Full length article

Resiliency factors that protect against post-deployment drug use among male US Army Reserve and National Guard soldiers

Rachel A. Hoopsick*, Katelyn R. Benson, D. Lynn Homish, Gregory G. Homish

Department of Community Health and Health Behavior, University at Buffalo, The State University of New York, Buffalo, NY, USA

ABSTRACT

Background: Service members who have been deployed are at risk for substance use, especially Reserve/Guard troops. However, it is unclear what modifiable factors protect against substance use in this at-risk population. Our objective was to examine the effects of pre-, peri-, and post-deployment resiliency factors on post-deployment drug use.

Methods: Data were drawn from Operation: SAFETY (Soldiers and Families Excelling Through the Years), an ongoing study examining the health of US Army Reserve/National Guard (USAR/NG) soldiers. This sample consisted of male USAR/NG soldiers with at least one combat deployment (N = 228). At baseline, we assessed the following as potential protective factors: deployment preparation, unit support and support from family/ friends during soldiers' most recent deployment, and marital satisfaction. We examined the relations between each of these resiliency factors with drug use at the first follow-up assessment using the NIDA modified ASSIST 2.0.

Results: Greater unit support (AOR = 0.56, 95% CI: 0.34, 0.92; $p < 0.05$) and support from family/friends during deployment (AOR = 0.64, 95% CI: 0.43, 0.96; $p < 0.05$) were associated with lower odds of drug use, controlling for age, rank, years of military service, combat exposure, traumatic brain injury, time since last deployment, and baseline drug use. Deployment preparation and marital satisfaction were not associated with drug use ($ps > 0.05$).

Conclusions: Social support provided to soldiers during deployment, either by his unit or his family/friends, showed evidence of protection against post-deployment drug use. In addition to existing post-deployment ef- forts, we recommend interventions that facilitate stronger interpersonal relationships *during* deployment.

1. Introduction

Service members in Reserve and Active Components have simila- rities in combat experiences, but United States Army Reserve/National Guard (USAR/NG) soldiers report higher rates of mental health pro- blems and treatment needs for post-traumatic stress disorder, depres- sion, and substance abuse than their active duty counterparts (Jacobson et al., 2008; Milliken et al., 2007; Riddle et al., 2007; Smith et al., 2008; Thomas et al., 2010). Reserve Components constitute 38% of the United States military (Defense Manpower Data Center, 2017). Growing the size and capacity of Reserve Components has been identified as a strategic goal by a federal advisory committee to the United States Department of Defense (Reserve Forces Policy Board, 2017). Per- forming the same duties as Active Components, but at approximately one third of the cost (Reserve Forces Policy Board, 2017), Reserve

Components have been increasingly relied upon in the post-9/11 era to serve overseas in combat zones (Defense Science Board Task Force, 2007). Service members who have been deployed to combat zones are at increased risk for licit and illicit substance use (Bennett et al., 2013). Prevalence estimates suggest that more than half of National Guard soldiers will experience a substance use disorder in his or her lifetime, with an increased risk among those who have experienced one or more deployments (Tamburrino et al., 2015). As the population of pre- viously-deployed USAR/NG soldiers continues to grow, it is critical to understand what factors contribute to enhanced resiliency and confer protection against post-deployment drug use.

1.1. Resiliency factors

There is a strong body of evidence demonstrating the protective role

---

of resiliency factors against adverse health outcomes among military personnel. Wooten's Bioecological Model of Deployment Risk and Resilience provides a military-informed framework for understanding the relations between protective factors and post-deployment outcomes (Wooten, 2013). Within this framework, it is thought that service members affect and are affected by the ecological environment and protective factors may originate from any point during the deployment disruption continuum (i.e., pre-deployment, peri-deployment, post-deployment). Thus, military organizational (e.g., deployment preparation) and social contexts (e.g. unit support, support from family and friends, marital satisfaction) are important to consider for soldiers' post-deployment trajectories. However, much of the resiliency literature focuses on mitigating poor mental health outcomes, namely posttraumatic stress disorder (PTSD) and depression. Resiliency factors that protect against drug use in the military have not been well-described in the literature, particularly among USAR/NG soldiers, who are at increased risk for post-deployment substance use, but remain an understudied population.

Previous research has shown that higher levels of deployment preparation are associated with better mental health outcomes among service members in Reserve Components (Goldmann et al., 2012; Polusny et al., 2009, 2011). However, the effect of military preparedness was no longer observed after considering the effects of other resiliency factors, including social support (Polusny et al., 2011). Further, work by Shea et al. showed that deployment preparation was only protective against poor mental health outcomes for soldiers with "lower-level" combat experiences (Shea et al., 2013). Research has also shown that deployment preparation does not protect against anger, depression or anxiety among previously deployed USAR/NG soldiers (Vest et al., 2017). Similarly, work by Renshaw demonstrated that soldiers' perceived level of preparedness did not buffer the effects of combat on post-deployment mental health (Renshaw, 2011). A study conducted by Ursano et al. (2018a, 2018b) demonstrated that while greater deployment preparedness was associated with a lower likelihood of mental health problems, deployment preparation was not associated with binge drinking. Whereas research from the Millennium Cohort Study concluded that pre-deployment preparedness was statistically associated with alcohol problems, but requires further research to understand if and how changes in deployment preparedness can be targeted to reduce the risk of alcohol problems (Orr et al., 2014). Findings on the relation between deployment preparation and mental health outcomes are mixed, and the relation between preparedness and post-deployment drug use is not known.

Literature regarding unit support as a potential resiliency factor is also unclear. Research has shown that greater unit support was associated with less PTSD symptomatology among Reserve Components (Goldmann et al., 2012; Pietrzak et al., 2009). Other work demonstrated that unit support did not promote resilience against PTSD, but was protective against anger among USAR/NG soldiers (Vest et al., 2017). Research has also shown greater support from military peers and unit leadership was associated with a lower likelihood of post-deployment alcohol problems, aggression, and risky behaviors among soldiers (Wright et al., 2012). Unit cohesion has also been shown to mitigate post-deployment avoidant coping (characterized by efforts to deny, minimize, or avoid dealing directly with stressful demands) (McAndrew et al., 2017) and attenuate the effects of stressful events on PTSD (Brailey et al., 2007). These findings warrant further examination of the effect of unit support on other maladaptive coping strategies, including post-deployment drug use.

Support from family and friends has been shown to be protective against depression and PTSD among USAR/NG soldiers (Vest et al., 2017), but this effect was no longer observed after controlling for service-related factors, including level of combat exposure. Other evidence suggest that interpersonal relationships are frequently a source of stress among service members (Laffaye et al., 2008; Yan et al., 2013). However, research also shows that a lack of social support from friends and family is associated with self-harm among service members (Hines et al., 2013), while greater social support has been shown to protect against depressive symptoms, regardless of deployment experiences (Welsh et al., 2015). Additionally, social support has been shown to buffer the relationship between stress and alcohol problems among service members (Kelley et al., 2017). Other research examining previously deployed service members suggests that although family support protects against poor mental health outcomes, this relationship is partially explained by intimate partner relationship functioning (Cederbaum et al., 2017). The effect of support from family and friends, particularly during the peri-deployment period, on post-deployment drug use has not been described in the literature.

Among non-military populations, relationship functioning has been shown to promote resiliency against substance use; for example, higher levels of marital satisfaction were protective against subsequent alcohol problems among recently married husbands and wives (Leonard and Homish, 2008). To our knowledge, marital satisfaction has not been examined as a protective factor that may reduce the incidence of post-deployment drug use among service members. However, recent research demonstrated that marital satisfaction was a strong resiliency factor in protecting against post-deployment anger, anxiety, depression, and PTSD among male USAR/NG soldiers (Vest et al., 2017), and has also been shown to protect against the effects of combat exposure on alcohol problems among this population (Vest et al., 2018).

1.2. Current study

Given that USAR/NG soldiers represent a high risk, but understudied population that is expected to grow (Reserve Forces Policy Board, 2017), it is important to gain a better understanding of what factors positively affect post-deployment drug use. The current study examined a data subset from Operation: SAFETY (Soldiers and Families Exceling Through the Years), an ongoing survey-based study that examines the health and well-being of USAR/NG soldiers and their partners. The objective of this sub-study was to examine the relations between pre-, peri-, and post-deployment resiliency factors and post-deployment drug use, while controlling for relevant demographic and service-related factors. We hypothesized that sources of social support (i.e., unit support, support from family and friends) and marital satisfaction would confer stronger protection against post-deployment drug use than deployment preparation.

2. Material and methods

2.1. Recruitment

We recruited USAR/NG soldiers and their partners over a 15-month period (Summer 2014 - Fall 2015) from 47 units across New York State. Participants were screened on 6 inclusion criteria: (i) The couple is married or living as if married; (ii) 1 partner is a current U.S. Army Reserve and National Guard soldier; (iii) the soldier is age 18–45; (iv) both partners speak and understand English; (v) both partners are willing and able to participate; and (vi) both partners have had at least 1 alcoholic beverage in the past year. A total of 731 male and female soldiers and their partners were eligible for inclusion in Operation: SAFETY. Of those, 572 (78%) agreed to participate and 83% of these couples ($N = 472$, 65% of those eligible) completed some part of the survey. Surveys were included only if both partners completed baseline in its entirety ($N = 418$). We conducted sensitivity analyses and found that couples where a civilian partner screened for the study ($n = 11$) were less likely to enroll ($p < 0.001$) than couples where a soldier screened for the study. In the current research, we examined a subset of data from Operation: SAFETY that included male soldiers who completed the baseline and first follow-up assessments and who also reported at least one deployment prior to baseline ($N = 228$). The retention rate of these deployed male soldiers from baseline to first

follow-up assessment was 93.1%.

2.2. Procedures

Surveys were administered and encrypted with the HIPAA-compliant survey programming software, StudyTrax™. Participants had the option to complete their consent and survey online using unique login information or by coming to the Center for Health Research at the University at Buffalo, The State University of New York. Baseline surveys took approximately 2 ½ hours to complete and follow-ups lasted 90 min. Participants received a $60 check at baseline and a $70 check at each follow-up.

2.3. Participants

Soldiers were predominantly Non-Hispanic White (81.2%), had at least some college education (86.5%), and had a median family income between $60,000 and $79,999. The majority of these soldiers were married at baseline (76.8%), with the remainder living as if married. Soldiers had a mean (± standard deviation [SD]) age of 33.5 (± 6.0) years and served an average of 12.1 (± 5.7) years in the military. Most soldiers (81.6%) reported serving in post-9/11 operations in Iraq or Afghanistan during their most recent deployment prior to baseline and were in an enlisted rank (84.2%).

2.4. Analysis

All statistical analyses were performed using Stata version 15.1 software (Stata Corporation, College Station, TX). We used descriptive statistics to characterize the study sample. We calculated independent samples t-tests comparing pre-, peri-, and post-deployment resiliency factors on post-deployment drug use. To allow for meaningful comparisons, each of the resiliency measures was then standardized using z-scores. We used logistic regression models to separately examine the relations between standardized baseline measures of resiliency (deployment preparation, unit support during deployment, support from family and friends during deployment, and post-deployment marital satisfaction) and current drug use (illicit drug use or nonmedical use of prescription drugs) at first follow-up. Final adjusted models controlled for age, rank, years of military service, combat exposure, traumatic brain injury, time since last deployment, and lifetime drug use at baseline. We reported adjusted odds ratios (AORs) and 95% confidence intervals (CIs).

2.5. Measures

2.5.1. Deployment preparation

The Deployment Risk and Resiliency Inventory-2 (DRRI-2) (Vogt et al., 2012) is comprised of 17 individual scales that assess risk and resiliency factors associated with military deployments and stressors. The subscales have been validated for use in nonclinical military populations (Maoz et al., 2016) and can be administered independently of the larger 17-measure inventory. At baseline, we used the Training and Deployment Preparation Scale to assess soldiers' perceived readiness for their most recent deployment. This scale includes 10 items regarding soldiers' perceptions of deployment and had good internal reliability consistency in our sample ($\alpha = 0.93$). Items are scored on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) and summed for an overall score range of 10–50, with higher scores indicating greater deployment readiness. Example items include, "My military duties and assignments were what I expected," and "The training I received taught me everything I needed to know for deployment."

2.5.2. Unit support

We assessed soldiers' perceived social support from unit leaders and unit members during the most recent deployment prior to the baseline assessment using the 12-item Unit Support Scale from the DRRI-2 (Vogt et al., 2012). Items are scored on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree) and summed for an overall score range of 12–60, with higher scores indicating greater unit support. Example items include, "My service was appreciated by the leaders in my unit," and "I felt valued by my fellow unit members" ($\alpha = 0.96$).

2.5.3. Support from family and friends

At baseline, we assessed the extent to which soldiers felt emotionally supported and able to count on family and friends to carry out necessary functions at home during their most recent deployment with the Support from Family and Friends Scale from the DRRI-2 (Vogt et al., 2012). This measure consists of 8 items scored on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). Items are summed for an overall score range of 8–40, with higher scores representing greater perceived family support during their most recent deployment prior to baseline. This scale includes items such as, "During my deployment, family members and/or friends back home were sincerely interested in hearing what was going on with me," and "During my deployment, relatives or friends at home could be counted on to take of my finances, property, or belongings, if needed" ($\alpha = 0.95$).

2.5.4. Marital satisfaction

We assessed soldiers' relationship functioning at baseline with the Marital Adjustment Test (MAT) (Locke and Wallace, 1959). This 15-item measure has been well validated in measuring overall marital satisfaction and adjustment of partners to each other. Questions include the extent of agreement with their spouse and degree of happiness that the individual has in their relationship. Responses to each question are summed for a total relationship satisfaction score ranging from 2 to 158, with higher scores indicating a stronger marriage/romantic partnership ($\alpha = 0.76$). Example items include the following: "degree of happiness" in the current relationship, level of partner agreement on the handling of family finances, sex relations, and philosophy of life, and if the participant would marry/get involved with the same person if they "had [his/her] life to live over again."

2.5.5. Current drug use

We used the NIDA Modified ASSIST 2.0 (Alcohol, Smoking, and Substance Involvement Screening Test) to assess current use of illicit drugs and nonmedical use of prescription drugs (NMUPD) at first follow-up (WHO Assist Working Group, 2002). The ASSIST was previously vigorously tested with three phases to examine and ensure reliability and validity across settings and cultures (WHO Assist Working Group, 2002). Illicit drug use included the use of cannabis, cocaine or crack, stimulants, inhalants, sedatives, hallucinogens, and street opioids." NMUPD is defined as using prescription stimulants, sedatives, opioids or other prescriptions "on your own, that is either without a doctor's prescription, in greater amounts, more often, or longer than prescribed, or for a reason other than a doctor said you should use them." Both illicit drug use and NMUPD were assessed with the following question: "In the past three months, how often have you used [substance]?" Any current drug use (illicit drug use and/or NMUPD) was dichotomized (yes/no) and included as a binary variable in all analyses.

2.5.6. Covariates

2.5.6.1. Age. Population data from the National Survey on Drug Use and Health show that there is great variability in substance use patterns according to age (Center of Behavioral Health Statistics and Quality (CBHSQ), 2016). Further, nationally representative data show that age is inversely associated with past month substance use and dependence among current and former military service members, independent of other demographic factors (Hoopsick et al., 2017). Soldiers self-

reported current age at baseline, and we included age as a continuous variable in all final adjusted models.

2.5.6.2. Rank. The incidence of substance use disorders among military service members has been shown to decrease as rank increases (Servies et al., 2012). Soldiers self-reported current rank at baseline, with participant responses ranging from Private First Class to Lieutenant Colonel. Each rank was assigned a numeric value and included as an ordinal covariate in the final adjusted models.

2.5.6.3. Years of military service. Soldiers with greater military tenure may be more resilient to the effects of deployment than newly enlisted soldiers. For example, recent data from the Millennium Cohort study demonstrated that soldiers were two times more likely to attempt suicide when they were deployed within the first 12 months of service compared to when they were deployed after the first 12 months of service (Ursano et al., 2018a,b). Time-in-service has also been associated with a lower likelihood of engaging in substance use (Rice and Liu, 2016). Participants in the current study were asked to report length of time in any military service branch at baseline. We created a cumulative sum across all service branches.

2.5.6.4. Combat exposure. The relation between combat deployment and substance use has been well-established (Adams et al., 2016; Bennett et al., 2013; Jacobson et al., 2008). In order to control for a range of combat exposures, we used the Combat Experiences Scale of the DRRI-2 to assess soldiers' exposure to combat during their most recent deployment prior to baseline (Vogt et al., 2012). Participants reported on 17 objective events and circumstances during their most recent warzone experience, ranging from 1 (Never) to 6 (Daily or almost daily). Items are summed for an overall score range of 17–102, with higher scores indicating greater exposure to combat. Items include statements such as, "I personally witnessed enemy combatants being seriously wounded or killed," "I was exposed to hostile incoming fire," and "I fired my weapon at enemy combatants." The DRRI-2 had high internal consistency in this sample ($\alpha = 0.94$).

2.5.6.5. Traumatic brain injury. Recent evidence suggests that previously deployed USAR/NG soldiers may engage in self-medication for undertreated conditions (e.g., traumatic brain injury [TBI]) (Hoopsick et al., 2018). Therefore, we controlled for TBI using the three-item Brief Traumatic Brain Injury Scale (Schwab et al., 2007). Soldiers were asked if any types of injuries occurred while deployed (e.g., blast, fragment, vehicular, etc.), the severity of injury (e.g., being dazed, no memory, lost consciousness for various lengths, etc.), and if they were currently experiencing any injury-related problems. An injury that resulted in any of the following was considered a positive screen for TBI: being dazed, confused or "seeing stars," not remembering the injury, or losing consciousness. TBI was dichotomized (yes/no) and included as a binary variable in the final adjusted models.

2.5.6.6. Time since last deployment. Post-deployment psychiatric symptomatology, including substance use, may increase over time; prospective research among military personnel serving in Afghanistan demonstrated increases in post-traumatic stress symptoms 5 years post-deployment (Eekhout et al., 2016). Likewise, a large retrospective study of more than 314,000 OEF/OIF/OND veterans with mental health and substance use disorders demonstrated a median of nearly 8 years between the end of the last deployment and initiation of outpatient care for mental health or substance use (Maguen et al., 2012), suggesting that symptomatology may peak a considerable time after deployment. In order to control for the potential effect of time since last deployment on soldiers' drug use, we calculated the time, in years, between baseline survey administration and soldier's most recent deployment. Time since last deployment was included as a

Table 1
Characteristics of Previously Deployed Male US Army Reserve and National Guard Soldiers (N = 228).

	% (n) or Mean (± SD)
Age, Years	33.5 (± 6.0)
Race	
Non-Hispanic White	81.1% (185)
Non-Hispanic Black	4.8% (11)
Hispanic	8.8% (20)
Other	3.5% (8)
Education	
High School	13.6% (31)
Some College	59.7% (136)
College Degree	26.8% (61)
Household Income	
Less than $19,999	1.3% (3)
$20,000 – $39,999	15.8% (36)
$40,000 – $59,999	23.3% (53)
$60,000 – $79,999	21.1% (48)
$80,000 – $99,999	13.2% (30)
$100,000 – $119,999	11.0% (25)
$120,000 or More	11.8% (27)
Relationship Status	
Married	76.8% (175)
Living as if Married	23.3% (53)
Years of Military Service	12.1 (± 5.7)
Most Recent Deployment	
Operation Enduring Freedom (Afghanistan)	47.8% (109)
Operation Iraqi Freedom (Iraq)	27.2% (62)
Operation New Dawn (Iraq)	6.6% (15)
Other	18.4% (42)
Rank	
Enlisted	84.2% (192)
Officer	14.5% (33)
DRRI-2 Training and Deployment Preparation Score	37.6 (± 9.3)
DRRI-2 Unit Support Score	46.1 (± 11.2)
DRRI-2 Support from Family and Friends Score	34.1 (± 7.1)
MAT Score	110.4 (± 28.4)
Current Drug Use at First Follow-Up	9.2% (21)

DRRI-2 = Deployment Risk & Resiliency Inventory-2; MAT = Marital Adjustment Test.

continuous variable in the final adjusted models.

2.5.6.7. Baseline drug use. To control for the effects of baseline substance use, soldier's self-reported lifetime uses of illicit drugs and NMUPD at baseline was also included in our final adjusted models. Consistent with current use at first follow-up, we used the NIDA Modified ASSIST 2.0 (WHO Assist Working Group, 2002) to assess for lifetime drug use at baseline (Table 1).

3. Results

3.1. Descriptive results

The prevalence of current drug use (i.e. illicit drug use, NMUPD) at first follow-up among this sample of male USAR/NG soldiers was 9.2%, with 6.6% of the sample reporting illicit drug use and 3.5% reporting NMUPD. Among those reporting post-deployment illicit drug use, 100.0% reported use of cannabis, 13.3% reported use of cocaine, 6.7% reported use of inhalants, and 6.7% reported use of hallucinogens. Among those that reported current drug use at first follow-up, mean substance use involvement scores for nonmedical use of prescription stimulants, sedatives, opioids, and other drugs ranged from 2.7 to 6.0, indicative of low to moderate risk. Mean substance use involvement scores for cannabis, cocaine, inhalants, and hallucinogens were all indicative of lower risk. The mean DRRI-2 Combat Experiences Scale score for soldiers' most recent deployment was 32.8 (± 16.6) and

Table 2

Independent Samples *t*-test Results Comparing Pre-, Peri-, and Post-Deployment Resiliency Factors on Post-Deployment Drug Use among Previously Deployed Male US Army Reserve and National Guard Soldiers (N = 228).

Resiliency Factor	Post-Deployment Drug Use	Mean (SD)	*t*
Training and Pre-Deployment Preparation	No	37.92 (9.09)	1.64
	Yes	34.43 (11.24)	
Peri-Deployment Unit Support	No	46.66 (11.02)	2.38*
	Yes	40.62 (12.01)	
Peri-Deployment Support from Family and Friends	No	34.43 (6.79)	2.33*
	Yes	30.67 (9.26)	
Post-Deployment Marital Satisfaction	No	110.95 (28.85)	0.94
	Yes	104.81 (22.95)	

* *p* < 0.05.

15.8% of the sample (n = 36) screened positive for TBI at baseline. The median time since last deployment was 3.8 years. On average, soldiers reported a mean DRRI-2 Training and Deployment Preparation Scale score of 37.6 (± 9.3), DRRI-2 Unit Support Scale score of 46.1 (± 11.2), and DRRI-2 Support from Family and Friends Scale score of 34.1 (± 7.1). The mean MAT score was 110.4 (± 28.4), with 29.0% of the sample (n = 66) having a score below 100, indicative of poor marital functioning (Locke and Wallace, 1959). Independent samples t-tests demonstrated that both peri-deployment unit support and peri-deployment support from family and friends were significantly lower among those who reported post-deployment drug use. However, there were no statistically significant differences in the training and deployment preparation and post-deployment marital satisfaction scores between soldiers who did and did not report post-deployment drug use (Table 2).

3.2. Effect of training and deployment preparation on current drug use

Training and deployment preparation were not associated with current drug use (OR = 0.70, 95% CI: 0.46, 1.08, *p* > 0.05). After controlling for age, rank, years of military service, combat exposure, TBI, time since last deployment, and baseline drug use the association remained non-significant (AOR = 0.76, 95% CI: 0.45, 1.29, *p* > 0.05); see Table 3.

3.3. Effect of unit support on current drug use

Greater unit support during deployment was associated with a lower odds of current drug use (OR = 0.62, 95% CI: 0.41, 0.93, *p* < 0.05). This association persisted after controlling for age, rank, years of military service, combat exposure, TBI, time since last deployment, and baseline drug use (AOR = 0.56, 95% CI: 0.34, 0.92, *p* < 0.05).

3.4. Effect of support from family and friends on current drug use

Greater support from family and friends during deployment was also associated with a lower odds of current drug use (OR = 0.65, 95% CI: 0.45, 0.95, *p* < 0.05), even after controlling for age, rank, years of military service, combat exposure, TBI, time since last deployment, and baseline drug use (AOR = 0.63, 95% CI: 0.40, 0.99, *p* < 0.05).

3.5. Effect of marital satisfaction on current drug use

Post-deployment marital satisfaction was not associated with current drug use (OR = 0.81, 95% CI: 0.53, 1.25, *p* > 0.05). After controlling for age, rank, years of military service, combat exposure, TBI, time since last deployment, and baseline drug use the association remained non-significant (AOR = 0.96, 95% CI: 0.56, 1.63, *p* > 0.05).

Table 3

Relation Between Pre-, Peri-, and Post-Deployment Resiliency Factors and Post-Deployment Drug Use among Previously Deployed Male US Army Reserve and National Guard Soldiers (N = 228).

	Unadjusted OR [95% CI]	Adjusted OR [95% CI]
Training and Pre-Deployment Preparation	0.70 [0.46, 1.08]	0.76 [0.45, 1.29]
Age, Years		0.92 [0.79, 1.07]
Rank		1.00 [0.91, 1.10]
Years of Military Service		0.93 [0.80, 1.08]
Combat Exposure		1.02 [0.98, 1.05]
Traumatic Brain Injury		1.53 [0.44, 5.31]
Time Since Last Deployment, Years		1.24* [1.03, 1.49]
Baseline Drug Use		9.35** [1.92, 45.48]
Peri-Deployment Unit Support	0.62* [0.41, 0.93]	0.56* [0.34, 0.92]
Age, Years		0.89 [0.76, 1.05]
Rank		1.00 [0.91, 1.10]
Years of Military Service		0.94 [0.81, 1.10]
Combat Exposure		1.02 [0.99, 1.06]
Traumatic Brain Injury		1.50 [0.43, 5.30]
Time Since Last Deployment, Years		1.29** [1.07, 1.56]
Baseline Drug Use		10.42** [2.07, 52.42]
Peri-Deployment Support from Family and Friends	0.65* [0.45, 0.95]	0.63* [0.40, 0.99]
Age, Years		0.91 [0.78, 1.06]
Rank		0.99 [0.90, 1.09]
Years of Military Service		0.96 [0.82, 1.12]
Combat Exposure		1.02 [0.98, 1.05]
Traumatic Brain Injury		1.27 [0.36, 4.55]
Time Since Last Deployment, Years		1.26* [1.05, 1.51]
Baseline Drug Use		9.36** [1.87, 46.86]
Post-Deployment Marital Satisfaction	0.81 [0.53, 1.25]	0.96 [0.56, 1.63]
Age, Years		0.93 [0.79, 1.08]
Rank		0.99 [0.90, 1.09]
Years of Military Service		0.93 [0.80, 1.08]
Combat Exposure		1.02 [0.98, 1.05]
Traumatic Brain Injury		1.47 [0.43, 5.03]
Time Since Last Deployment, Years		1.25* [1.04, 1.50]
Baseline Drug Use		10.23** [2.01, 52.24]

* p < 0.05.
** p < 0.01.

4. Discussion

The current literature suggests lower rates of illicit drug use among soldiers compared to civilian populations (Platteborze et al., 2013). In contrast, our findings show that nearly 1 in 10 (9.2%) male USAR/NG soldiers in the current study reported current drug use at the first follow-up, which is similar to the prevalence of illicit drug use among

the general population aged 26 and older (8.9%) (Substance Abuse and Mental Health Services Administration, 2017). These findings demonstrate that despite a strict "zero tolerance" policy regarding the use of most substances by the US Armed Forces, USAR/NG soldiers who have been deployed may remain at risk for drug use. Results from this study identify resiliency factors that should be considered as intervention targets for the prevention of post-deployment substance use, including support provided by the soldier's unit or by family and friends. Specifically, findings show that social support provided *during* deployment may have protective effects that extend to post-deployment trajectories among partnered male USAR/NG soldiers.

We hypothesized that sources of social support (i.e., unit support, support from family and friends) and post-deployment marital satisfaction would confer stronger protection against post-deployment drug use than deployment preparation. Social support provided during deployment, either by the soldier's unit or by the soldier's family and friends, was protective against subsequent drug use. Findings from the Millennium Cohort Study demonstrated that family stress occurring during the peri-deployment period was associated with post-deployment incident alcohol use disorder (Cerdá et al., 2014), and our findings demonstrate that strong family relationships during deployment are also important to consider in the context of post-deployment drug use. Contrary to our hypothesis, we found that deployment preparation and post-deployment marital functioning did not confer protection against post-deployment drug use among this sample of partnered male USAR/NG soldiers. Wooten's Bioecological Model of Deployment Risk and Resilience purports that protective factors may originate from different points during the deployment disruption continuum, including the pre-deployment phase, the peri-deployment phase, and the post-deployment phase (Wooten, 2013). In the case of post-deployment drug use, protective factors emerging from the peri-deployment time period (i.e., unit support and family support provided during deployment) may be more salient than some protective factors originating from the pre- and post-deployment periods. It is important to note that while post-deployment marital satisfaction was not a significant protective factor for post-deployment drug use, peri-deployment family support also includes support provided by the soldier's partner during his deployment. However, the effects of support from family and friends during deployment among soldiers who are not partnered is unknown, given that the current study was restricted to USAR/NG soldiers who were married or living as married at baseline.

Deployment may represent a critical time period in the lives of soldiers when coping strategies are established or reinforced. Prior research has demonstrated that service members are more likely to engage in avoidant coping when they have limited or no control over their environment, as is the case with deployment (McAndrew et al., 2017; Romero et al., 2015). Learned avoidance-oriented coping strategies can often be considered adaptive in the context of combat deployment when traumatic responses must be suppressed in order to continue the mission, but these strategies are no longer necessary during the post-deployment period and contribute to great risk of problematic substance use (Norman et al., 2014). Despite a lifetime prevalence of substance use disorders exceeding 52% among National Guard soldiers (Tamburrino et al., 2015), service members with substance use disorders predominantly go untreated (Fink et al., 2015). Research from the Millennium Cohort Study suggests that there are critical time periods when substance use disorders might best be prevented among service members. For example, the age-of-onset of substance use disorders among National Guard soldiers tends to occur during a short interval from late-adolescence to early-adulthood (Fink et al., 2016a,b), a time period which can frequently co-occur with service members' first deployment. The findings of the current study demonstrate a need for peri-deployment interventions that may promote resiliency against post-deployment substance use and substance use disorders.

Nearly 1 in 5 soldiers reports problems with social support (Griffith, 2017), and poor post-deployment social support has been associated

with a greater odd of PTSD (Bloeser et al., 2014), depression (Bloeser et al., 2014), anger (Vest et al., 2017), violence (Van Voorhees et al., 2018), and excessive drinking (Fuehrlein et al., 2018). Previous research by Romero et al. demonstrated that family social support buffered the effects of avoidant coping strategies on post-deployment mental health (Romero et al., 2015). Likewise, a recent longitudinal study examining the coping strategies and outcomes of USAR/NG soldiers showed that better unit cohesion was associated with less avoidant coping and better mental health functioning during the post-deployment period (McAndrew et al., 2017). Our findings extend the current literature by demonstrating that among male partnered USAR/NG soldiers, peri-deployment interpersonal relationships providing social support may also protect against drug use during the post-deployment period, independent of intrapersonal military factors including rank, years of military service, combat exposure TBI, and time since last deployment.

4.1. Limitations

It should be noted that this research has some limitations. First, the measurement of pre- and peri-deployment resiliency factors during the post-deployment period is subject to recall bias. It is possible that those who did not report post-deployment drug use may have been less likely to perceive problems with supports in the pre-, peri-, and post-deployment periods. Underreporting of poor support among those who do not use drugs could result in a bias away from the null. Second, as with all survey-based research, there is a potential for response bias. However, given the use of reliable and validated tools and the use of a confidential survey, the risk of social desirability bias was low. Our findings might even underestimate the true association between peri-deployment resiliency factors and post-deployment drug use if drug use was underreported. Additionally, only male soldiers were included in the current study due to a limited sample of women. However, the overall Operation: SAFTY study sample is consistent with the demographic and military characteristics of Reserve and Guard soldiers nationally, including the proportion of female soldiers (Office of the Deputy Assistant Secretary of Defense, 2016). Lastly, all participants were either married or living as married and reported having at least one alcohol beverage in the year prior to study enrollment. These restrictions may limit our ability to generalize these findings to service members who are not married or who do not drink alcohol. However, national data indicate that the majority of U.S. service members are married (Office of the Deputy Assistant Secretary of Defense for Military Community and Family Policy, 2015). Further, adults that abstain from alcohol tend to be different in other health behaviors compared to ever-drinkers (Green and Polen, 2001).

4.2. Conclusions

We found that social support provided to soldiers during deployment, either by his unit or his family and friends, showed evidence of protection against post-deployment drug use. These associations build upon previous findings demonstrating the protective effects of post-deployment social support by further illustrating that peri-deployment social support is also a strong resiliency factor. In addition to existing post-deployment and reintegration efforts, we recommend a focus on interventions that facilitate stronger family and unit relationships *during* the peri-deployment time period, when coping strategies may be established or reinforced. Future work should examine the comparative and potential interaction effects of peri- and post-deployment social support on post-deployment trajectories.

Role of funding source

Homish and by the National Center for Advancing Translational Sciences of the National Institutes of Health under award number UL1TR001412 to the University at Buffalo, The State University of New York. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Contributors

Dr. Homish and Ms. Homish conceived of, designed, and implemented the study. Ms. Hoopsick and Ms. Homish conducted the statistical analysis. Ms. Hoopsick conducted the literature review and wrote the first draft of the manuscript with sections contributed by Ms. Benson and Ms. Homish. All authors critically reviewed the manuscript for content. All authors contributed to and approve the final manuscript.

Conflict of interest

No conflict declared.

References

Adams, R., Nikitin, R., Wooten, N., Williams, T., Larson, M., 2016. The association of combat exposure with postdeployment behavioral health problems among U.S. Army enlisted women returning from Afghanistan or Iraq. J. Trauma Stress 29, 356–364.

Bennett, A., Elliott, L., Golub, A., 2013. Opioid and other substance misuse, overdose risk, and the potential for prevention among a sample of OEF/OIF veterans in New York City. Subst. Use Misuse 48, 894–907.

Bloeser, K., McCarron, K.K., Batorsky, B., Reinhard, M.J., Pollack, S.J., Amdur, R., 2014. Mental health outreach and screening among returning veterans: are we asking the right questions? US Army Med. Dep. J. 109–117.

Brailey, K., Vasterling, J.J., Proctor, S.P., Constans, J.I., Friedman, M.J., 2007. PTSD symptoms, life events, and unit cohesion in US soldiers: baseline findings from the neurocognition deployment health study. J. Trauma Stress 20, 495–503.

Cederbaum, J.A., Wilcox, S.L., Sullivan, K., Lucas, C., Schuyler, A., 2017. The Influence of social support on dyadic functioning and mental health among military personnel during postdeployment reintegration. Public Health Rep. 132, 85–92.

Center of Behavioral Health Statistics and Quality (CBHSQ), 2016. Results from the 2015 National Survey on Drug Use and Health: Summary of National Findings. Retrieved from. Substance Abuse and Mental Health Services Administration (SAMHSA), Rockville, MD. https://www.samhsa.gov/.

Cerdá, M., Richards, C., Cohen, G.H., Calabrese, J.R., Liberzon, I., Tamburrino, M., Galea, S., Koenen, K.C., 2014. Civilian stressors associated with alcohol use disorders in the National Guard. Am. J. Prev. Med. 47, 461–466. https://doi.org/10.1016/j.amepre.2014.06.015.

Defense Manpower Data Center, 2017. Counts of Active Duty and Reserve Service Members and APF Civilians. Retrieved from https://www.dmdc.osd.mil/appj/dwp/rest/download?fileName=DMDC_Website_Location_Report_1612.xlsx&groupName=milRegionCountry (Accessed 3 April 2019). .

Defense Science Board Task Force, 2007. Deployment of Members of the National Guard and Reserve in the Global War on Terrorism. Retrieved from Washington, DC https://www.acq.osd.mil/dsb/reports/2000s/ADA478163.pdf (Accessed 3 April 2019). .

Eekhout, I., Reijnen, A., Vermetten, E., Geuze, E., 2016. Post-traumatic stress symptoms 5 years after military deployment to Afghanistan: an observational cohort study. Lancet Psychiatry 3, 58–64. https://doi.org/10.1016/S2215-0366(15)00368-5.

Fink, D.S., Sampson, L., Tamburrino, M.B., Liberzon, I., Slembarski, R., Chan, P., Cohen, G.H., Shirley, E., Goto, T., D'Arcangelo, N., Fine, T., Reed, P., Galea, S., Calabrese, J.R., 2015. Lifetime and 12-month use of psychiatric services among U.S. Army National Guard soldiers in Ohio. Psychiatr. Serv. 66, 514–520. https://doi.org/10.1176/appi.ps.201400128.

Fink, D.S., Calabrese, J.R., Liberzon, I., Tamburrino, M.B., Chan, P., Cohen, G.H., Sampson, L., Reed, P.L., Shirley, E., Goto, T., D'Arcangelo, N., Fine, T., Galea, S., 2016a. Retrospective age-of-onset and projected lifetime prevalence of psychiatric disorders among U.S. Army National Guard soldiers. J. Affect. Disord. 202, 171–177. https://doi.org/10.1016/j.jad.2016.05.025.

Fink, D.S., Gallaway, M.S., Tamburrino, M.B., Liberzon, I., Chan, P., Cohen, G.H., Sampson, L., Shirley, E., Goto, T., D'Arcangelo, N., Fine, T., Reed, P.L., Calabrese, J.R., Galea, S., 2016b. Onset of alcohol use disorders and comorbid psychiatric disorders in a military cohort: are there critical periods for prevention of alcohol use disorders? Prev. Sci. 17, 347–356. https://doi.org/10.1007/s11121-015-0624-1.

Fuehrlein, B.S., Kachadourian, L.K., DeVylder, E.K., Trevisan, L.A., Potenza, M.N., Krystal, J.H., Southwick, S.M., Pietrzak, R.H., 2018. Trajectories of alcohol consumption in U.S. military veterans: results from the National Health and Resilience in Veterans Study. Am. J. Addict. https://doi.org/10.1111/ajad.12731.

Goldmann, E., Calabrese, J.R., Prescott, M.R., Tamburrino, M., Liberzon, I., Slembarski, R., Shirley, E., Fine, T., Goto, T., Wilson, K., Ganocy, S., Chan, P., Serrano, M.B., Sizemore, J., Galea, S., 2012. Potentially modifiable pre-, peri-, and postdeployment characteristics associated with deployment-related posttraumatic stress disorder among ohio army national guard soldiers. Ann. Epidemiol. 22, 71–78. https://doi.org/10.1016/j.annepidem.2011.11.003.

Green, C.A., Polen, M.R., 2001. The health and health behaviors of people who do not drink alcohol. Am. J. Prev. Med. 21, 298–305.

Griffith, J., 2017. Homecoming of citizen soldiers: postdeployment problems and service use among army national guard soldiers. Community Ment. Health J. 53, 766–777. https://doi.org/10.1007/s10597-017-0132-9.

Hines, L.A., Jawahar, K., Wessely, S., Fear, N.T., 2013. Self-harm in the UK military. Occup. Med. (Lond.) 63, 354–357. https://doi.org/10.1093/occmed/kqt065.

Hoopsick, R.A., Fillo, J., Vest, B.M., Homish, D.L., Homish, G.G., 2017. Substance use and dependence among current and former reserve service members: cross-sectional findings from the National Survey on Drug Use and Health, 2010–2014. J. Addict. Dis. 36, 243–251. https://doi.org/10.1080/10550887.2017.1366735.

Hoopsick, R.A., Vest, B.M., Homish, D.L., Homish, G.G., 2018. Combat exposure, emotional and physical role limitations, and substance use among male United States Army Reserve and National Guard soldiers. Qual. Life Res. 27, 137–147. https://doi.org/10.1007/s11136-017-1706-2.

Jacobson, I.G., Ryan, M.A., Hooper, T.I., Smith, T.C., Amoroso, P.J., Boyko, E.J., Gackstetter, G.D., Wells, T.S., Bell, N.S., 2008. Alcohol use and alcohol-related problems before and after military combat deployment. JAMA 300, 663–675. https://doi.org/10.1001/jama.300.6.663.

Kelley, M.L., Milletich, R.J., Hollis, B.F., Veprinsky, A., Robbins, A.T., Snell, A.K., 2017. Social support and relationship satisfaction as moderators of the stress-mood-alcohol link association in US Navy members. J. Nerv. Ment. Dis. 205, 99–105.

Laffaye, C., Cavella, S., Drescher, K., Rosen, C., 2008. Relationships among PTSD symptoms, social support, and support source in veterans with chronic PTSD. J. Trauma. Stress 21, 394.

Leonard, K.E., Homish, G.G., 2008. Predictors of heavy drinking and drinking problems over the first 4 years of marriage. Psychol. Addict. Behav. 22, 25–35. https://doi.org/10.1037/0893-164X.22.1.25.

Locke, H.J., Wallace, K.M., 1959. Short marital-adjustment prediction tests: their reliability and validity. Marriage Fam. Living 21, 251–255.

Maguen, S., Madden, E., Cohen, B.E., Bertenthal, D., Seal, K.H., 2012. Time to treatment among veterans of conflicts in Iraq and Afghanistan with psychiatric diagnoses. Psychiatr. Serv. 63, 1206–1212. https://doi.org/10.1176/appi.ps.201200051.

Maoz, H., Goldwin, Y., Lewis, Y.D., Bloch, Y., 2016. Exploring reliability and validity of the Deployment Risk and Resilience Inventory-2 among a nonclinical sample of discharged soldiers following mandatory military service. J. Trauma. Stress 29, 556–562. https://doi.org/10.1002/jts.22135.

McAndrew, L.M., Markowitz, S., Lu, S.E., Borders, A., Rothman, D., Quigley, K.S., 2017. Resilience during war: better unit cohesion and reductions in avoidant coping are associated with better mental health function after combat deployment. Psychol. Trauma 9, 52–61. https://doi.org/10.1037/tra0000152.

Milliken, C.S., Auchterlonie, J.L., Hoge, C.W., 2007. Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq War. JAMA 298, 2141–2148. https://doi.org/10.1001/jaama.298.18.2141.

Norman, S.B., Schmied, E., Larson, G.E., 2014. Predictors of continued problem drinking and substance use following military discharge. J. Stud. Alcohol Drugs 75 https://doi.org/10.15288/jsad.2014.75.557. 557-556.

Office of the Deputy Assistant Secretary of Defense for Military Community and Family Policy (ODASD (MC and FP)), 2015. Demographics Profile of the Military Community. Department of Defense (DOD). 2015. Retrieved from http://download.militaryonesource.mil/12038/MOS/Reports/2015-Demographics-Report.pdf (Accessed 3 April 2019).

Office of the Deputy Assistant Secretary of Defense for Military Community and Family Policy (ODASD (MC and FP)), 2016. Demographics Profile of the Military Community. Department of Defense (DOD). 2016. Retrieved from http://download.militaryonesource.mil/12038/MOS/Reports/2016-Demographics-Report.pdf (Accessed 3 April 2019).

Orr, M.G., Prescott, M.R., Cohen, G.H., Calabrese, J.R., Tamburrino, M.B., Liberzon, I., Galea, S., 2014. Potentially modifiable deployment characteristics and new-onset alcohol abuse or dependence in the US National Guard. Drug Alcohol Depend. 142, 325–332. https://doi.org/10.1016/j.drugalcdep.2014.07.005.

Pietrzak, R.H., Johnson, D.C., Goldstein, M.B., Malley, J.C., Southwick, S.M., 2009. Psychological resilience and postdeployment social support protect against traumatic stress and depressive symptoms in soldiers returning from Operations Enduring Freedom and Iraqi Freedom. Depress. Anxiety 26, 745–751.

Platteborze, P.L., Kippenberger, D.J., Martin, T.M., 2013. Drug positive rates for the Army, Army Reserve, and Army National Guard from fiscal year 2001 through 2011. Mil. Med. 178, 1078–1084. https://doi.org/10.7205/milmed-d-13-00193.

Polusny, M.A., Erbes, C.R., Arbisi, P.A., Thuras, P., Kehle, S.M., Rath, M., Courage, C., Reddy, M.K., Duffy, C., 2009. Impact of prior Operation Enduring Freedom/Operation Iraqi Freedom combat duty on mental health in a predeployment cohort of National Guard soldiers. Mil. Med. 174, 353–357.

Polusny, M.A., Erbes, C.R., Murdoch, M., Arbisi, P.A., Thuras, P., Rath, M.B., 2011. Prospective risk factors for new-onset post-traumatic stress disorder in National Guard soldiers deployed to Iraq. Psychol. Med. 41, 687–698. https://doi.org/10.1017/S0033291710002047.

Renshaw, K.D., 2011. An integrated model of risk and protective factors for post-deployment PTSD symptoms in OEF/OIF era combat veterans. J. Affect. Disord. 128, 321–326. https://doi.org/10.1016/j.jad.2010.07.022.

Reserve Forces Policy Board, 2017. Improving the Total Force Using National Guard and Reserves. Retrieved from https://rfpb.defense.gov/Portals/67/Documents/Improving%20the%20Total%20Force%20using%20the%20National%20Guard%20and%20Reserves_1%20November%202016.pdf?ver=2016-11-17-142718-243

(Accessed 3 April 2019). .

Rice, V., Liu, B., 2016. Personal resilience and coping Part II: identifying resilience and coping among U.S. military service members and veterans with implications for work. Work 54, 335–350. https://doi.org/10.3233/wor-162301.

Riddle, J.R., Smith, T.C., Smith, B., Corbeil, T.E., Engel, C.C., Wells, T.S., Hoge, C.W., Adkins, J., Zamorski, M., Blazer, D., 2007. Millennium Cohort: the 2001–2003 baseline prevalence of mental disorders in the US military. J. Clin. Epidemiol. 60, 192–201. https://doi.org/10.1016/j.jclinepi.2006.04.008.

Romero, D.H., Riggs, S.A., Ruggero, C., 2015. Coping, family social support, and psychological symptoms among student veterans. J. Couns. Psychol. 62, 242–252. https://doi.org/10.1037/cou0000061.

Schwab, K.A., Ivins, B., Cramer, G., Johnson, W., Sluss-Tiller, M., Kiley, K., Lux, W., Warden, D., 2007. Screening for traumatic brain injury in troops returning from deployment in Afghanistan and Iraq: initial investigation of the usefulness of a short screening tool for traumatic brain injury. J. Head Trauma. Rehabil. 22, 377–389.

Servies, T., Hu, Z., Eick-Cost, A., Otto, J.L., 2012. Substance use disorders in the U.S. Armed Forces, 2000–2011. MSMR 19, 11–16.

Shea, T.M., Reddy, M.K., Tyrka, A.R., Sevin, E., 2013. Risk factors for post-deployment posttraumatic stress disorder in National Guard/Reserve service members. Psychiatry Res. 210, 1042–1048. https://doi.org/10.1016/j.psychres.2013.08.039.

Smith, T.C., Wingard, D.L., Ryan, M.A., Kritz-Silverstein, D., Slymen, D.J., Sallis, J.F., Millennium Cohort Study Team, 2008. Prior assault and posttraumatic stress disorder after combat deployment. Epidemiology 19, 505–512. https://doi.org/10.1097/EDE.0b013e31816a9dff.

Substance Abuse and Mental Health Services Administration (SAMHSA), 2017. Key substance use and mental health indicators in the United States: Results from the 2016 National Survey on Drug Use and Health (HHS Publication No. SMA 17-5044, NSDUH Series H-52). Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, Rockville, MD. Retrieved from https://www.samhsa.gov/data/ (Accessed 3 April 2019).

Tamburrino, M.B., Chan, P., Prescott, M., Calabrese, J., Liberzon, I., Slembarski, R., Shirley, E., Fine, T., Goto, T., Wilson, K., Derus, A., Ganocy, S., Beth Serrano, M., Galea, S., 2015. Baseline prevalence of Axis I diagnosis in the Ohio Army National Guard. Psychiatry Res. 226, 142–148. https://doi.org/10.1016/j.psychres.2014.12.038.

Thomas, J.L., Wilk, J.E., Riviere, L.A., McGurk, D., Castro, C.A., Hoge, C.W., 2010. Prevalence of mental health problems and functional impairment among Active Component and National Guard soldiers 3 and 12 months following combat in Iraq. Arch. Gen. Psychiatry 67, 614–623.

Ursano, R.J., Kessler, R.C., Naifeh, J.A., Herberman Mash, H., Fullerton, C.S., Aliaga, P.A., Wynn, G.H., Ng, T.H.H., Dinh, H.M., Sampson, N.A., Kao, T.C., Bliese, P.D., Stein, M.B., 2018a. Associations of time-related deployment variables with risk of suicide attempt among soldiers: results from the Army Study to assess Risk and Resilience in Servicemembers (Army STARRS). JAMA Psychiatry 75, 596–604. https://doi.org/10.1001/jamapsychiatry.2018.0296.

Ursano, R.J., Wang, J., Fullerton, C.S., Ramsawh, H., Gifford, R.K., Russell, D., Cohen, G.H., Sampson, L., Galea, S., 2018b. Post-deployment mental health in Reserve and National Guard service members: deploying with or without one's unit and deployment preparedness. Mil. Med. 183, e51–e58. https://doi.org/10.1093/milmed/usx002.

Van Voorhees, E.E., Wagner, H.R., Beckham, J.C., Bradford, D.W., Neal, L.C., Penk, W.E., Elbogen, E.B., 2018. Effects of social support and resilient coping on violent behavior in military veterans. Psychol. Serv. 15, 181–190. https://doi.org/10.1037/ser0000187.

Vest, B.M., Heavey, S.C., Homish, D.L., Homish, G.G., 2017. Marital satisfaction, family support, and pre-deployment resiliency factors related to mental health outcomes for Reserve and National Guard soldiers. Mil. Behav. Health 5, 313–323. https://doi.org/10.1080/21635781.2017.1343694.

Vest, B.M., Homish, D.L., Hoopsick, R.A., Homish, G.G., 2018. What drives the relationship between combat and alcohol problems in soldiers? The roles of perception and marriage. Soc. Psychiatry Psychiatr. Epidemiol. 53, 413–420. https://doi.org/10.1007/s00127-017-1477-7.

Vogt, D., Smith, B.N., King, D.W., King, L.A., 2012. Manual for the Deployment Risk and Resilience Inventory-2 (DRRI-2): a Collection Ofmeasures for Studying Deployment-related Experiences of Military Veterans. Retrieved from https://www.ptsd.va.gov/professional/assessment/deployment/index.asp (Accessed April 3, 2019). .

Welsh, J.A., Olson, J., Perkins, D.F., Travis, W.J., Ormsby, L., 2015. The role of natural support systems in the post-deployment adjustment of active duty military personnel. Am. J. Community Psychol. 56, 69–78. https://doi.org/10.1007/s10464-015-9726-y.

WHO Assist Working Group, 2002. The alcohol, smoking and substance involvement screening test (ASSIST): development, reliability and feasibility. Addiction 97, 1183–1194. https://doi.org/10.1046/j.1360-0443.2002.00185.x.

Wooten, N.R., 2013. A bioecological model of deployment risk and resilience. J. Hum. Behav. Soc. Environ. 23, 699–717. https://doi.org/10.1080/10911359.2013.795049.

Wright, K.M., Foran, H.M., Wood, M.D., Eckford, R.D., McGurk, D., 2012. Alcohol problems, aggression, and other externalizing behaviors after return from deployment: understanding the role of combat exposure, internalizing symptoms, and social environment. J. Clin. Psychol. 68, 782–800. https://doi.org/10.1002/jclp.21864.

Yan, G.W., McAndrew, L., D'Andrea, E.A., Lange, G., Santos, S.L., Engel, C.C., Quigley, K.S., 2013. Self-reported stressors of National Guard women veterans before and after deployment: the relevance of interpersonal relationships. J. Gen. Intern. Med. 28, S549–S555. https://doi.org/10.1007/s11606-012-2247-6.