF personnel were no more likely to score positive for PTSD symptoms than non-combat personnel and combat personnel reported significantly fewer CMD symptoms than non-combat personnel. Subthreshold PTSD (traumatic stress) was significantly associated with all IED types except radio controlled devices. Subthreshold PTSD appeared to be related to IED devices after adjusting for general combat exposure. Levels of IED exposure, associated concerns and functional impairment increased with lengthening time in theatre, however, exposure to exploding IED does not uniquely contribute to reporting functional impairment.

Table 4 Probable PTSD, CMD and IED exposure among combat, C-IED TF and non-combat groups

Exposed to exploding IED, C-IED operations, IED detection failure or IED casualty incident	Non-combat arms*		C-IED TF		AOR 95% CI	Combat arms		AOR 95% CI
	PCL ≥ 44		PCL ≥ 44			PCL ≥ 44		
	No case	Case	No case	Case		No case	Case	
No IED exposure	910 (98.3)	16 (1.7)	25 (96.6)	1 (3.8)		394 (98.3)	7 (1.7)	
IED exposure	346 (94.5)	20 (5.5)	83 (92.2)	7 (7.8)	1.46 (0.60 to 3.57)	897 (92.9)	69 (7.1)	1.33 (0.80 to 2.22)
	GHQ ≥ 4		GHQ ≥ 4			GHQ ≥ 4		
No IED exposure	738 (84.2)	147 (15.8)	24 (92.3)	2 (7.7)		356 (88.8)	45 (11.2)	
IED exposure	281 (77.0)	84 (23.0)	74 (82.2)	16 (17.8)	0.72 (0.40 to 1.31)	800 (82.8)	166 (17.2)	0.69 (0.52 to 0.93)

*Reference group.

AOR, adjusted OR; C-IED TF, counter improvised explosive device task force; CMD, common mental disorder; GHQ, General Health Questionnaire; IED, improvised explosive device; PCL, post-traumatic stress disorder checklist; PTSD, post-traumatic stress disorder.

Table 5 Deployment length, IED exposure, IED concerns and functional impairment

Weeks in theatre	IED related concerns		Exploding IED exposure (1 or more occasion)		Functional impairment	
	None or mild n (%)	Moderate or strong n (%)	Not exposed n (%)	Exposed n (%)	None n (%)	Impaired n (%)*
0–4	108 (64.7)	59 (35.3)	170 (91.9)	15 (8.1)	127 (89.4)	15 (10.6)
5–8	118 (44.5)	147 (55.5)	213 (76.1)	67 (23.9)	196 (82.0)	43 (18.0)
9–16	397 (50.0)	397 (50.0)	596 (69.6)	260 (30.4)	586 (76.7)	178 (23.3)
17–26	464 (36.7)	802 (63.3)	692 (52.9)	617 (47.1)	942 (79.3)	246 (20.7)
27	31 (22.1)	109 (77.9)	49 (34.8)	92 (65.2)	91 (70.0)	39 (30.0)
χ^2 test for trend, p=		74.79, p \leq 0.0001		198.77, p \leq 0.0001		8.47, p \leq 0.01

*Somewhat, very or extremely functionally impaired. IED, improvised explosive device.

Strengths and limitations

This study used data collected in person, during deployment, while personnel were engaged in combat operations. During deployment self-report is probably less subject to memory distortion than that which is evaluated following return from deployment³⁰ where recall of deployment exposures seems to increase with time since deployment, suggesting recall bias. We were able to select from a substantial number of observed confounders and adjust for them in our analyses and in particular, we were able to examine IED exposure by isolating it from general combat exposure. The sample sizes were substantial and response rate was very high. As with any cross-sectional data, we can only report associations, though the use of adjusted regression analyses allowed us to evaluate where the strongest associations occurred. We cannot comment on the longitudinal mental health effects of IED exposure and, as those sustaining substantial injury from IED blast will most probably have been evacuated out of theatre for further medical treatment, we were unable to comment on the psychological impact in injured personnel.

Our first research question was whether PTSD and CMD symptoms were associated with IED exposure. With the exception of undertaking counter-IED operations, IED exposure was associated with scoring positive for probable PTSD but not CMD symptoms. Our second research question was whether IEDs function as a terror weapon. The increased levels of probable PTSD related to IED exposure and traumatic stress symptoms that varied by device type, even when other combat exposures are accounted for, supports the hypothesis that the IED might have a terror function³¹; over half of personnel expressed substantial concerns about encountering IEDs. Nevertheless, although IED exposure and concern were associated with an increased risk of developing probable PTSD, overall, PTSD levels were low and there were no statistically significant differences in the rates of probable PTSD between combat, counter-IED and non-combat personnel despite the latter experiencing substantially lower levels of IED exposure.

Subthreshold PTSD symptoms (traumatic stress symptoms) were related to specific device types and exposure to command wire triggered devices had the strongest association with these symptoms. This form of device relies on the enemy having direct visual contact with the victim or being instructed to trigger the device by an observer. In this sense the device is targeted in a way that pressure plate operated devices are not and it may be this characteristic that drives psychological distress. The chance of discovering victim-operated pressure plate devices is high if the correct drills are followed; the intended victim therefore has a measure of control which can be an important determinant of psychological health.³² We therefore

suggest that those exposed to command wire and multiple device types may benefit from focused mentoring in the early postexposure period.

Our third research question was whether C-IED TF personnel were at greater psychological risk when deployed. Previous research suggests that deployed combat personnel are at increased risk compared with non-combat personnel^{33 34}; our results suggested that, with the exception of undertaking counter-IED operations, combat personnel were overall more likely to encounter any of the five IED-related events measured in this study. Our finding that around a third of the Combat Arm personnel reported that they had taken part in IED casualty incidents suggests that they may well be a group who would benefit from focused psychological support relating to this specific exposure. Combat Arm personnel are required to administer first aid to often seriously injured personnel in very difficult circumstances,³⁵ sometimes in contact with the enemy³⁶ which may multiply the stress associated with casualty treatment. C-IED TF personnel's IED exposure profile was similar to Combat Arm personnel though they may be exposed in subtly different ways. Combat Arm personnel will often be the first to detect IEDs while patrolling, to trigger them, and will often call for C-IED TF support to carry out follow-up searches, detection, device recovery and or destruction. We therefore propose that C-IED TF personnel's risk profile is similar to that of Combat Arm personnel and the levels of psychological support that they may require will not be that different.

Our fourth research question was whether functional impairment is associated with IED exposure. We found that functional impairment was probably related to general combat exposure rather than to IEDs specifically; in one sense this should be reassuring for commanders as we have demonstrated that the IED may be a psychological terror weapon, though it seems that the psychological effect is not associated with behavioural impairment. However, while not necessarily IED related, functional impairment is a particular concern for combat and C-IED TF personnel who are required to undertake tasks which require prolonged concentration, courage and great personal control. Given the cumulative nature of functional impairment, irrespective of the cause, it is likely to have an impact on personnel's ability to deploy effective counter-IED drills as deployment progresses.

CONCLUSION

UK military personnel in Afghanistan reported substantial levels of exposure to the IED threat, although the majority of IED-exposed personnel remained psychologically healthy. We found some evidence that specific IED device types had

differential psychological effects and that the most substantial impact derives from exposure to command wire IEDs. IED exposure appeared to be highest among Combat Arm and C-IED TF personnel compared with the non-Combat Arm group. Levels of IED exposure, concern and functional impairment increased with lengthening time of deployment, however, such impairment appeared to have been associated with factors other than contact with or concern about IEDs. Whatever the cause of impairment, it is relevant because of the complex nature of some military tasks and the impact upon deployed personnel's ability to do their duty effectively. We propose that, in relation to IED exposure, C-IED TF personnel are not at particular risk compared with combat personnel and should therefore be afforded standard mental health support in the same way as combat personnel, that operational commanders be aware that IED device types may have differential psychological effects and that personnel are likely to be fearful of the devices whether or not they have directly encountered them.

Funding UK Ministry of Defence.

Competing interests NJ is a full-time reserve member of the British Army currently seconded to King's College London. GT, NTF, SW and NG are employed by King's College London which receives funding from the UK Ministry of Defence. SW is also honorary civilian consultant advisor in psychiatry to the British Army and is a trustee of Combat Stress, a UK charity that provides service and support for veterans with mental health problems.

Patient consent Obtained.

Ethics approval The study was approved by the Ministry of Defence Research Ethics Committee.

Provenance and peer review Not commissioned; externally peer reviewed.

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Occup Environ Med published online January 16, 2014
doi: 10.1136/oemed-2013-101903

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