

# What Are the Psychological Effects of Delivering and Receiving “High-Risk” Survival Resistance Training?

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**ABSTRACT** Objective: To evaluate the possible mental health impact of resistance training on UK Armed Forces personnel undergoing training and the psychological effects of delivering such training. Method: British Military personnel ( $n = 42$ ) completed a battery of self-report measures on anxiety, general mental health, post-traumatic stress disorder, resiliency and training outcomes 1 month before, on the first and last day of the course and at 1-month follow-up. Resistance Instructors (RIs) ( $n = 40$ ) completed a battery of self-report measures on anxiety, depression, post-traumatic stress disorder, alcohol use, sleep, burnout, leadership, and morale. Results: Although student self-ratings of resiliency did not change, they reported significant improvements in their ability to use strategies to cope with captivity. There was no significant increase in anxiety between precourse and follow-up. Post-traumatic stress intrusive symptoms were elevated at 1-month postcourse but remained low. Prevalence rates of psychological distress among RIs were elevated compared to U.K. military personnel but views of professional efficacy, unit leadership and morale were broadly positive. Conclusion: Resistance training demonstrates some benefit to students but was associated with increase in traumatic stress symptoms at follow-up, whereas the mental health of RI appears modestly worse than the rest of the Armed Forces population.

## INTRODUCTION

Survival, Evasion, Resistance and Escape (SERE) training provides U.K. military personnel who are at high risk of capture with opportunities to learn survival strategies. Resistance training (RT) aims to prepare trainees for captivity and interrogation through classroom discussion, didactic teaching, and challenging practical exercises that include simulated physical and psychological pressures including threats and ploys. RT scenarios are designed to be realistic and take account of coercive pressures used against military personnel in prior captivity situations.<sup>1</sup> Although there are many factors that determine how well personnel might cope with being taken hostage, many military forces use RT to promote military personnel's psychological resilience in such adversity.<sup>2,3</sup> Although RT is widely used in military settings, apart from anecdotal classified accounts from former hostages who have received RT, there is little published literature about how effective the training might be.

The UK Armed Forces' (UK AF) RT is underpinned by Stress Inoculation Training (SIT) theory.<sup>4</sup> SIT is a cognitive-

behavioral-based approach designed to prevent and treat severe stress reactions and aims to “develop and nurture coping skills by means of gradual exposure and mastery of increasingly challenging stressors; it thus acts as a proactive defense against future stressful situations.”<sup>4</sup> RT thus requires a high degree of realism to achieve its aims which, given the nature of hostage taking, may include physical and emotional discomfort; however, RT protocols specifically mandate the avoidance of frank physical or psychological injury. Scenarios thus aim to achieve a fine balance and encourage immersive learning without overtly impairing performance and health as demonstrated by the stress-response continuum (Yerkes–Dodson Law).<sup>5</sup> An emerging body of research though has indeed shown SERE training to be highly stressful.<sup>6,7</sup> RT includes psychoeducation about stress and captivity situations and lessons that aim to develop evidence-based stress management skills that are practiced in highly controlled acute stress scenarios. Although there is limited evidence about the use of SIT within the SERE setting, it has been applied clinically (e.g., anxiety disorders) and within high-risk occupations (e.g., police) to improve job performance. Studies have shown that SIT is effective at reducing performance anxiety, state anxiety, and enhancing performance under stress.<sup>4,8</sup> Safety within RT is assured by scenarios being reviewed by medical and psychological staff beforehand, all exercises being video-recorded and monitored by training staff and access to a dedicated GP throughout.

The U.K. military initiated studies to evaluate the possible mental health impact of RT on UK AF personnel going through the training and to identify the psychological effects of delivering and receiving such training. One study aimed to examine the psychological health of the RT

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trainers (called Resistance Instructors [RIs]) who are required to expose colleagues to unconventional stressors during RT. The other study aimed to determine whether RT students experience adverse psychological reactions and whether, overall, training might be harmful. We hypothesized that RT will cause no psychological harm to students as evidenced by a nonsignificant effect on the primary outcome measure (STAI-S) from 1-month precourse to 1-month postcourse. Both studies thus aimed to inform military commanders about impact of the current safeguards put in place to protect and promote mental and physical health in those teaching and undergoing RT.

**METHODS**

**RI Study**

RIs were asked to complete an anonymous cross-sectional survey comprising a short (<20 minutes) self-report questionnaire. Questionnaire was completed by all available permanent RIs at the main RT school in January 2011 and by all nonpermanent RIs in December 2011. Differentiation between permanent and nonpermanent staff was made as multiple studies investigating health effects in the military demonstrate different health outcomes between regulars and reservists that may transfer into difference between permanent (mostly regular) and nonpermanent (mostly reservists) RI.<sup>9,10</sup>

We utilized measures to assess possible adverse mental health effects as seen in other high-stress occupations including anxiety, depression, PTSD, alcohol misuse, insomnia, and burnout at work (see Fig. 1).<sup>11</sup> Measures were chosen

for their validity and ease in assessing these symptoms and correlate with measures used in other military health studies in the United Kingdom.<sup>12</sup>

*RI Study Outcome Measures*

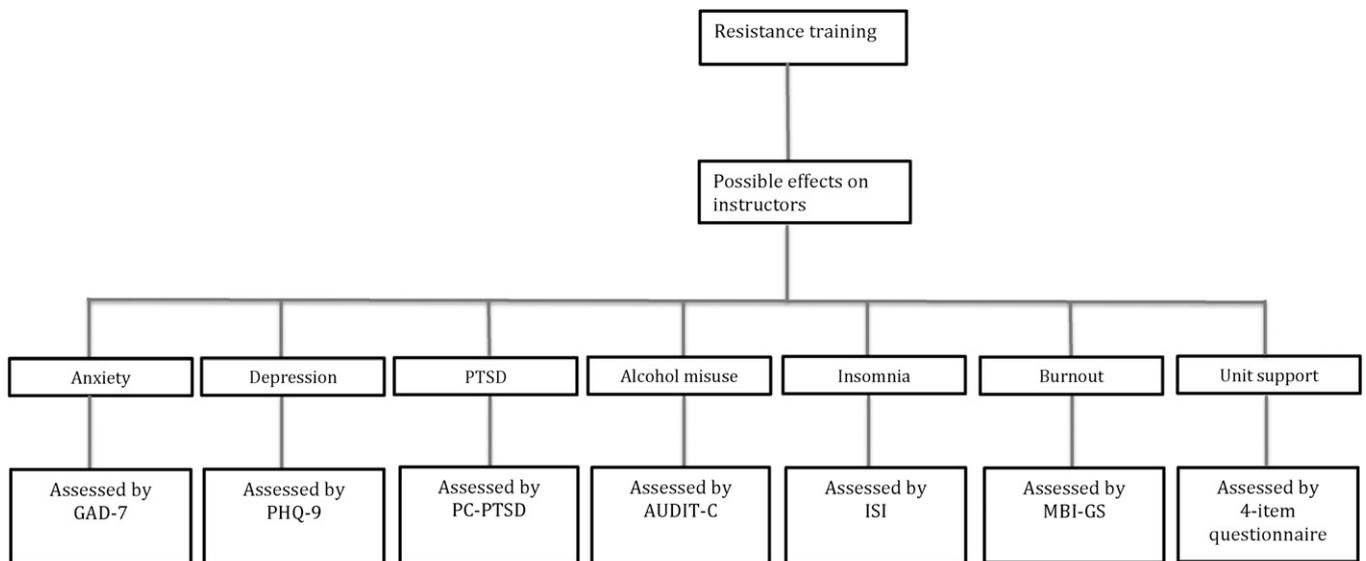
The PRIME-MD Generalized Anxiety Disorder (GAD-7)<sup>13</sup> is a 7-item anxiety scale used to screen for generalized anxiety disorder (GAD). GAD-7 total score ranges from 0 to 21 with scores of 5, 10, and 15 representing cutoff for mild, moderate, and severe anxiety respectively.

The PRIME-MD Patient Health Questionnaire (PHQ-9)<sup>14</sup> is a 9-item screening tool for depression in primary care. PHQ-9 total score ranges from 0 to 27 with scores of 5, 10, and 15 representing cutoff for mild, moderate, and severe depression respectively.

The Primary Care-PTSD<sup>15</sup> is a 4-item measure of PTSD with yes–no response options developed for use in primary care settings. The scale assesses 4 dimensions of PTSD (re-experiencing, numbing, avoidance, and hyperarousal). Psychometrics found to be good with a cutoff of either “2” or “3” with the latter favoring specificity.<sup>16</sup> This study used a cutoff of 3.

The Alcohol Use Disorder Identification Test-Consumption (AUDIT-C)<sup>17</sup> is a 3-item validated screen for alcohol use disorders or hazardous drinking. AUDIT-C total score ranges from 0 to 12 with a score of 5+ indicating increasing or higher risk drinking.

The Insomnia Severity Index<sup>18</sup> is a 7-item scale assessing perceived insomnia severity, dissatisfaction with current sleep pattern and interference with daily functioning. Items score on 4-point Likert scale (“0” not at all—“4” extremely);



Key  
 PTSD – Post Traumatic Stress Disorder  
 GAD-7 – Generalised Anxiety Disorder 7; PHQ-9 – Patient Health Questionnaire 9; PC-PTSD – Primary Care Post Traumatic Stress Disorder; AUDIT-C – Alcohol Use Disorder Identification test – Consumption; ISI – Insomnia Severity Index; MBI-GS – Maslach Burnout Inventory General Survey

**FIGURE 1.** Possible impact of resistance training on instructors and construct measures.

total scores range from 0 to 28. Scores of 0 to 7 suggest no clinically significant insomnia, 8 to 14 subthreshold insomnia, 15 to 21 moderate clinical insomnia, and 22 to 28 severe clinical insomnia.

The Maslach Burnout Inventory General Survey (MBI-GS)<sup>19</sup> measures respondents' relationships with their work using three general scales: the Professional Efficacy (PE) scale focuses on individual's expectations of continued effectiveness at work, the Exhaustion (EX) scale explores generic sources of fatigue and the Cynicism (CY) scale indifferent or distant attitudes to work. MBI scores use mean ratings rather than totals; means are determined by dividing total score by the number of items responded to. The PE categorization is 0 to 23 (low), 24 to 29 (moderate), 30 or over (higher). The EX categorization is 0 to 7 (low), 8 to 15 (moderate), 16 or over (high). The CY categorization is 0 to 5 (low), 6 to 12 (moderate), 13 or over (high). Importantly, the PE scale is interpreted in the opposite direction from EX and CY so a higher PE score indicates a more positive response.

A 4-item questionnaire was used to explore attitudes toward unit leadership (e.g., "my seniors in my unit are interested in what I do or think"). Scoring is based on a 4-point Likert scale (range 4–16) with a higher score suggesting a more favorable response. A 4-item questionnaire was used to explore morale (e.g., "the unit has been motivated and enthusiastic"). Scoring is based on a 5-point Likert scale (range 5–20) with a higher score suggesting a more favorable response. Both these measures have been used in previous UK AF health studies.<sup>20</sup>

### **Student Study**

To assess effect of RT on students a repeated measures within-group design with 1-month follow-up was devised. All military personnel attending SERE training at the UK AF RT facility during 2012 were eligible to participate in the study. RT students are armed forces personnel that the U.K. military classes as potentially at risk of capture during deployment. Registration is online and for the purpose of this study was modified to include an intranet web link to the study information sheet and consent form. The web link and all study documentation contained multiple statements that participation in the research was voluntary, there was no link between the researchers and the SERE instructors' evaluation of student performance and withdrawal from the study was permitted at any time and without consequence.

RT students agreeing to participate in the research completed the consent form and Time 1 (T1; 1-month pretraining) questionnaires. All volunteers were given a unique identification number to allow confidential follow-up. SERE training takes place over a 2-week course and at the start of day 1, a research brief with question and answer session was given to all students by a member of the research team employed within the U.K. SERE community but not involved in the direct delivery of training to students. Time 2 (T2; day 1 of training) questionnaires were completed and anonymized

using the identification system. Time 3 (T3: last day of training) questionnaires were completed approximately 2 hours before the end of training. Time 4 (T4: 1-month follow-up) questionnaires were handed out to students at the end of course with participants receiving a maximum of two reminders via email or telephone.

### *RT Student Outcome Measures*

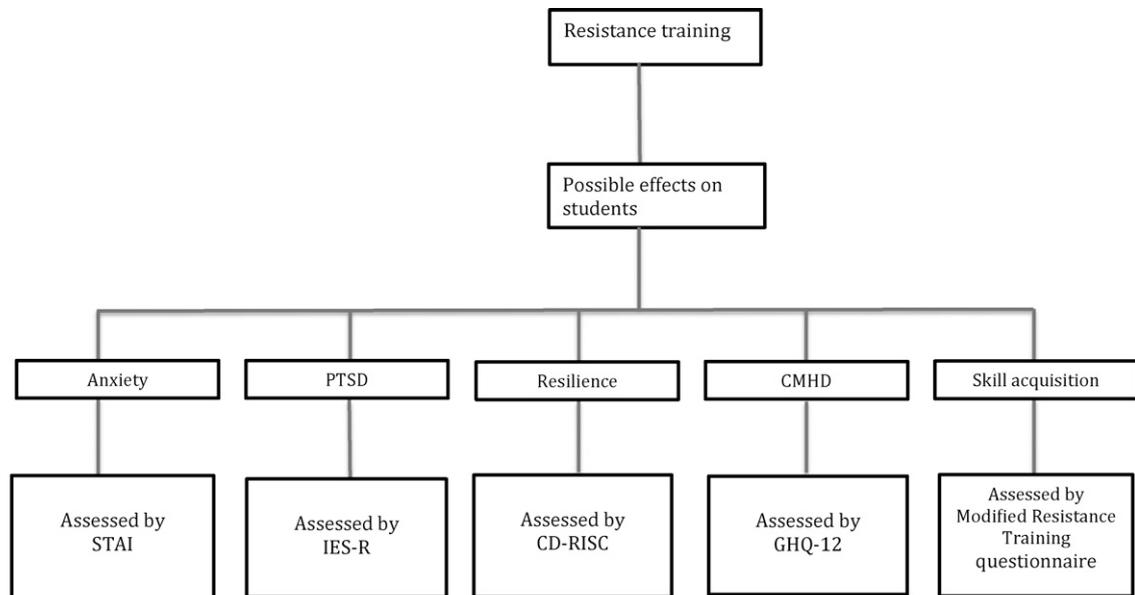
For an overview of outcome measures assessed, see Figure 2. All students were asked to complete a Background Information Questionnaire to ascertain basic sociodemographic data and other details including current job, prior exposure to potentially traumatic events and previous help-seeking. The Background Information Questionnaire was administered at T1 only.

The primary outcome measure for students was the State-Trait Anxiety Inventory (STAI), which is a 40-item self-report measure of anxiety.<sup>21</sup> 20 items measure the temporary condition of state anxiety ("S-Anxiety") and 20 items measure the more stable condition of trait anxiety ("T-Anxiety"). Each STAI item is given a weighted score of 1 to 4 with a number of statements reverse-scored. For both scales, the range is 20 to 80 with a higher score suggesting more state or trait anxiety. The STAI-S was the primary outcome measure because it has been widely used to assess stressful experimental procedures and overall the STAI has good reliability and validity with normative data available on a wide-range of groups including working age adults and military recruits.<sup>22</sup> The STAI was administered at all time-points.

The Impact of Events Scale-R (IES-R) is a 22-item measure of post-traumatic stress reactions, which has good reliability and validity measuring trauma symptoms.<sup>23</sup> The IES-R comprises 3 subscales: intrusion (8 items), avoidance (8 items), and hyperarousal (6 items) with items recorded from 0 ("not at all") to 4 ("extremely"). The IES-R was modified with a few minor grammatical changes so participants rated each item in relation to RT. There is little data using IES-R for cutoff points, rather interpretation involves calculation of total mean score and for each subscale. The IES-R was administered at all time-points.

The Connor-Davidson Resiliency Scale (CD-RISC)<sup>24</sup> is a 25-item self-report measure of resiliency. Items are scored from 0 ("not true at all") to 4 ("true nearly all the time") giving a total score from 0 to 100 with a higher score suggesting greater resiliency. Scoring is based on the previous month, therefore, at T3 the measure was modified slightly so that participants rated each item in relation to the last 2 weeks. Mean scores are available on a relatively wide range of populations and a review of 19 resiliency measures found the CD-RISC to be one of three measures with best psychometric ratings.<sup>25</sup> The CD-RISC was administered at all time-points.

The 12-item General Health Questionnaire (GHQ-12) is widely used to measure common mental health disorders



Key  
 PTSD – Post Traumatic Stress Disorder  
 STAI – State-Trait Anxiety Inventory; IES-R – Impacts of Event Scale Revised; CD-RISC – Connor-Davidson Resiliency Scale; GHQ-12 – General Health Questionnaire-12

**FIGURE 2.** Possible impact of resistance training on students and construct measures.

(CMHDs) such as anxiety and depression.<sup>26</sup> The GHQ-12 Likert scoring method (0-1-2-3) was used as this is a more sensitive measure of severity in small sample sizes. To assess “clinical cases,” the GHQ scoring method (0-0-1-1) was used as a score of 4 or more is routinely used within UK AF research to identify clinical cases.<sup>12</sup> The GHQ-12 was administered at all time-points.

To assess training effects and in particular changes in skill acquisition, students completed a slightly modified RT questionnaire designed and used within the USA SERE community. The six main questions are concerned with skills acquisition and cover the main goals of training (e.g., “use psychological strategies to maintain my mental health in captivity”), which are scored from 1 (“not at all confident”) to 5 (“extremely confident”) and were administered at T1 and T4. 5 items evaluate training (e.g., “overall, how emotionally demanding is this course?”), which are scored from 1 (“not at all”) to 5 (“extremely”) and 3 items assess RT in relation to other courses (e.g., “as far as the emotional impact, how did this experience compare with your prior military training?”), which are scored from 1 (“much less challenging”) to 5 (“much more challenging”). The training evaluation and comparison items were administered at T4 only.

**Power Calculation and Analysis**

Published data from a military sample undergoing training and information about test–retest reliability were used to generate estimates of reliable change for the STAI-S and STAI-T.<sup>21,27</sup> Reliable change refers to the size of the change

in test scores, that is, sufficiently large as to be unlikely to be caused by chance ( $p < 0.05$ ).<sup>28</sup> These values were calculated from the equations provided by Jacobson and Truax as 9.56 for the STAI-S and 8.37 for the STAI-T.<sup>28</sup> It was determined based on previous U.S. research that the proportion of individuals showing a reliable deterioration in their test scores of this magnitude following training should be no more than 5%. Power analysis was based on a test of the hypothesis that 5% of the sample would be significantly different from the expected proportion of 0.<sup>29</sup> With  $n = 100$ , expected power is approximately 90%. These procedures both determine a threshold for suspecting deterioration in anxiety caused by training and estimate the number of individuals who will need to be tested if an observed rate of 5% is to lead to the rejection of the null hypothesis that the rate is 0%.

Both studies were approved by the Ministry of Defence Research Ethics Committee and all data analyzed using SPSS (version 14).

**RESULTS**

**RI Study**

The survey was completed by 40 RIs: 17 permanent and 23 external representing 69% of the RIs who were invited to complete the survey. Table I reports mean score and, where applicable, “caseness” (percentage above the cutoff on questionnaires for CMHDs and burnout).

Overall, 32% and 22% scored above the cutoffs for anxiety and depression, respectively; 7% scored above the

**TABLE I.** Prevalence Rates and Comparison of Mental Health Problems and Burnout, and Attitudes to Leadership and Morale Among Permanent and External Resistance Instructors

	All Personnel (n = 40)		Permanent (n = 17)		External (n = 23)		t test
	N (%)	M (SD)	N (%)	M (SD)	N (%)	M (SD)	
GAD-7	13 (32)	3.40 (3.88)	5 (29)	2.47 (2.57)	8 (34)	4.09 (4.52)	-1.31
PHQ-9	9 (22)	3.20 (3.72)	3 (17)	2.59 (3.35)	6 (26)	3.65 (3.98)	<-1
PC-PTSD	3 (7)	0.20 (0.64)	0 (0)	0 (0)	3 (13)	0.35 (0.83)	-2.00
AUDIT	31 (77)	6.28 (2.46)	11 (65)	5.53 (2.96)	20 (87)	6.83 (1.89)	-1.68
ISI	10 (25)	5.38 (4.57)	6 (35)	5.88 (4.78)	4 (17)	5.00 (4.49)	<1
Unit Leadership	—	11.58 (2.44)	-	12.00 (2.09)	—	11.26 (2.68)	<1
Morale	—	13.88 (3.09)	-	14.00 (13.78)	—	13.78 (3.20)	<1
MBI EX	21 (52)	7.70 (7.47)	7 (41)	5.71 (5.18)	14 (61)	9.17 (8.61)	-1.47
MBI CY	15 (37)	7.18 (7.53)	5 (29)	5.24 (5.59)	10 (43)	8.61 (8.52)	-1.41
MBI PE	22 (55)	28.80 (7.35)	11 (65)	29.82 (6.84)	11 (48)	28.04 (7.76)	<1

GAD-7, PRIME-MD Generalised Anxiety Disorder (5+ represents the cutpoint for mild anxiety); PHQ-9, PRIME-MD Patient Health Questionnaire (5+ represents the cutpoint for mild depression); PC-PTSD, Primary Care-Post-Traumatic Stress Disorder (2+ represents the cutpoint for PTSD); AUDIT-C, Alcohol Use Disorder Identification Test (5+ represents the cutpoint for increasing or higher risk drinking); ISI, Insomnia Severity Index (8+ represents subthreshold insomnia); Unit leadership, mean score of 8; Morale, mean score of 10; MBI EX, Maslach Burnout Inventory Exhaustion subscale (8+ represents the cutpoint for moderate exhaustion with a low score representing a more favorable response); MBI CY, Maslach Burnout Inventory Cynicism subscale (6+ represents the cutpoint for moderate cynicism with a low score representing a more favorable response); MBI PE, Maslach Burnout Inventory Professional Efficacy subscale (30+ represents the cutpoint for high professional efficacy with a high score representing a more favorable response).

cutoff for probable PTSD, 77% for higher risk drinking and 25% for subthreshold insomnia. Attitudes to leadership and morale among the RIs were 11.5 and 13.8, respectively, and over half reported moderate levels of EX (52%) and PE (55%).

Despite the descriptive statistics suggesting that external RIs report higher levels of psychological distress, CY and EX, reduced PE and less favorable attitudes about morale and leadership than permanent RIs, t tests (2-tailed) showed that the responses of permanent and external RIs were not statistically different.

**RT Student Study**

Because of security restrictions, a response rate cannot be provided for student completion but in total 115 nonclinical active duty members of the UK AF consented to take part in the study. Although attrition from T1 to T4 was high (63%) a nonresponder analysis showed no differences in terms of age, length of service, rank, Service, and marital status between those that completed all phases of the study and noncompleters. To permit direct analyses between results, only participants whom had completed all phases were included (n = 42) although the final sample size varied slightly across the analyses because of minor instances of missing data. Demographic and service characteristics are reported in Table II with rank collapsed into Juniors (Marine/Private, Lance Corporal, Corporal) and Seniors (Sergeants and above). In summary, 93% were male; mean age was 30 years (range 24–50 years) with 69% married or in a relationship and 78% from the Senior ranks. A substantial number had seen service in Afghanistan (44%) and exposure to operational traumatic events (56%) or any trauma

(73%) was high although previous professional help-seeking was low (2.4%).

Table III reports the one-way repeated measures analysis of variance used to identify any significant differences over

**TABLE II.** Characteristics of the Sample

	N	%	M	SD
Gender				
Male	39	93	—	—
Female	3	7	—	—
Marital Status				
Single	13	31	—	—
Married/Relationship	29	69	—	—
Age	—	—	30	5.2
Service				
RN/RM	17	41	—	—
RAF	16	39	—	—
Army	8	20	—	—
Forces				
Regular	37	90	—	—
Reservists	4	10	—	—
Rank				
Junior	9	22	—	—
Senior	32	78	—	—
Length of Service				
2–4 years	9	24	—	—
5–12 years	21	55	—	—
13–22 years	6	16	—	—
22+	2	5	—	—
Deployments				
Iraq	7	17	0.3	0.8
Afghanistan	18	44	0.7	1.1
Other	11	27	0.4	0.8
Exposure to War Trauma	23	56	—	—
Exposure to Any Trauma	30	73	—	—
Professional Help	1	2.4	—	—

**TABLE III.** Comparison of Psychological Scores at 1-month Pretraining, Start and End of Training and 1-Month Follow-Up

	Time 1		Time 2		Time 3		Time 4		
	M	SD	M	SD	M	SD	M	SD	
STAI-S ( <i>n</i> = 40)	29.8	7.2	32.2	9.6	27.2	9.5	28.6	9.8	<i>F</i> (2.5,98.8) = 4.06*
STAI-T ( <i>n</i> = 37)	30.6	6.4	29.8	7.1	29.1	7.0	31.4	8.1	<i>F</i> (3,108) = 1.83
IES Total ( <i>n</i> = 35)	2.3	3.7	6.4	7.8	14.5	14.6	7.2	10.2	<i>F</i> (2.4,81.9) = 12.79***
IES Intrusion ( <i>n</i> = 35)	1.1	1.7	2.6	3.2	6.9	6.6	4.0	5.1	<i>F</i> (2.3,78.9) = 15.75***
IES Avoidance ( <i>n</i> = 35)	1.1	2.1	2.8	3.5	4.9	4.9	2.2	3.4	<i>F</i> (2.6,90.9) = 9.04***
IES Hyperarousal ( <i>n</i> = 35)	0.2	0.7	0.8	1.9	2.6	4.3	1.0	2.4	<i>F</i> (2.0,68.6) = 6.15**
CD-RISC ( <i>n</i> = 39)	71.1	11.1	74.1	11.1	74.4	14.4	74.5	13.9	<i>F</i> (2.4,93.1) = 1.05
GHQ-12	8.4	2.8	9.0	2.6	11.7	5.7	9.2	3.4	<i>F</i> (1.8,71.5) = **

STAI-S, State Trait Anxiety Inventory-State; STAI-T, State Trait Anxiety Inventory-Trait; IES, Impact of Events Scale; CD-RISC, Connor-Davidson Resiliency Scale; GHQ-12, General Health Questionnaire–12 Item. \**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.001.

time. Significant differences were found on the STAI-S, IES, and all IES subscales and the GHQ-12. Although mean scores on the GHQ-12 were subthreshold at all time-points additional statistics using the standard threshold score of 4 or more to identify the frequency of “caseness” for psychological distress showed a rate of 2.5% (*n* = 1) at T1, 5% (*n* = 2) at T2, 38% (*n* = 16) at T3, and 10% (*n* = 4) at T4. Interestingly, the 3 participants who met GHQ-12 caseness pretraining (i.e., T1 and T2) did not meet criteria at follow-up, which suggests the 4 participants who met caseness post-training were experiencing new episodes of psychological distress.

Table IV reports the pairwise *t* tests used to locate significant differences in the analysis of variances. Because of multiple comparisons Bonferroni correction was made leading to a more conservative  $\alpha$  level of 0.008. Changes in the STAI-S were no longer significant on any of the time comparisons. Significant differences were found between T1 and T3 on the IES, the IES subscales and the GHQ-12 suggesting a significant deterioration in general mental health (although mean scores remained subthreshold for GHQ-12) and increased PTSD symptoms. Significant differences were also found on these measures between T3 and T4 with scores moving in the direction of recovery although there was no change on the IES Hyperarousal scale. Overall, no significant differences were found between T1 and T4 on the GHQ-12 and the IES Avoidance and Hyperarousal subscales whereas there was a significant negative change on the IES and IES Intrusion subscale.

Students’ self-rating on skill acquisition pre and post-training is reported in Table V. Significant differences were found in all areas with the exception of “communicating with captives” demonstrating multiple perceived skill acquisition. The course evaluation and course comparison data suggest the course was emotionally and physically arduous and was considered especially emotionally demanding in comparison to other military courses. Many students reported that training had “significantly” better prepared them for captivity (a score of 4.2 where 1 is “not at all” and 5 is “extremely”) and 83% of students reported that the course was “significantly” or “extremely” relevant to their future role.

**DISCUSSION**

This article reports on the first U.K. studies of the psychological effects of RT training on both trainers and students. The results provide an important baseline of psychological health from which to monitor change. Overall, the data show that the mental health of RI staff appears modestly poorer than the rest of the AF population. In addition, our result shows that while RT students appear to find that going through RT left them better prepared if they were taken hostage it also was associated with a modest increase in traumatic stress symptoms at follow-up 1 month after the end of the course.

**RI Study**

This survey found that 32% and 22% of RIs met caseness criteria for anxiety and depression, respectively. This is slightly higher than the previously reported prevalence rate

**TABLE IV.** Pairwise *t* Tests to Identify Differences Between the Four Timeime-Points

	T1–T2	T1–T3	T1–T4	T2–T3	T2–T4	T3–T4
STAI-S	<i>t</i> (39) = –2.0	<i>t</i> (40) = 1.6	<i>T</i> (40) = 0.5	<i>t</i> (40) = 2.3	<i>t</i> (40) = 2.1	<i>t</i> (41) = –0.8
IES Total	<i>t</i> (34) = –3.0*	<i>t</i> (35) = –4.9**	<i>t</i> (35) = –2.8*	<i>t</i> (40) = –4.3**	<i>t</i> (40) = –0.7	<i>t</i> (41) = 3.6*
IES Intrusion	<i>t</i> (34) = –3.1*	<i>t</i> (35) = –5.3**	<i>t</i> (35) = –3.6*	<i>t</i> (40) = –5.2**	<i>t</i> (40) = –1.7	<i>t</i> (41) = 3.3*
IES Avoidance	<i>t</i> (34) = –2.9*	<i>t</i> (35) = 4.6**	<i>T</i> (35) = –1.7	<i>t</i> (40) = –2.6	<i>t</i> (40) = 0.4	<i>t</i> (41) = 3.7*
IES Hyperarousal	<i>t</i> (34) = –1.9	<i>t</i> (35) = –3.2*	<i>T</i> (35) = –1.7	<i>t</i> (40) = –3.4*	<i>t</i> (40) = –0.3	<i>t</i> (41) = 2.3
GHQ-12	<i>t</i> (38) = –1.6	<i>t</i> (39) = –3.2*	<i>T</i> (39) = –1.4	<i>t</i> (40) = –3.1*	<i>t</i> (40) = 0.4	<i>t</i> (41) = 2.9*

Bonferroni correction \**p* < 0.008; \*\**p* < 0.001.

**TABLE V.** Resistance Training Outcomes

	Time 1		Time 4		
	M	SD	M	SD	
<b>Skill Acquisition</b>					
Humanize Self to Captor	2.8	1.0	3.8	0.8	$t(38) = -6.6^{***}$
De-Escalate a Volatile Situation	3.0	1.0	3.5	0.9	$t(38) = -3.1^*$
Communicate With Captives	3.2	1.0	3.6	1.0	$t(38) = -1.1$
Communicate With Captors	2.9	1.0	3.7	0.8	$t(38) = -4.6^{***}$
Protect Information	2.9	1.0	3.9	0.7	$t(38) = -7.6^{***}$
Use Psychological Strategies	2.8	1.1	3.9	0.8	$t(39) = -5.7^{***}$
<b>Course Evaluation</b>					
Challenge	—	—	3.8	0.8	—
Physical Demands	—	—	3.4	0.8	—
Emotional Impact	—	—	3.2	0.9	—
Realistic	—	—	3.6	0.8	—
Prepared	—	—	4.2	0.8	—
<b>Course Comparison</b>					
Overall Comparison	—	—	3.9	0.8	—
Physical Demands	—	—	3.3	0.8	—
Emotional Impact	—	—	3.9	0.8	—

\* $p < 0.05$ ; \*\*\* $p < 0.001$ .

of 19% for CMHDs within a representative sample of UK AF personnel; rates in the U.K. general population have been reported as approximately 25%.<sup>9</sup> Alcohol misuse has been found to affect a substantial proportion of the UK AF: As high as 67% of male and 49% of female AFs personnel have been found to be “hazardous drinkers.”<sup>30</sup> Within this survey of RI, 77% reported increasing or higher risk drinking.<sup>30</sup> Although not asked directly in this study, other evidence has shown that drinking alcohol may be a form of “self-medication” to cope with psychological distress; it is possible that high levels of harmful drinking among RI could be related to high reported levels of CMHDs.

Although PTSD is relatively uncommon in the UK AF (4%–5%),<sup>9</sup> results again demonstrated modestly higher rates within RIs: 7% of RIs scoring above the PTSD screening threshold. This study did not, however, find any evidence that RIs were suffering with an excess of sleep problems. U.K. sleep research has found that 30%–40% of those surveyed report some sleep problems; 16%–21% reporting frequent disturbances of sleep and 10%–28% reporting moderate to severe problems.<sup>31</sup>

Although there are no “norms” for the MBI-GS within a U.K. military setting, overall the results do not suggest that the RI role is associated with significant burnout. Moderate levels of EX and CY were reported, but further research is needed to identify whether this is job-related because of other factors or whether these results are the “norm” for U.K. military personnel. A relatively high level of PE was reported suggesting RIs perceive, they are able to determine positive outcomes in the workplace. These positive scores are mirrored in the leadership and morale surveys, although a limitation of these measures is there are no interpretation guidelines of what is an appropriate and expected organizational benchmark for leadership and morale.

Overall RIs appear to have higher rates of psychiatric morbidity compared to their military peers. These results suggest that further study is warranted to determine if these differences are significant and what the causes might be. The results also suggest scope for improved support for the health and wellbeing of RIs and that those who supervise RIs should assess whether suitable safeguards are in place.

**RT Student Study**

The main focus of this study was to identify possible harmful psychological effects of receiving RT as evidenced by a significant effect on the STAI-S. Our results suggested a nonsignificant effect on anxiety (STAI-S) between pre-course and follow-up suggesting RT does not lead to significant psychological state-anxiety distress. However, results showed RT had a significant but temporary psychological impact with the IES and the GHQ-12 showing significant deterioration shortly before the end of training and with post-traumatic stress intrusive symptoms remaining elevated at 1-month postcourse. Thus, RT students appear to suffer with some short-term distress and may possibly have some longer term increase in traumatic stress symptoms. Further studies of larger samples would be able to examine whether the modest effects found in this study have any longer term impact on RT students. Also further exploration of how effective current mitigation initiatives (e.g., video recording of scenarios, access to GP) are in reducing the potential adverse effects of RT is warranted

U.S. research has also demonstrated that RT is stressful. Taylor et al administered the Clinician Administered Dissociative States Scale and found that 52% of students experienced dissociative symptoms pretraining and 94.4% during mock-captivity.<sup>6</sup> Research by USA SERE Clinical Psychologists has shown that 4.3% of their students experience

“significant adverse psychological reactions” during training.<sup>32</sup> Although stressful, U.K. RT does not seem to produce such adverse effects with the scores for both the STAI and the IES-R relatively low: normative mean State anxiety scores for U.S. working-age adults is 35.7 (male) and 35.2 (female) and for military recruits is 44 (male) and 47 (female), which compares with 29 to 32 in this study.<sup>21</sup> Multiple factors could be responsible for this, including that U.S. and U.K. “norms” may be different and therefore further study is clearly warranted. U.S. research has also shown that the psychological effects of RT continue to reduce 3-month post-training and this is likely to be trajectory for this study.<sup>6</sup> However, RT is often a predeployment training exercise and therefore consideration needs to be given to deploying personnel to high-threat roles in the immediate days post-training while the adverse psychological effect of RT might remain elevated. Similarly, students have only a short recovery period between the final high-stress practical exercise before they are permitted to leave the training establishment and many will have long journeys back to their unit. Consideration might be given about extending this recovery time to mitigate potential health and operational risks, which would also afford more time to monitor students’ psychological reactions.

An additional important study focus was to identify the potential impact of RT in terms of resiliency and skill acquisition. Psychological resiliency training presents a number of challenges not least because resiliency is a construct that is difficult to define and there is no “gold standard” measurement tool.<sup>25</sup> One commonly held definition is “an outcome of successful adaptation to adversity” that was operationalized as “recovery to baseline scores following RT.”<sup>25,33</sup> An important additional element to resiliency is “sustainability” that was operationalized as “maintaining baseline scores at 1 month follow-up” with any significant improvement at follow-up as evidence of “thriving.” To the authors’ knowledge, this is the first U.K. study to use the CD-RISC and therefore there is no culture-specific normative data.

This study found a mean resiliency score from 71.1 to 74.5, which appears low compared to the mean scores identified in the original U.S. CD-RISC validation study: U.S. general population 80.7, Primary care patient 71.8 and Psychiatric outpatient 68.0.<sup>24</sup> Other research has demonstrated a score of 83.4 in a study of nonpsychiatric U.S. combat veterans and 73.8 in a cohort of National Guard returnees from Iraq and Afghanistan.<sup>34,35</sup> Although there are likely to be cultural determinants to these self-ratings, these findings are somewhat surprising given the overall prevalence rate of common mental health problems in U.K. military personnel is less than the civilian population and therefore a mean resiliency score at least similar to general population rates might have been predicted. Also, a significant “bounce-back” in rates of resiliency at the end of training and/or 1-month follow-up might have been predicted but was not evident. Overall, it is not possible to

conclude that RT is associated with an increase in resilience 1 month after training nor is there any evidence for personnel “thriving” post-training.

It has been suggested that factors associated with resiliency include active coping, access to positive emotional states, and coping reappraisal.<sup>33</sup> Results from the training effects survey showed clear evidence of improvements in skill acquisition, which were related to these factors and these skills could be considered as protective in the face of extreme adversity. Results also suggest that the RT might be developed to include more focused teaching on how to “de-escalate a volatile situation” and “communicate with captors” as training effects were more limited in these areas.

### **Strength and Limitations of the Studies**

The RI study achieved a good response rate from those RIs who were asked to complete surveys. However, the numbers of subjects in that study were still small that may have increased the possibility of Type-II errors. Within the RT students study, the follow-up rate was poor as is often found in studies of military personnel with multiple time-points. Given that RT is part of predeployment training, it is likely that operational factors would have been responsible for many of the dropouts between T3 and T4. Our nonresponder analysis did not suggest a response bias. However, low final numbers would have increased the chance for Type-II errors. Although data show higher rates of PTSD among RIs compared to UK AF average, RI background information was not gathered, therefore potential confounders including number of deployments, exposure to trauma, or other variables may be responsible for the differences in results. However, as RIs are drawn from all arms of the UK AF, not just combat troops, rates should be similar and therefore differences likely attributable to RI role.

In addition, RT students’ GHQ-12 rates were considerably lower than rates found in other samples, which suggest possible underreporting of symptoms. It has been demonstrated that there is significant stigma in the armed forces toward mental health, which is attributed to why a significant proportion of soldiers who require mental health services do not seek help.<sup>36</sup> It is also of note that psychiatric diagnosis in the Army can have severe career implications.<sup>36</sup> These factors could have significantly affected uptake and retention as well as underreporting of symptoms. Conversely, “caseness” may be overestimated as self-assessment screening tools not diagnostic instruments were used resulting in possible over diagnosis. Although students demonstrated higher rates of anxiety disorders (including PTSD) and depression compared to the UK AF population, there are significant sociodemographic and military differences, including students more likely to be male, to have deployed to Afghanistan and exposed to traumatic events when compared to UK AF population, which could confound the results. Also, because of military operational factors, follow-up was restricted to

1 month limiting understanding of long-term effects of training in students. Although students were asked to complete questionnaires 1 month after the course, the actual questionnaires were given at the end of the course and potentially might have been completed at distribution or at a time other than 1-month postcourse, meaning results may not accurately represent students health 1 month after training.

Further studies would benefit from comparison of RI to instructors in other “high-risk” training areas as comparison of RIs to the general military population may be less than ideal: working in a military instructor role may be especially stressful. Also except differentiating between permanent and external staff, no other service or demographic data were collected. Without accounting for these variables, it is unclear whether other sociodemographic factors are responsible for the adverse mental health outcomes. Even if collected in this study, the small sample size and number of “cases” limit the power to detect only the most prevalent risk factors therefore future studies would benefit from larger cohorts to assess these.

## CONCLUSION

These studies represent an important first step in understanding the psychological effects and training outcomes associated with RT for U.K. personnel. Given that the results suggest that RIs report modestly worse mental health than other U.K. military personnel and also that RT students continue to report higher levels of post-traumatic stress symptoms 1 month after the end of RT, these initial results should be of interest to military commanders. However, given the limitations of the studies and small sample sizes, further studies are required before any firm conclusions can be drawn. Finally, it is important to bear in mind that the true effects of RT will only be understood from analyzing reactions during and after real hostage situations.

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