
Risky Driving Among Regular Armed Forces Personnel from the United Kingdom

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Background: Road traffic accidents are the leading cause of death for service personnel from the United Kingdom (UK). Little is known about the pattern of risky driving by these service personnel.

Methods: Cross-sectional data (collected postdeployment, between June 2004 and March 2006) were analyzed from a large, randomly selected cohort of military personnel from the UK. These analyses were limited to regular-service personnel who were drivers ($n=8127$; 7443 men and 684 women). "Risky driving" (not wearing a seatbelt, speeding, or both) was examined. Analyses were then repeated but restricted to those with experience of deployment to Iraq ($n=4611$). All analyses were undertaken during 2007.

Results: Nineteen percent of armed forces personnel from the UK were defined as risky drivers. Risky driving was associated with being of young age; being male; being in the Army; childhood adversity; being deployed to Iraq; having a combat role; and being separated, divorced, or widowed. Restricting analyses to those deployed to Iraq revealed that risky driving was associated with increasing exposure to traumatic events and low in-theater morale.

Conclusions: There are clear sociodemographic associations of risk-taking behaviors in the military population, and the study's results imply that risky driving is more common in drivers who had deployed.

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Introduction

The single-largest cause of death in serving military personnel from the United Kingdom (UK) is land transport accidents (unrelated to hostile action), which account for 32% of deaths.¹ This mirrors findings in the general population in the U.S. and the UK, where road traffic accidents are among the leading causes of death in younger age groups.^{2,3} In U.S. military and general population studies, young unmarried men with lower educational attainment are at the greatest risk for road traffic accidents.^{4–7}

Among military personnel from the U.S. and the UK, the risk of a road traffic accident is raised further in those who have had operational experience.^{8–14} Following the 1991 Gulf War, deaths due to external causes, such as road traffic accidents, were higher on return

from deployment than among a group of nondeployed military personnel,^{11–14} although the excess risk declined over time.^{15–17}

One hypothesis that may explain this excess is that excombatants may be more prepared to indulge in risk-taking behaviors such as speeding or driving without a seatbelt.⁴ Kang et al.¹⁸ found that U.S. Gulf War veterans who died from road traffic accidents were less likely to wear seatbelts or motorcycle helmets or to perform crash-avoidance behaviors than non-Gulf veterans who died from road traffic accidents; these U.S. Gulf War veterans were also more likely to speed, have consumed alcohol, have single-vehicle crashes, collide with fixed objects, experience rollovers, be ejected, have previous convictions for driving under the influence, and die at the scene of the accident.

Little is known about risky driving among military personnel from the UK and whether it is influenced by the experience of deployment. Using data from a large, randomly selected cohort of military personnel from the UK,¹⁹ the current study examined risky driving, testing the hypothesis that deployment is associated with an increase in risky driving and examining whether there are any deployment-related factors that place service personnel from the UK at increased risk.

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Methods

Study Sample

Full details of the study and responders can be found in Hotopf et al.¹⁹ In brief, that study was the first phase of a cohort study of military personnel from the UK in service at the time of the 2003 Iraq War (Operation TELIC, the military code name for the current operation in Iraq) in March 2003. A total of 4722 regular and reserve personnel who were deployed on TELIC 1 (the war-fighting phase) and 5550 regular and reserve personnel who were not deployed on TELIC 1 (referred to as "ERA") completed a questionnaire (postdeployment, between June 2004 and March 2006) on their military and deployment experiences, lifestyle factors, and health outcomes. For the purposes of the current study, TELIC 1 was defined as January 18, 2003–April 28, 2003. A percentage of the ERA group were subsequently deployed on later TELIC deployments, when the deployment changed to counter-insurgency (i.e., TELIC 2–6). The current study compared those deployed on TELIC 1 and those deployed on later phases of TELIC to a non-TELIC deployed group (non-TELIC).

The response rate after three mailings and intensive follow-up was 59% ($n=10,272$). The main reason for nonresponse was the inability to contact personnel. There was no evidence of any response bias by health outcome or medical downgrading status (being fit for operational deployment).²⁰ The response rate was lower among those not deployed on TELIC 1 (56% vs 62%), but this difference was greatly reduced once sociodemographic factors were taken into account.¹⁹

Data Collection

Data covering a wide range of factors were collected via a self-completion questionnaire. All data collected are held anonymously to ensure participant confidentiality. Furthermore, no identifiable data are released to any other party.

For the purposes of these analyses, the following variables were considered:

Risky driving. Defined as *anyone who sometimes, seldom, or never wears a seatbelt; or who drives more than 10 mph above the limit (10 mph is equivalent to 16 kilometers per hour [kph]) in a built-up area, or more than 20 mph above the limit on a motorway (20 mph is equivalent to 32 kph).* Questions on seatbelt usage and speeding were adapted from the study by Bell et al.⁴

Self-harm. Defined as *anyone who had ever purposefully hurt himself or herself.*

Heavy smoking. Defined as *smoking ≥ 20 cigarettes per day.*

Heavy drinker. Defined as *having a score of ≥ 16 on the WHO's Alcohol Use Disorders Identification Test.*²¹

Childhood adversity. From 16 questions about experiences in childhood (e.g., playing truant from school, being hit regularly by parents or caregivers), a composite score of adverse childhood events was constructed, with a higher score indicating greater adversity. Further details of this measure can be found in Iversen et al.²²

Health outcomes. The General Health Questionnaire-12 (GHQ-12)^{23,24} was used to measure symptoms of common

mental disorder in the past month. The 17-item National Center for Post-Traumatic Stress Disorder Checklist (PCL-C) was used as a measure of symptoms of posttraumatic stress disorder (PTSD).²⁵ General well-being was assessed using the general health-perception question of the 36-item Short Form health survey (SF-36).^{26,27} The defined (and previously used)¹⁹ cut-off values were a score of ≥ 4 for the GHQ-12; a score of ≥ 50 on the PCL-C; and a self-description of one's health as *poor* or *fair* on the SF-36. The survey also asked whether individuals had had a serious accident (i.e., been taken to an Accident & Emergency department or similar facility) within the last 5 years. If a participant responded positively, the cause of the accident was also sought (e.g., road traffic accident, sport or leisure activity, military training, military operations).

Deployment factors. Exposure to traumatic events while in-theater was a variable derived from the number of traumatic events experienced while on deployment. Traumatic events included discharging a weapon in direct combat, coming under small-arms fire or mortar attack, experiencing a land-mine strike, and aiding the wounded. Participants were also asked four questions—adapted from the U.S. Deployment Experiences Survey²⁸—to measure morale/comradeship during deployment; a composite variable was generated from the four questions. The composite variable was divided into three equal groups to represent those with the highest, middle, and lowest levels of morale/comradeship.

Analytical Sample

Reported analyses were based on data from regular-service personnel only. Reservists often have military roles, social backgrounds, and postdeployment experiences different from regulars,^{19,29} and they have a lower prevalence of risky driving than regulars (14% vs 19%, respectively, $p<0.0001$). Further, the sample was restricted to drivers. The analytical sample considered here consisted of 8127 personnel (7443 men and 684 women).

Statistical Analysis

Univariate and multivariate logistic regression analyses were performed to examine the relationships among risky driving, demographic and military characteristics, other risk-taking behaviors, and health outcomes.³⁰ Odds ratios, 95% CIs, and two-sided p -values are presented. All analyses were performed during 2007 using STATA version 9.2; significance was defined as $p<0.05$.

Results

The Demographics of Risky Driving

Nineteen percent of armed forces personnel from the UK were defined as risky drivers ($n=1504$). Men were significantly more likely than women to be risky drivers (men: 19.5%, $n=1437$; women: 9.9%, $n=67$; χ^2 statistic=37.51, based on 1 df, $p<0.0001$). An examination of the behaviors combined to generate this variable showed that 14% of armed forces personnel from the UK drove more than 20 mph above the speed limit on a motorway ($n=1093$); 6% sometimes, seldom, or never wore a seatbelt ($n=498$); and

Table 1. Sociodemographic and military factors associated with risky driving

	<i>n</i> (%)	OR (95% CI)	AOR ^a (95% CI)
Age (years)			
<25	420 (32.3)	1.75 (1.52, 2.01)	1.60 (1.34, 1.90)
25–34	738 (21.5)	1.0	1.0
35–44	308 (11.6)	0.48 (0.42, 0.56)	0.52 (0.43, 0.61)
≥45	38 (5.7)	0.22 (0.16, 0.31)	0.29 (0.19, 0.43)
Gender			
Male	1437 (19.5)	1.0	1.0
Female	67 (9.9)	0.45 (0.35, 0.59)	0.45 (0.33, 0.62)
Rank			
Officer	167 (11.2)	0.49 (0.41, 0.58)	1.09 (0.84, 1.42)
Other	1337 (20.4)	1.0	1.0
Service			
Naval	206 (15.3)	0.59 (0.50, 0.70)	0.81 (0.67, 0.98)
Army	1168 (23.3)	1.0	1.0
RAF	130 (7.6)	0.27 (0.22, 0.33)	0.39 (0.31, 0.49)
Deployment status			
TELIC 1	806 (22.1)	1.67 (1.48, 1.89)	1.33 (1.15, 1.54)
TELIC 2+	192 (21.0)	1.57 (1.31, 1.89)	1.10 (0.88, 1.37)
Non-TELIC	506 (14.5)	1.0	1.0
Role within parent unit			
Combat	466 (28.4)	2.34 (2.04, 2.68)	1.28 (1.08, 1.53)
Medical/welfare	49 (12.9)	0.87 (0.64, 1.19)	0.69 (0.46, 1.03)
Logistics/supply	211 (18.8)	1.37 (1.15, 1.62)	1.05 (0.87, 1.41)
Communications	150 (23.2)	1.77 (1.45, 2.17)	1.11 (0.87, 1.41)
Other	607 (14.5)	1.0	1.0
Marital status			
Married/cohabiting	1071 (16.9)	1.0	1.0
Single	322 (26.6)	1.79 (1.55, 2.06)	1.09 (0.91, 1.31)
Separated/divorced/widowed	105 (21.7)	1.36 (1.09, 1.71)	1.58 (1.20, 2.08)
Number of childhood adversity factors			
0–1	192 (9.8)	1.0	1.0
2–3	372 (14.8)	1.59 (1.33, 1.92)	1.52 (1.23, 1.88)
4–5	330 (22.4)	2.66 (2.19, 3.23)	2.17 (1.74, 2.72)
6–16	517 (29.3)	3.82 (3.19, 4.58)	3.02 (2.43, 3.74)
Educational qualifications			
No qualifications	157 (26.4)	1.35 (1.10, 1.65)	1.09 (0.85, 1.41)
Ordinary levels or equivalent ^b	692 (21.1)	1.0	1.0
Advanced levels or equivalent ^c	417 (17.8)	0.81 (0.71, 0.93)	1.11 (0.94, 1.30)
University degree or equivalent	166 (11.7)	0.49 (0.41, 0.59)	1.00 (0.77, 1.30)
Ethnic group			
White	1255 (17.9)	1.0	1.0
Nonwhite ^d	58 (23.5)	1.41 (1.04, 1.90)	1.07 (0.74, 1.55)

^aAdjusted for age, gender, service, rank, deployment status, role within parent unit, marital status, educational qualifications, childhood adversity score, and ethnic group

^bUsual examinations taken after finishing secondary education (usually when aged 16 years)

^cUsual examinations required for entry into university or equivalent (usually when aged 18 years)

^dIncludes those with mixed parentage and those who class themselves as Indian, Pakistani, Bangladeshi, black, or any other ethnic group
RAF, Royal Air Force; TELIC 1, the war-fighting phase; TELIC 2+, the counter-insurgency phase

5% drove more than 10 mph above the speed limit in a built-up area. Of the 1504 risky drivers, 73% reported one risky-driving behavior ($n=1096$); 23% reported two ($n=347$); and 4% reported three risky-driving behaviors ($n=61$).

Table 1 presents the sociodemographic and military factors associated with risky driving. Risky driving was associated with being young; male; in the Army; of a lower rank; deployed on TELIC 1 or 2+; in a combat, logistics, or communications role; unmarried; of lower educational attainment; nonwhite; and having experienced childhood adversity. Following adjustment, risky

driving remained associated with being young; male; in the Army; deployed on TELIC 1; in a combat role; separated, divorced, or widowed; and having experienced childhood adversity. The strongest associations were observed for being young, in the Army, and having experienced childhood adversity.

Table 2 shows how risky driving is associated with heavy smoking and heavy drinking. Table 2 also shows that risky drivers are more likely to have had a serious road traffic accident within the last 5 years and to report PTSD symptoms or symptoms of common mental disorders.

Table 2. Associations between risky driving and other risk-taking behaviors, having an accident within the last 5 years, and other health outcomes

	Risky driving	
	<i>n</i> (%)	AOR ^a (95% CI)
Risk-taking behaviors		
Previous self-harm	38 (2.5)	1.10 (0.73, 1.66)
Heavy smoking	287 (19.2)	1.68 (1.42, 2.00)
Heavy drinking	443 (29.8)	1.90 (1.63, 2.21)
Accidents		
Any accident	504 (34.2)	0.97 (0.85, 1.10)
Road traffic accident	143 (9.5)	1.26 (1.01, 1.58)
Other health outcomes		
Posttraumatic stress symptoms (PCL-C)	106 (7.2)	1.74 (1.32, 2.29)
Symptoms of common mental disorder (GHQ-12)	403 (27.1)	1.43 (1.24, 1.66)
Fair/poor general health	202 (13.6)	1.07 (0.89, 1.29)

^aAdjusted for age, gender, service, deployment status, role within parent unit, marital status, and childhood adversity score
GHQ-12, General Health Questionnaire (12-item); PCL-C, National Center for Post-Traumatic Stress Disorder Checklist

Deployment-Related Factors Associated with Risky Driving

To further examine the association observed with deployment to Iraq, analyses restricted to those personnel with TELIC deployment experience (*n*=4611) were undertaken. Risky driving was associated with increasing exposure to in-theater traumatic events and to low in-theater morale/comradeship for TELIC 1 (Table 3). For the later TELIC deployments, risky driving was associated with increasing exposure to in-theater traumatic events and problems at home.

No associations were apparent between risky driving and the time between leaving the theater and completing the study questionnaire (data not shown).

Discussion

Principal Findings

This study, which examined risky driving among 8127 regular armed forces personnel from the UK, showed that 19% of the personnel were defined as risky drivers. Risky driving was associated with being young; in the Army; male; deployed on TELIC 1 (the first phase of the 2003 Iraq War); in a combat role; separated, divorced, or widowed; and having experienced childhood adversity. The strongest associations were observed for being young; in the Army; and having experienced childhood adversity. Risky driving was also associated with being a heavy drinker; being a heavy smoker; having a road traffic accident; reporting PTSD symptoms; and reporting symptoms of common mental disorder. Further, among those deployed on TELIC 1, risky driving was associated with increasing exposure to traumatic events and low in-theater morale. Associations with later TELIC deployment were less consistent.

Risky Driving and the Military

Various reasons have been suggested for the increase in risk-taking behaviors among those with deployment experience.³¹ It is plausible that the excess of risky driving is explained by the persistence on homecoming of driving behaviors that are essential and encouraged during deployment. For instance, driving fast and unpredictably, not wearing a seatbelt, making rapid lane changes, and straddling the middle line are necessary in-theater to avoid improvised explosive devices and ambushes.³² A recent survey of 237 British Army personnel on operational deployment in Iraq revealed that 47% of the drivers sometimes or never wore a seatbelt,³³ even though wearing a seatbelt is mandatory.³⁴ The reasons given for not complying with the regula-

Table 3. Deployment factors associated with risky driving for those deployed on TELIC

	TELIC 1		TELIC 2+	
	<i>n</i> (%)	AOR ^a (95% CI)	<i>n</i> (%)	AOR ^a (95% CI)
Exposure to trauma				
1 traumatic exposure	206 (14.1)	1.0	49 (14.2)	1.0
2-4 traumatic exposures	296 (24.9)	1.28 (1.03, 1.60)	68 (23.0)	1.23 (0.78, 1.96)
5-16 traumatic exposures	288 (32.8)	1.69 (1.31, 2.18)	66 (32.2)	2.03 (1.21, 3.41)
Time in theater (months)				
0-1	76 (19.0)	1.35 (0.96, 1.89)	14 (17.7)	1.43 (0.61, 3.36)
2	162 (19.0)	1.0	18 (18.8)	1.0
3	166 (24.0)	1.20 (0.92, 1.57)	17 (20.0)	1.11 (0.49, 2.49)
4	116 (26.7)	1.25 (0.93, 1.70)	23 (16.1)	0.82 (0.39, 1.73)
5-6	33 (27.7)	1.05 (0.63, 1.75)	80 (27.2)	1.15 (0.61, 2.18)
≥7	35 (19.0)	1.01 (0.65, 1.57)	17 (25.4)	1.12 (0.50, 2.52)
Morale/comradeship in theater				
Highest	253 (20.3)	1.0	68 (21.1)	1.0
Middle	263 (20.5)	0.98 (0.79, 1.21)	59 (19.5)	0.94 (0.61, 1.44)
Lowest	290 (25.7)	1.32 (1.06, 1.64)	65 (22.6)	1.03 (0.67, 1.57)
Problems at home (while on deployment)				
	166 (25.2)	1.10 (0.89, 1.37)	63 (28.1)	1.59 (1.08, 2.34)

^aAdjusted for age, gender, service, role within parent unit, marital status, and childhood adversity score
TELIC 1, the war-fighting phase; TELIC 2+, the counter-insurgency phase

tions were that seat belts inhibited the exiting of the vehicle and the use of weapons.³³

Risky driving is more common in Army personnel than in the Naval Services or Royal Air Force personnel. Injury hospitalization rates are higher for active-duty U.S. Army personnel than for active-duty Navy or Air Force personnel.³⁵ This may be because Army personnel are exposed to more traumatic events; this, in turn, increases their risk-taking behavior. This study reports an association between risky driving and the number of traumatic exposures experienced during deployment. Others have argued that exposure to traumatic experiences alters an individual's perception of his or her own risk of being harmed on returning home because of a personal sense of invulnerability.¹⁷

Another possible explanation is that those who join the military are likely to be risk-takers, particularly those who join to undertake a combat role. Hooper et al.⁷ propose that entering certain combat specialties—and even entering the military at all—brings together individuals with certain traits such as high-risk tolerance.

Research among U.S. military personnel shows that even predeployment, there were more risk-taking behaviors (such as driving under the influence, speeding, and failure to wear seatbelts) by personnel who subsequently deployed to the 1991 Gulf War than by those not deployed.³⁶ Furthermore, those who deployed were more likely to receive hazardous duty pay (for activities such as parachuting) and to be hospitalized for an injury predeployment than were nondeployed Gulf War veterans.^{36,37}

Risky Driving and Sociodemographic Factors

Road traffic accidents do not occur at random. The authors' finding that risk taking is highest in the young has been consistently reported in the literature.^{38,39}

That childhood adversity is associated with risky driving was shown in this study. Previous work indicated that risky driving correlates with a variety of markers of problem behavior in adolescence, including poor school adjustment, having an antisocial peer group, and reduced social competence.^{40–42} This may be because childhood adversity is associated with risk taking/impulsivity, low frustration tolerance, and sensation seeking in adult life,⁴³ and these factors are associated with risky driving.⁴⁴

Associations with Other Risk-Taking Behaviors

This study has shown that risk-taking behaviors co-vary. There is a clear association of risky driving with heavy alcohol use and heavy smoking. Work in the U.S. has shown that heavy drinkers are more likely to drive after drinking, to speed, to fail to wear seatbelts, and to be hospitalized.^{4,45–50}

Associations with Other Health Outcomes

According to this study, an association exists among posttraumatic stress symptoms (as measured by the PCL-C); symptoms of common mental disorder (as measured by the GHQ-12); and risky driving. Vassallo et al.⁵¹ have demonstrated that although risky-driving behaviors do not appear to be related to internalized problems such as depression and anxiety, they are clearly related to other problem behaviors such as substance and alcohol misuse as well as antisocial behavior.

There is evidence to suggest that young adults exposed to repeated traumas are more likely to indulge in a range of risk-taking behaviors.^{52,53} Vietnam veterans with PTSD were more likely to die from accidental causes than those without PTSD, suggesting that risk taking may have been increased in this group.⁵⁴ This may be because the same personality traits that predispose an individual to risky-driving behaviors (e.g., sensation seeking) would also predispose that individual to exposure to combat situations, with the consequential risk of PTSD. There is evidence in both military and general population studies^{55,56} to suggest that this is the case. Alternatively, the symptoms of PTSD may make it more likely that an individual would indulge in risk-taking behavior; for example, the avoidance cluster of symptoms may increase risk taking as a mechanism to externalize distress or to act out to relieve tension.

Comparisons with the General Population of the United Kingdom

Data from England and Wales show that in July 2005, 14% of drivers aged ≥ 18 years drove at 90 mph on the motorway at least every 2–3 months (10% driving at 90 mph at least monthly), and that 7% when traveling in the front of a car did not wear a seatbelt at least every 2–3 months (6% not wearing a seat belt at least monthly).⁵⁷ These data are not directly comparable, but they do reflect the results reported here (14% of armed forces personnel from the UK drove more than 20 mph above the speed limit on a motorway, and 6% sometimes, seldom, or never wore a seatbelt).

Strengths and Limitations

This study is the largest ever conducted within the armed forces of the UK, with the sample being representative of all three services. The response rate of 59% is comparable to that achieved by other population-based studies, especially of populations dominated by young men. Participation was limited due to either difficulty in finding people or participant inertia.⁵⁸ Further, there was no evidence of any response bias by health outcome or medical downgrading status (being fit for operational deployment).²⁰

Despite the large numbers studied, the analyses by phase of TELIC deployment were limited by the small number of respondents participating in later phases of TELIC. Hence, the results of these analyses should be treated with caution. Further, data were not collected on driving duties undertaken within Iraq; those with driving duties may be more likely to maintain in-theater driving behaviors on their return to the UK. Additional data collection is now under way, and a question on driving duties while on deployment has been included.

The self-reported behaviors on which this study relied are vulnerable to response bias. There are clearly socially desirable answers for questions related to risk taking and health behaviors. The giving of socially desirable responses has been shown to be more common among women (than men) for dietary factors⁵⁹ but not for alcohol and drug use⁶⁰; older age groups (compared to younger age groups) have been shown to give more socially desirable responses for drug and alcohol use⁶⁰; no association has been seen with ethnicity.⁶⁰ U.S. data have shown that military personnel are slightly more likely to report driving under the influence of alcohol in an anonymous survey compared to a non-anonymous survey (6.4% vs 4.7%).⁶¹ Therefore, the true levels of risky driving may be higher than the levels reported in this study. This may be particularly true for individuals who are still serving in the military, who may have feared that reporting risky driving would have an impact on their careers. These analyses include a small percentage (approximately 10%) of veterans (i.e., personnel who have left the services); however, no difference in the prevalence of risky driving was observed between serving personnel and veterans (data not shown).

Risky driving was examined at only one point in time; therefore, the direction of causality of the associations was unable to be determined. The authors have consent to link this self-reported behavior data to a UK Ministry of Defence database that holds information on accidents and deaths among regular-service personnel; this will allow the authors to determine whether risky driving is associated with an increase in accidents and deaths.

Implications

The implications of this work are threefold. First, risk is not distributed evenly. There are clear demographic associations of risk-taking behavior that would allow potential interventions to be preferentially targeted. Second, there needs to be awareness of the increase in risky driving among personnel who have been deployed. Finally, risk-taking behaviors co-vary, and therefore the public health impact of these findings may extend further than the measures of risk taking reported here. Although this paper has focused on the associations of risky driving with heavy alcohol use and

heavy smoking, there is evidence that risk taking is also associated with a variety of other risk behaviors, such as the use of illicit drugs and unsafe sexual practices.^{62,63}

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