

Psycho-educational interventions designed to prevent deployment-related psychological ill-health in Armed Forces personnel: a review

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Background. Employers such as the Armed Forces (AF) and emergency services, who predictably expose their staff to potentially traumatic events (PTEs), often provide psycho-educational briefings in an attempt to mitigate possible adverse psychological sequelae. Within the military, psycho-educational briefings are widely used, particularly following exposure to PTEs on operations. The aim of this review was to evaluate the efficacy of these interventions and make appropriate recommendations.

Method. A search of Medline, PsycINFO and EMBASE was conducted, bibliographies of retrieved articles were searched and experts in the field were consulted.

Results. Two surveys and seven intervention studies were identified for inclusion in the review. Only three studies were randomized controlled trials (RCTs). Overall, the review found some evidence of benefit of psycho-educational interventions but it was not consistent across studies or outcomes and effects were small. However, there was also little evidence to suggest that they caused harm. There was some evidence that the beneficial effects may be greater for those who have been exposed to a higher number of PTEs.

Conclusions. Given the high operational tempo currently faced by coalition forces personnel, there remains a pressing need to identify the most effective way of minimizing the impact of exposure to potentially traumatic deployment incidents. To date, few psycho-educational interventions designed to prevent deployment-related psychological ill-health have been evaluated systematically in methodologically robust studies. The review recommends that future interventions are theoretically based and evaluated in cluster RCTs that examine both process and outcome variables.

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Introduction

Numerous occupations, including the Armed Forces (AF), emergency services and media organizations, inevitably expose staff to potentially traumatic events (PTEs). Although it is unrealistic to assume that exposure to PTEs can be eliminated from such occupations (see, for example, McGeorge *et al.* 2006), it remains incumbent on employers to take what reasonable steps they can to minimize the risk of problems occurring as a consequence of that exposure. For example, UK government guidance on workplace stress states that, 'Managers should make active attempts to minimize or prevent stress in the workforce'

(Health and Safety Executive, 2007). One such approach is the provision of psycho-education.

Although there is no clear definition of what constitutes psycho-education, interventions typically include information about common symptoms experienced following trauma, self-help techniques, and also information about where to get help if symptoms persist. There is some debate about equating psycho-education with psychological debriefing sessions, in which participants are encouraged to go through detailed recollection and emotional processing of the traumatic event experienced (Krupnick & Green, 2008). However, debriefing sessions do incorporate psycho-education in that they include information about possible symptoms for example, and some authors have concluded that debriefing is a form of education (Wessely *et al.* 2008). For the purposes of this review, we use the term psycho-education to include debriefing.

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Within the AF, psycho-education could be delivered at several stages throughout the deployment cycle, for instance before, during and after deployment, and also when a military unit is reconstituting in preparation for future deployment. The interventions might be expected to vary somewhat across stages. For example, pre-deployment emphasis is likely to be on potential operational stressors and how to manage them. Interventions delivered during deployment may focus on specific incidents. At the end of the deployment, interventions are likely to focus on leaving the operational environment and coping with returning home, and also managing grief, where appropriate.

The single identified paper that evaluated the use of psycho-educational briefings delivered before operational deployment (Sharpley *et al.* 2008) found no evidence of effectiveness in terms of common mental health disorders, post-traumatic stress disorder (PTSD) or alcohol misuse some 2–3 years after personnel had returned home, although it should be noted that this study was a natural experiment rather than a randomized controlled trial (RCT).

Psycho-education is also widely implemented following exposure to PTEs, either shortly after an incident or at the end of the deployment period. For instance, of 16 nations who participated in a military leader's survey on occupational stress, 11 reported some type of psychological support, which could include defusing or debriefing sessions, being available during deployment, often in response to a specific traumatic event. Fourteen nations reported that some type of post-deployment psychological support was offered, among which were briefs on homecoming and debriefings (Adler *et al.* 2008*b*). Despite their frequent use in the military in many countries, few studies have evaluated these interventions (Litz *et al.* 2002). Evaluation of intervention efficacy is important to ensure that they do not cause harm, that they are acceptable to participants and that they provide a beneficial use of resources. Evaluation is especially pertinent given the generally disappointing results that have been obtained from studies that have evaluated both single session (Rose *et al.* 2002; van-Emmerik *et al.* 2002) and multiple session psychological interventions (Roberts *et al.* 2009) more generally. It is noteworthy, however, that the reviewed studies mostly evaluated interventions for individual victims of trauma rather than high-risk occupational groups (see Regal, 2007). Furthermore, the reviews of single session interventions each included only one study that examined a military population whereas none of the multiple session intervention studies included the military.

The aim of this review was therefore to examine the evidence for efficacy of psycho-educational

interventions for military personnel delivered following operational deployment, where exposure to PTEs is commonplace.

Method

Search strategy

A literature search of Medline, PsycINFO and EMBASE from 1979 to March 2009 was conducted using the terms: ('military' or 'armed forces' or 'soldier*' or 'army' or 'navy' or 'air force' or 'peacekeeper*' or 'combat') and ('psychoeducation' or 'debrief*' or 'stress education').

Papers were eligible if: (i) they included an evaluation of a psycho-educational intervention with military personnel delivered following exposure to PTEs (this could include a specific deployment incident or the end of a period of deployment) and (ii) they were reported in English. This review is concerned with interventions aimed at prevention rather than treatment of psychological ill-health, therefore papers that reported evaluations of treatment of personnel with diagnosed psychological illness were excluded.

The titles of all retrieved articles were screened. If the study seemed to relate to a psycho-educational intervention for AF personnel, the abstract was reviewed and if the study met the inclusion criteria, the full article was examined. In addition, the bibliographies of retrieved articles were searched and experts in the field were consulted.

Results

Included studies

A total of nine studies were identified for inclusion in the review (Deahl *et al.* 1994, 2000; Orsillo *et al.* 1998; Shalev *et al.* 1998; Larsson *et al.* 2000; Adler *et al.* 2008*a*, 2009*a*; Iversen *et al.* 2008; Greenberg *et al.*, in press).

Design of included studies

The search identified two distinct types of studies that examined psycho-educational interventions. First, surveys of health and well-being (Tables 1 and 3) did not evaluate interventions directly but asked respondents if they had received a psycho-educational intervention and examined whether receipt of an intervention was predictive of psychosocial outcomes. The second type of study reported the results of intervention trials, of which seven studies were identified (Tables 2 and 4). The robustness of design of these studies varied, with only three studies conducting cluster RCTs (Adler *et al.* 2008*a*, 2009*a*; Greenberg *et al.*, in press). Although Deahl *et al.* (2000) included a

Table 1. *Surveys*

Study	Participants	Intervention	Duration and time of intervention delivery	Study assessment time
Orsillo <i>et al.</i> 1998	3461 US military returning from a peacekeeping mission in Somalia of whom 854 participants (25%) had received a brief	Psychological debriefing that discussed events in chronological order from receipt of orders to deploy through to return home and current experiences	Post-deployment duration of intervention not reported	Within an average of 15 weeks after returning to the USA
Iversen <i>et al.</i> 2008	4762 UK military personnel deployed in Iraq since 2003. Of those who provided information about receipt of a homecoming brief, 54.5% had received a brief	Homecoming brief	Details of brief not known	1–3 years after deployment

comparison group, they acknowledge that the study was not an RCT. Most studies that included a comparison group compared the intervention of interest with a no-treatment control, except in the study by Adler *et al.* (2009a), in which, for ethical reasons, this was no longer considered appropriate; the comparison group therefore received stress education. The timing of the follow-up assessment varied from immediately post-intervention to 12 months. There was no consistent finding between studies in the duration of follow-up post-intervention when benefits were found.

Study participants

Participants were recruited from the AF of Israel, Sweden, the UK and the USA. Sample sizes ranged from 3461 to 4762 in the surveys and from 41 to 2297 in the intervention studies. Study participation rates were fairly high, but loss to follow-up was also high. All studies were not explicit in reporting inclusion and exclusion criteria.

The types of deployment that participants were involved in included operational warships, peace-keeping missions in Bosnia, Kosovo and Somalia and combat missions in Iraq and the Israel/Lebanon border. The study samples also varied in the extent of their exposure to PTEs. For example, three of the earlier studies, which had small sample sizes (Deahl *et al.* 1994; Shalev *et al.* 1998; Larsson *et al.* 2000), included only those who were known to have experienced PTEs. Adler *et al.* (2009a) did not limit their

population in this way but the participants, who had completed a combat tour in Iraq, were all found to have experienced PTEs. By contrast, 57% of the sample recruited by Adler *et al.* (2008a) had been exposed to at least one event. The extent of combat exposure was found to be a significant moderator of outcome in both studies by Adler *et al.* (see below) but this relationship was not examined in the other studies in the review.

Interventions evaluated

The studies included in this review evaluated a variety of different interventions, which are described below.

Iversen *et al.* (2008) asked service personnel if they had received a homecoming brief, but the exact nature of the intervention was not known.

Historical Group Debriefing (HGD)

HGD, evaluated by Shalev *et al.* (1998), was developed during World War II by Brigadier General Marshall to obtain comprehensive historical overviews of combat events. This method involves asking all members of a team who have experienced the event to describe it in detail in a strict chronological path. Events, thoughts and feelings are of equal importance. Marshall considered that sharing combat stories in this way had the effect of helping to build morale (Shalev, 2000), albeit without any evidence to support his conclusion. It is also fair to say that his methods have been challenged (Chambers, 2003). Although not primarily a psycho-educational intervention, the process allows

Table 2. *Intervention studies*

Study	Design	Participants	Study group and intervention received	Duration and time of intervention delivery	Intervention delivered by	Study assessment times
Deahl <i>et al.</i> 1994	Non-randomized group comparison	Seventy-four British regular soldiers serving with the Army War Graves Service during the Gulf War. Data received from 62 (86%), of whom 40 received the intervention. Recruitment criteria not reported	1. Single session small group debriefing (Dyregrov model) including education about PTSD symptoms, and advice on where to get help 2. Comparison group who, for 'operational reasons' were not debriefed	Delivered as soon as possible in the Gulf or on return to the UK. Duration of intervention not reported	Two welfare professionals (chaplains, psychologist, psychiatrists or social workers)	Nine months post-intervention
Shalev <i>et al.</i> 1998	Single group, repeated measures	Forty-one Israeli soldiers stationed on Lebanese border who had been directly involved in combat events. Thirty-nine completed the study. Recruitment criteria not reported	Single session small group Historical Debriefing (Marshall model). Group size not reported but six groups held	Average duration 2.5 h, delivered within 72 h of exposure to combat events	Three members of traumatic stress centre with 'military and line experience'	Before and immediately after intervention
Deahl <i>et al.</i> 2000	Controlled trial	All members ($n = 106$) of a group of British soldiers preparing for 6-month peacekeeping tour of Bosnia. All had received pre-deployment stress training Follow-up assessments completed by 66% at 6 months and 52% at 12 months	1. Single session group psychological debriefing (Mitchell and Dyregrov model). Group size 8–10 2. Control group	Delivered immediately following return from Bosnia. Duration approximately 2 h	'Experienced debriefers'	Before intervention and after 3, 6 and 12 months
Larsson <i>et al.</i> 2000	Non-randomized group comparison	181 members of a Swedish battalion on a peacekeeping mission to Bosnia, who reported experiencing a potentially traumatic combat event, were surveyed about the type of support received. Note: This is a subsample of a survey population	No support ($n = 56$) Informal peer support ($n = 29$) Peer support plus a defusing session ($n = 60$) Peer support plus defusing plus debriefing session ($n = 36$)	N.A. Not reported Defusing session on day of event occurring Debriefing session 1–3 days after event Duration of interventions not reported	1. N.A. 2. Friend 3. Platoon commander or similar leader 4. External counsellor	When returning from Bosnia

Adler <i>et al.</i> 2008a	Cluster RCT	1004 US peacekeepers in Kosovo, of whom 952 completed pre-intervention data and were included in the analysis. Recruited when attending deployment-related processing or during last month of deployment. Follow-up assessments were completed by 614 (64%) at 3–4 months and 276 (29%) at 8–9 months	<ol style="list-style-type: none"> 1. Single session group CISD for multiple incidents (Everly & Mitchell model) 2. Single session group Stress education 3. Control group <p>Average group size 15</p>	<ol style="list-style-type: none"> 1. Average duration 47.5–148 min 2. Average duration 43.5–110 min <p>Both interventions delivered during the final phase of the peacekeeping mission</p>	Both interventions were delivered by four individuals from a pool of nine personnel trained in CISD (three enlisted and six officers, five of whom were in Army Combat Stress Control team)	Before intervention (both pre-deployment and in last month of deployment) then 3–4 months and 8–9 months post-intervention
Adler <i>et al.</i> 2009a	Cluster RCT	A total of 2297 US soldiers returning from a year of combat duty in Iraq, of whom 1060 (46.1%) provided follow-up data	<ol style="list-style-type: none"> 1. Battlemind debriefing. Group size 20–32 2. Small group. Battlemind training. Group size 18–45 3. Large group. Battlemind training. Group size 126–225 4. Stress education. Group size 51–257 	<ol style="list-style-type: none"> 1. Median duration 50 min 2. Median duration 39 min 3. Median duration 39 min 4. 40–50 min <p>All delivered within a few days after returning from deployment</p>	All interventions were delivered by teams comprised of an active duty officer along with an enlisted soldier and/or civilian staff member. Most had a qualification in psychology	Before intervention and after 4 months
Greenberg <i>et al.</i> , in press	Cluster RCT	2259 personnel on 12 Royal Navy warships, matched for crew size and nature of operational duties, of whom 1559 completed the baseline questionnaire. Fifteen per cent of personnel completed both baseline and follow-up questionnaires	<ol style="list-style-type: none"> 1. TRiM peer support. Conducted individually or in small groups 2. Control group 	<p>Held within 48 h of an incident plus 1-month follow-up assessment</p> <p>Note: Participants in the intervention group will have received TRiM only if they had been involved in a potentially traumatic incident</p>	Trained peer-group practitioners	Before implementation of TRiM system and after 12–18 months

RCT, Randomized controlled trial; PTSD, post-traumatic stress disorder; CISD, Critical Incident Stress Debriefing; TRiM, Trauma Risk Management; N.A., not applicable.

Table 3. Study outcomes: surveys

Outcome assessed	Study	Measure used	Findings
PTSD	Iversen <i>et al.</i> 2008	PCL-C	Those who had not received a homecoming brief were more likely to be a PTSD 'case' (defined as a score ≥ 50) than those who had received a brief, after adjusting for age, sex, rank, educational status, Service and marital status [adjusted OR 1.84, 95% CI 1.30–2.62]. This relationship became non-significant after adjusting for pre-deployment (childhood adversity) and deployment related (e.g. morale, perceived danger to self) factors (adjusted OR 0.93, 95% CI 0.58–1.47)
General psychiatric morbidity	Orsillo <i>et al.</i> 1998	BSI	Receipt of debriefing was not a significant predictor of outcome (statistical data not reported in paper)

PTSD, Post-traumatic stress disorder; PCL-C, Post-traumatic Stress Disorder Checklist – Civilian version (Blanchard *et al.* 1996); BSI, Brief Symptom Inventory (Derogatis & Spencer, 1982); OR, odds ratio; CI, confidence interval.

participants to be educated about other people's experience of trauma and their responses.

Critical Incident Stress Debriefing (CISD)

CISD was developed for emergency service personnel by Mitchell (1983) as part of a system of Critical Incident Stress Management (CISM). Mitchell has described CISD as 'a psycho-educational small group process' (Mitchell, 2009). CISD aims to reduce the risk of post-incident psychological problems by promoting detailed recollection and emotional processing of the event using a structured format. Some adaptations of this model also exist (e.g. Dyregrov, 1989; Everly & Mitchell, 2000). Variations of this approach were assessed by Deahl *et al.* (1994, 2000) and Larsson *et al.* (2000) and a version for multiple incidents was assessed by Adler *et al.* (2008a). Orsillo *et al.* (1998) also evaluated a debriefing session, although a description of the type of debriefing was not given. A defusing session, as used by Larsson *et al.* (2000), is a briefer, less structured version of CISD, which is conducted on the day of the event.

Stress education

Stress education is widely used in military organizations. In the studies by Adler *et al.* (2008a, 2009a), the stress education package included information on identification of stressors, symptoms associated with stress and adaptive coping behaviours.

Trauma Risk Management (TRiM)

TRiM (Greenberg *et al.*, in press) is a peer-group model of psychological risk assessment developed in collaboration with the Royal Marines. TRiM personnel

are trained to use a structured interview model to identify those who might be at substantial risk of developing post-incident psychological disorders. These high-risk personnel are encouraged to access appropriate help or support. TRiM attendees are also provided with a booklet or an interactive briefing containing information about stress reactions and how to cope with them. In contrast to the debriefing models described above, TRiM purposely avoids excessive exploration of emotions (Jones *et al.* 2003).

Battlemind

Battlemind training (Adler *et al.* 2009a) is a cognitive and skills-based group approach developed by the US Army. Battlemind aims to normalize reactions to operational stress, build resilience and help participants to recognize difficulties in oneself and one's colleagues and to seek help promptly. Battlemind training focuses on 10 core skills or strengths that helped people cope in the combat environment and highlights how they should be adapted for the home environment.

Battlemind debriefing (Adler *et al.* 2009a,b) differs from other debriefing models described above in that it de-emphasizes the recounting of specific events and reactions to them, so as to avoid the risk of re-exposing participants, and instead focuses on normalizing reactions. This is achieved through group discussion that reinforces the concepts included in Battlemind training.

Delivery of interventions

All interventions, with the exception of TRiM, were delivered in a single session. The interventions were all fairly brief, lasting from under 1 h (Adler *et al.*

2009a) to 2½ h (Shalev *et al.* 1998). This lack of variation meant that we were unable to consider the possible impact of intervention duration on outcomes.

Most interventions were delivered in small groups, with the exception of Adler *et al.* (2009a), in which large-group Battlemind and Stress Education had group sizes of up to 225 and 257 respectively. Only Adler *et al.* (2009a) evaluated the effect of group size, and did not find a consistent effect.

There was some variation between studies in the time at which interventions were delivered; this could be after exposure to a PTE (Shalev *et al.* 1998; Larsson *et al.* 2000; Greenberg *et al.*, in press), at the end of deployment (Adler *et al.* 2008a) or soon after returning from deployment (Adler *et al.* 2009a; Deahl *et al.* 2000). Deahl *et al.* (1994) delivered the intervention as soon as possible, either in theatre or on return to the UK. No consistent relationship was identified between time of delivery and intervention outcomes.

Study findings

The findings of the survey and intervention studies are summarized in Tables 3 and 4 respectively. The surveys each reported the effect of the intervention on a single outcome. Orsillo *et al.* (1998) found that debriefing was not a significant predictor of psychiatric symptomatology. However, Iversen *et al.* (2008) found that receipt of a homecoming brief was associated with reduced reporting of PTSD symptoms, although the association became non-significant after adjusting for pre-deployment (childhood adversity) and deployment related (e.g. morale, perceived danger to self) factors.

In the intervention studies, the main outcomes assessed were measures of mental health, the most commonly measured being symptoms of PTSD. Although the interventions were mostly ineffective in terms of PTSD symptoms, two studies by Adler *et al.* (2008a, 2009a) both found an interaction between study condition and degree of combat exposure; those in the intervention groups who had experienced high levels of combat reported greater reduction over time in symptoms than those who received stress education. However, it should be noted that effect sizes were small. Adler *et al.* (2008a) also found that, at higher levels of combat exposure, the control group showed greater reduction in symptoms than those who received stress education, although the effect size was small.

Adler *et al.* (2009a) also found an interaction effect for sleep problems, which might be expected as sleep problems are substantial in PTSD. At high levels of combat exposure, those who received Battlemind debriefing or small-group Battlemind training reported

fewer sleep problems than those who received stress education.

General psychiatric morbidity was assessed in four intervention studies. A beneficial effect of debriefing was found by Deahl *et al.* (2000) at one assessment time and Larsson *et al.* (2000) found peer support plus a defusing session to have some benefits over peer support alone. Other interventions did not have a significant impact on general psychiatric morbidity.

Other outcomes were evaluated in very few studies and findings were generally inconsistent across studies. A significant beneficial effect on depression was found with Battlemind training (Adler *et al.* 2009a) but not CISD (Deahl *et al.* 2000; Adler *et al.* 2008a). However, personnel who had received CISD reported lower levels of anxiety than controls (Deahl *et al.* 2000).

Behavioural outcomes were assessed in only two studies, both of which examined alcohol misuse. Deahl *et al.* (2000) found debriefing to be better than a no-treatment control in reducing alcohol misuse whereas Adler *et al.* (2008a) found stress education to be better than CISD. The former intervention included specific advice about limiting alcohol (Jones, personal communication), but it is not known if such advice was included by Adler *et al.*

Only one study (Greenberg *et al.*, in press) supplemented self-report measures of well-being with data on occupational functioning, by using personnel data on disciplinary offences collected in the year preceding and the year following the introduction of TRiM. Although the authors qualified their findings, commenting that confounding factors made comparison of the groups difficult, the crews who received TRiM reported significantly fewer offences than the control crews at follow-up.

The two studies that assessed stigma related to seeking help for mental health problems did not find an effect of study condition. However, at higher levels of combat exposure, Adler *et al.* (2009a) found that those who received large-group Battlemind reported less stigmatizing beliefs than those who received Stress Education.

Where participant feedback about the interventions was obtained (Adler *et al.* 2008a, 2009a; Greenberg *et al.*, in press), interventions were considered acceptable, with modified CISD and Battlemind training being rated more positively than Stress Education.

Discussion

Although psycho-educational interventions are widely implemented in the AF (Adler *et al.* 2008b), few have undergone systematic evaluation. Overall, this review found evidence of some benefit; however, there is variation in the composition of the

Table 4. Study outcomes: intervention studies

Outcome assessed	Study	Measure used	Findings
PTSD symptoms	1. Deahl <i>et al.</i> 1994	1. IES	1. No significant effect
	2. Deahl <i>et al.</i> 2000	2. IES, PTSS-10	2. The control group had significantly higher IES scores than the intervention group at baseline. There was significant improvement from baseline to 3 months and 1 year in the control group on IES but no change in the intervention group (the intervention group had a median score of 0 at baseline) ^a . No significant effect on PTSS-10
	3. Larsson <i>et al.</i> 2000	3. IES	3. No significant differences found between the four support-type groups
	4. Greenberg <i>et al.</i> , in press	4. PCL-C	4. No significant effect
	5. Adler <i>et al.</i> 2008a	5. PCL-C	5. No significant effect for the whole sample but at high levels of combat exposure, there was an effect of CISD over Stress education ($B = -0.65$, $SE B = 0.22$, $p < 0.01$, $d = 0.12$) and of the Control group over Stress education ($B = -0.53$, $SE B = 0.26$, $p < 0.05$, $d = 0.08$) in change from baseline to 3-month follow-up.
	6. Adler <i>et al.</i> 2009a	6. PCL-C	6. No significant effect for the whole sample but at high levels of combat exposure, there was an effect of Battlemind debriefing, small group Battlemind training and large group Battlemind training over Stress education (effect sizes 0.21, 0.14 and 0.16 respectively).
General psychiatric morbidity	1. Deahl <i>et al.</i> 1994	1. GHQ-28	1. No significant effect
	2. Deahl <i>et al.</i> 2000	2. SCL-90	2. Significant group difference favouring intervention group at 6-month follow-up (Wilcoxon statistic = 408, $p = 0.02$) but not at 3 months or 1 year
	3. Larsson <i>et al.</i> 2000	3. GHQ-28	3. The proportion classified as 'critical cases' (total score ≥ 5) did not differ significantly between the four support-type groups. When the continuous scale was used, those who received peer support plus a defusing session had significantly better outcomes than those who received peer support only on the subscales of Social Dysfunction ($F = 2.82$, $p < 0.05$) and Severe Depression ($F = 2.59$, $p < 0.05$) and on the total score ($F = 3.10$, $p < 0.05$). No other group differences were found
	4. Greenberg <i>et al.</i> , in press	4. GHQ-12	4. No significant effect
Depression	1. Deahl <i>et al.</i> 2000	1. HADS	1. No significant effect
	2. Adler <i>et al.</i> 2008a	2. CES-D	2. No significant effect
	3. Adler <i>et al.</i> 2009a	3. PHQ-D	3. Effect of large group Battlemind over Stress education ($p < 0.05$)
Anxiety	1. Shalev <i>et al.</i> 1998	1. STAI-State	1. Significant within-group improvement over time (Wilcoxon, $Z = 2.35$, $p = 0.02$)
	2. Deahl <i>et al.</i> 2000	2. HADS	2. Significant difference favouring intervention group in change from baseline to 6 months (Wilcoxon test statistic = 425, $p = 0.03$) but not 3 months or 1 year ^a
Sleep problems	1. Adler <i>et al.</i> 2009a	1. Four-item scale (adapted from Morin, 1993)	1. No significant effect for whole sample but at high levels of combat exposure, effect of Battlemind debriefing, small group Battlemind training and large group Battlemind training over Stress education (effect sizes 0.25, 0.25 and 0.27 respectively)

Alcohol use	1. Deahl <i>et al.</i> 2000	1. CAGE (Ewing, 1984)	1. Significant group difference favouring intervention group at 1-year follow-up (Fisher's exact test $p=0.03$) but not at 3 or 6 months
	2. Adler <i>et al.</i> 2008a	2. AUDIT	2. Significant difference favouring Stress education compared to modified CISD at 3–4 months ($B = -1.16$, s.e. $B=0.51$, $p < 0.05$)
Aggressive behaviour	1. Adler <i>et al.</i> 2008a	1. Conflict Tactics Scale	1. No significant effect for whole sample but at high levels of combat exposure, effect of CISD over Control group ($B=0.11$, s.e. $B=0.05$, $p < 0.05$; $p=0.05$, $d=0.10$)
Self-efficacy	1. Shalev <i>et al.</i> 1998	1. Combat self-efficacy scale (Solomon <i>et al.</i> 1988)	1. Significant within-group improvement over time (Wilcoxon, $Z = 3.49$, $p = 0.001$)
Occupational functioning	1. Shalev <i>et al.</i> 1998	1. Combat Evaluation Scale (measure of unit effectiveness)	1. No significant effect
	2. Greenberg <i>et al.</i> , in press	2. Personnel records of common disciplinary offences	2. Ships in intervention reported fewer offences (although confounding factors made group comparison difficult)
	3. Adler <i>et al.</i> 2008a	3. POS	3. No significant effect
Stigma	1. Greenberg <i>et al.</i> , in press	1. Seventeen-item measure	1. No significant effect
	2. Adler <i>et al.</i> 2009a	2. Five-item scale (adapted Hoge <i>et al.</i> 2004)	2. No significant effect for whole sample but at high levels of combat exposure, effect of large group Battlemind over Stress education group (effect size 0.25)
Participant feedback	1. Greenberg <i>et al.</i> , in press	1. Qualitative interviews with subsample of 374 participants	1. TRiM considered acceptable and useful
	2. Adler <i>et al.</i> 2008a	2. Twenty-five-item scale developed for study	2. Modified CISD evaluated more positively than Stress education
	3. Adler <i>et al.</i> 2009a	3. Brief evaluation survey developed for study	3. Debriefing generally rated more highly than Stress Education, Small group Battlemind rated more highly than large group Battlemind on some aspects of group processes

AUDIT, Alcohol Use Disorder Identification Test (Babor *et al.* 2001); CES-D, Center for Epidemiological Studies – Depression scale (Radloff, 1977); GHQ, General Health Questionnaire (Goldberg & Williams, 1988); HADS, Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983); IES, Impact of Events Scale (Horowitz *et al.* 1979); PCL-C, Post-traumatic Stress Disorder Checklist – Civilian version (Blanchard *et al.* 1996); PHQ-D, Patient Health Questionnaire for Depression (Spitzer *et al.* 1999); POS, Perceived Organizational Support scale (Lynch *et al.* 1999); PTSS-10, Post-Traumatic Symptom Scale (Holen *et al.* 1983); SCL-90, Symptom Checklist (Derogatis, 1983).

^aGroup differences in this variable at baseline were not controlled for in the analysis.

psycho-educational interventions studied and the outcomes where benefit was found. The effects, where found, are modest.

It might be argued that the largely non-statistically significant findings of this review indicate that psycho-education for military personnel is ineffective in preventing deployment-related psychological ill-health and therefore unnecessary. However, such a decision may be premature. The studies by Adler *et al.* (2008a, 2009a) indicate that the effects are greater in those most at risk (albeit with small effect sizes). Given the high operational tempo currently being experienced by AF deployed in Afghanistan, the need for interventions that support mental health, such as psycho-education, may be increasing and result in significant health benefits if appropriate interventions are delivered.

However, it does not follow that interventions should only target those who have experienced high levels of PTEs; in practice this is neither feasible nor desirable. Adler *et al.* (2009a) stress the importance of including all unit members, as participants are encouraged to watch out for and support each other and the inclusion of personnel who are at low risk of developing problems may benefit those at higher risk. They also argue that selecting out some personnel could potentially increase stigma and also be more complex logistically. As few well-designed studies of interventions have been conducted to date, it would be premature to restrict them to subsamples of the deployed population at this stage.

The review highlights several areas in which research in this field can develop, as follows.

Study design

Because of the paucity of RCTs of psycho-educational interventions in this population, we accepted other levels of evidence in this review, including surveys, non-randomized controlled and single-group repeated-measures designs. Of these, the RCT is commonly considered to provide the best level of evidence for establishing treatment efficacy (e.g. Rawlins, 2008; Oxford Centre for Evidence-Based Medicine, 2009). Controlled studies that do not use random allocation are more susceptible to selection bias. Cross-sectional surveys provide evidence of association but not causality and potential confounding variables may not be distributed evenly between intervention recipients and non-recipients. Studies using single-group repeated-measures designs provide very limited evidence as improvement over time could reflect natural improvement, regression to the mean or a placebo effect.

It is acknowledged that conducting good quality RCTs with military populations is difficult, but not

impossible, although smaller nations in particular may be limited by the substantial costs involved. However, as the risk of bias is higher in other study designs, good quality RCTs are essential to provide reliable evaluations (Pocock & Elbourne, 2000). Indeed, the structure of the AF lends itself more to randomization by cluster rather than by individual, where the cluster consists of personnel belonging to the same team who therefore work closely together. Cluster randomization is essential to prevent 'contamination' between study arms. Analysis of study findings in a cluster RCT also takes account of the similarities that exist between members of the same team. It is encouraging to note that the most recent intervention studies in this review did use the cluster RCT design.

Another aspect of design that needs careful consideration is the nature of the control group. Studies in this review used mostly no-treatment controls. As many AF now provide some form of psycho-education as 'standard care', it is likely that future studies will need to compare any new intervention with the pre-existing intervention, such as in Adler *et al.* (2009a), where stress education was the control condition.

Studies that compare more than one intervention, where a single component is varied, would also help to identify which components are most important.

Intervention content

Medical Research Council (MRC) guidance on developing and evaluating complex interventions (Craig *et al.* 2008) recommends that interventions have a coherent theoretical basis, drawn from evidence on what factors are related to outcomes and the likely process of change. Intervention content should be informed by evidence on potentially modifiable factors that are related to poor psychological ill-health in AF populations (e.g. Britt *et al.* 2004; Hoge *et al.* 2004; Iversen *et al.* 2008). This approach has been adopted in Battlemind training, for example, which aims to address factors such as stigma, which is a barrier to help-seeking (French *et al.* 2004; Hoge *et al.* 2004), and social support, which is related to better outcomes.

Process of change

The likely process of change also needs to be examined more closely. For example, if improvement in psychological health is theorized to arise through building resilience, then approaches that are thought to build resilience should be made explicit and incorporated into the intervention. Change in these process variables should also be measured.

Moderators of effect

The findings of Adler *et al.* (2008a, 2009a) suggest that the extent of combat exposure may moderate the effect of post-deployment interventions. Further study is required to identify other potential moderator variables to ascertain which type of intervention is likely to be of most benefit to which participants and on which outcomes. When Sijbrandij *et al.* (2006) conducted a 'dismantling trial' comparing emotional ventilation debriefing, educational debriefing and no debriefing in 236 adult survivors of trauma, they found that participants in the emotional debriefing who had a high baseline hyperarousal score had more PTSD symptoms than those in the control group at 6 weeks. These findings highlight the need to consider the interaction between the population and the nature of the intervention when evaluating effectiveness, and further examination of these factors may help in the development of more beneficial interventions.

Study evaluation

In addition to health outcomes, acceptability of the intervention is also important. Greenberg *et al.* (2009), asked Royal Navy personnel if they had received stress education during their service. They found that receipt of stress education was not a significant predictor of PTSD for the full sample. When participants were categorized as to whether or not they thought the brief useful, those who found it useful were less likely to be a PTSD case than those who had not received education. However, those who did not find it useful were no more or less likely to be a case than those who had not received a brief. Obtaining participant ratings of the intervention is therefore important.

An assessment of intervention fidelity, that is whether it was delivered as intended (Bellg *et al.* 2004), is also recommended.

Intervention efficacy should be assessed based on what the intervention was designed to target. Studies need to consider the most relevant outcomes. This review demonstrates that a wide range of outcome measures have been used to evaluate military psycho-educational interventions; however, several have been assessed in too few studies to draw meaningful conclusions about the impact upon them. The question about the most appropriate outcomes, raised by Deahl *et al.* (2001), remains important. Although the presence of PTSD (either caseness or symptoms) is often the focus of interventions, symptoms of PTSD are not the only consequence of traumatic experiences; in fact depressive symptoms and alcohol misuse are more common (Rona *et al.* 2004; Fear *et al.* 2010), whereas aggression and violence might have the most adverse

consequences. In addition to symptoms, assessment of occupational and social functioning is also important. Studies in this review have mostly measured adverse outcomes; however, if the aim of the intervention is to enhance well-being, then an assessment of positive psychological health is also merited.

Limitations of the reviewed studies

The reviewed studies had several limitations that should be taken into account when interpreting their findings. The findings of studies that did not use RCT methodology are susceptible to bias. Several studies did not report inclusion and exclusion criteria, and therefore the extent to which their results can be generalized must be treated with caution. Future studies must be more explicit about their population selection, which should be aided by journals requesting that reports meet Consolidated Standards of Reporting Trials (CONSORT) guidelines (Begg *et al.* 1996).

In many studies loss to follow-up was high, although this may result from difficulty in locating a mobile population. Tate *et al.* (2007) found that non-response in a military population was related to younger age, lower rank, male gender, non-white ethnicity and reservist enlistment but not to health. Given that the nature of military populations is unlikely to change, future authors should give more thought to establishing that loss to follow-up is at least not biased by outcome (see, for example, the assessment of bias by Adler *et al.* 2009a).

Limitations of the review

Limitations of this review must also be considered. Inclusion criteria for studies in the review were not limited to RCTs and therefore the quality of some of the included studies is suboptimal. However, as this is the first published review of psycho-educational interventions in this population, and to date few studies have been conducted, it was considered important to be as inclusive as possible to provide an overview of work conducted in the area. The limitations in the design of included studies have been reported in the review.

The type of interventions evaluated in the review form an eclectic mix and therefore the findings of one type of psycho-education are not necessarily applicable to psycho-education as a whole. However, combining these interventions in a single review is justified to gain a broader understanding of interventions that aim to mitigate the potential adverse effects of deployment. Furthermore, our recommendations for how to progress research in this field apply across the variety of interventions.

The summary of the findings was made discursively rather than by using meta-analysis. This method was chosen because meta-analysis requires homogeneity in the interventions evaluated and in the outcomes assessed. Given the heterogeneity of the included studies in terms of design and intervention evaluated, meta-analysis was not considered to be an appropriate methodology.

The review is limited to published studies and therefore may not be an exhaustive summary of the area. However, we did ask experts in the field if they were aware of any other studies that we had not identified. As none were reported to us, it is probably unlikely that any unpublished studies consist of RCTs.

Conclusions

Although widely implemented by military forces in many countries, few psycho-educational interventions have been evaluated systematically in methodologically robust studies. This review found some evidence of benefit for the various psycho-educational interventions that military forces have used, but the effect seems to be small. Some results suggested that the beneficial effects may be greater for those who have been exposed to a greater number of combat events. Given the considerable exposure to traumatic situations currently faced by AF personnel operating in the Middle East, with repeated and/or prolonged operational tours and considerable combat exposure for many, we suggest there remains a pressing need to identify the most useful and effective way of minimizing the impact of exposure to potentially traumatic deployment incidents.

Declaration of Interest

N.G. and N.J. are both AF employees based at the Academic Centre for Defence Mental Health. S.W. is an Honorary Civilian Consultant Advisor in Psychiatry to the British Army (unpaid).

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