



# Resilience to mental health problems and the role of deployment status among U.S. Army Reserve and National Guard Soldiers

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## Abstract

**Purpose** Research suggests that interpersonal and intrapersonal resiliency factors protect against poor post-deployment mental health outcomes among Reserve/Guard soldiers who have been deployed. There is increasing awareness that never-deployed soldiers are also at risk. The purpose of this study was to examine the relationships between resiliency factors and a range of mental health outcomes among a sample of United States Army Reserve and National Guard (USAR/NG) soldiers who have and have not experienced deployment.

**Methods** A subset of data was drawn from Operation: SAFETY ( $N = 360$ ), an ongoing study examining the health and well-being of USAR/NG soldiers. We used a multivariate path analysis approach to examine the simultaneous effects of unit support, marital satisfaction, and psychological hardiness on the following mental health outcomes, concurrently: anger, anxiety, depression, and posttraumatic stress disorder (PTSD) symptomatology. We also examined interaction effects between resiliency factors and deployment status on mental health outcomes.

**Results** Greater unit support ( $ps < 0.01$ ), marital satisfaction ( $ps < 0.001$ ), and psychological hardiness ( $ps < 0.001$ ) were associated with less anger, anxiety, depression, and PTSD symptomatology. Psychological hardiness had significant interactions with deployment status on anxiety, depression, and PTSD, such that the protective effects of psychological hardiness were even stronger among never-deployed soldiers than previously deployed soldiers.

**Conclusion** Resiliency factors can be targeted for intervention to prevent poor mental health outcomes among USAR/NG soldiers, regardless of deployment status. Further, psychological hardiness may be an even more important protective factor among soldiers who have never been deployed.

**Keywords** Marital satisfaction · Military · Mental health · Psychological hardiness · Unit support

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## Introduction

United States Army Reserve/National Guard (USAR/NG) soldiers experience higher rates of psychiatric problems than active-duty soldiers, despite sharing similar military job roles and combat experiences [1–4]. These Reservists comprise over one-third of the US military [5], and a federal advisory committee to the US Department of Defense has identified the growth of Reserve Components as a strategic goal [6]. Given the projected growth of this population and their risk for mental illness, it is critical to expand our knowledge of modifiable factors that might protect against mental health symptomatology.

Anger, anxiety, depression, and posttraumatic stress disorder (PTSD) are prevalent among Reserve/Guard service members. Data from a representative cohort of Reserve/

Guard troops suggests that over half of these service members have a problem with anger [7]. Likewise, a large study examining the mental health of current National Guard soldiers estimated the prevalence of anxiety disorders to be 13.2% [8]. A systematic review also demonstrated that the prevalence of clinical depression and PTSD among Reserve/Guard service members was estimated to be 5.6% and 9.8%, respectively [9]. Moreover, Reserve Component service members access psychiatric services at higher rates than active duty service members [10]. Clinical samples may even underestimate the true prevalence of mental illness among reserve service members, as many who have problems with mental health do not seek care [11]. Interestingly, emerging literature suggests that never-deployed USAR/NG soldiers (i.e., no history of ever being deployed) are at similar risk for adverse mental health outcomes as ever-deployed USAR/NG soldiers (i.e., history of at least one deployment) [12]. Thus, it is important to understand what factors contribute to enhanced resiliency among this population as a whole, not just within the context of post-deployment outcomes.

## Resiliency among USAR/NG Soldiers

There is significant evidence demonstrating the role of resiliency factors in protecting against adverse post-deployment mental health outcomes among service members who have been deployed. The Bioecological Model of Deployment Risk and Resilience provides a framework for understanding the role of resiliency factors in the context of the military “deployment disruption continuum” [13]. This model suggests that service members affect and are affected by the ecological environment and that protective factors may originate before, during, or after a deployment experience. For example, interpersonal and intrapersonal factors such as unit support, marital satisfaction, and psychological hardiness (i.e., the way in which a person approaches and interprets experiences [14]) can contribute to resiliency to adverse mental health outcomes. While this framework is critical to understanding how and when service members develop resiliency, it does not consider what role resiliency factors may play in preventing poor mental health outcomes among service members who have never been deployed. Moreover, much of the resiliency literature focuses on mitigating psychiatric conditions in the post-deployment time period.

Examinations of unit support as a potential resiliency factor are generally suggestive of a protective post-deployment effect. Research has shown that greater unit support provided to USAR/NG soldiers during deployment is associated with a lower risk of post-deployment substance use [15]. Likewise, greater support from military peers and unit leadership have also been associated with less

post-deployment PTSD symptomatology, alcohol problems, and aggression among Reserve service members [16–18]. Conversely, other findings have shown that unit support did not promote resilience against post-deployment PTSD symptomatology, but was protective against post-deployment anger among USAR/NG soldiers [19]. However, the effects of unit support on service members’ mental health outside the context of deployment have not been well-studied. While evidence points to unit support being associated with better post-deployment outcomes, it is not known if unit support has the same effect for service members who have never been deployed.

National data show that the majority of US service members are married [20]. Some research has focused on the effects of deployment and deployment-related psychiatric problems on service members’ intimate relationships [21–23]. However, few studies have examined if marital functioning promotes resiliency among service members. Emerging research shows that marital satisfaction is a strong resiliency factor in protecting against post-deployment anger, anxiety, depression, and PTSD symptomatology among male USAR/NG soldiers [19]. Likewise, low levels of marital satisfaction coupled with poor communication during deployment have been associated with greater PTSD symptomatology [24]. Limited research has also demonstrated that marital satisfaction may buffer the effects of combat exposure on post-deployment alcohol problems [25]. However, the effect of intimate relationships on service members’ mental health, regardless of deployment experiences, has not been well-described.

Dispositional resiliency, or psychological hardiness, has been an important area of military-related research [26–28]. People with greater hardiness tend to interpret life experiences as interesting and worthwhile, something over which they can exert control, and challenging, presenting opportunities to learn and grow [29]. Psychological hardiness has been shown to positively affect individuals’ reactions to stress, including neuroimmunological responses, cardiovascular health, and psychiatric symptomatology [30–32]. Among service members, psychological hardiness has been shown to be protective of post-deployment alcohol problems [27, 33]. Likewise, psychological hardiness has also been shown to be associated with less post-deployment depression and anxiety symptomatology [32]. Further, one study showed that greater psychological hardiness was associated with lower mental health symptomatology, even in the absence of strong unit cohesion [34], suggesting that psychological hardiness may be more important to resilience than some interpersonal factors. While the evidence for psychological hardiness as a protective factor for post-deployment is consistent, it is not known if psychological hardiness reduces the risk of poor mental health among never-deployed service members.

## The current study

Research on resiliency to mental health problems in military populations has largely focused on resiliency in the context of deployment. USAR/NG soldiers represent a high risk, but understudied population that is expected to grow [6], and ever- and never-deployed soldiers appear to be at similar risk for poor mental health [12]. Therefore, it is critical to understand what factors contribute to better psychiatric outcomes among this population as a whole, not just among service members who have been deployed. The current study examined a subset of data from the third yearly survey of Operation: SAFETY (Soldiers and Families Excelling Through the Years), an ongoing longitudinal survey-based study that examines the health and well-being of USAR/NG soldiers and their partners. We analyzed data from a sample of 360 USAR/NG soldiers to answer the following research questions: (1) Are interpersonal and intrapersonal resiliency factors (i.e., unit support, marital satisfaction, and psychological hardiness) associated with less mental health symptomatology (i.e., anger, anxiety, depression, and PTSD symptomatology) among never- and ever-deployed USAR/NG soldiers as a whole?; and (2) Are there any differences in the relationships among these resiliency factors and mental health outcomes on the basis of deployment status (ever/never deployed)? We hypothesized that interpersonal and intrapersonal resiliency factors would be associated with less mental health symptomatology, and that these effects would be similar for USAR/NG soldiers who have and have not been deployed.

## Method

### Participants and recruitment

We recruited USAR/NG soldiers and their partners from 47 units across New York, US over a 15-month period between the summer of 2014 and the fall of 2015 for the Operation: SAFETY study. The military occupational specialties of these units were diverse and included combat, medical, logistics, and support roles. Participation involved the completion of yearly online surveys covering a variety of health topics. Participants were screened on 6 inclusion criteria: (1) the couple was married or living as if married; (2) one member of the couple dyad was a current Army Reserve soldier or National Guard soldier; (3) the soldier was between the ages of 18 and 45; (4) both partners were able to speak and understand English; (5) both partners were willing and able to participate; and

(6) both partners have had at least one alcoholic beverage in the past year, given that individuals who completely abstain from alcohol tend to differ in other health behaviors than non-abstainers [35].

A total of 731 soldiers and partners were eligible for inclusion in Operation: SAFETY. Of those, 572 (78%) agreed to participate and 83% of these couples ( $N=472$  couples, 65% of those eligible) completed some part of the survey. Surveys were included only if both partners completed follow-up ( $N=418$  couples). We conducted sensitivity analyses and found that if a civilian partner screened for the study ( $n=11$  couples) the couple was less likely to enroll ( $p<0.001$ ) than if a soldier screened for the study.

The current research examined a subset of data from Operation: SAFETY that included male and female USAR/NG soldiers who completed the third yearly survey, which was the first assessment that included questions related to resiliency factors and mental health symptomatology that was administered to both never- and ever-deployed soldiers ( $N=360$  soldiers). Participants were predominantly male (83.3%), Non-Hispanic European American (80.0%), had at least some college education (90.0%), and were an enlisted rank (81.9%); see Table 1. Tests of two proportions showed that when compared to never-deployed soldiers ( $n=135$ ), soldiers who had previously been deployed ( $n=225$ ) were more likely to be male (91.1% vs. 70.4%,  $p<0.001$ ) and have an annual household income  $\geq$  \$60,000 (75.4% vs. 50.8%,  $p<0.001$ ). *T* tests also demonstrated that soldiers who had previously been deployed tended to be older,  $t(358)=-9.9$ ,  $p<0.001$  ( $M=35.8$ ,  $SD=5.9$  vs.  $M=29.6$ ,  $SD=5.5$ ) and to have served more years in the military,  $t(358)=-14.2$ ,  $p<0.001$  ( $M=12.7$ ,  $SD=5.7$  vs.  $M=5.0$ ,  $SD=3.5$ ) than never-deployed soldiers.

### Procedures

All participants completed an informed consent process prior to accessing the baseline survey. Surveys were administered and encrypted with the HIPAA-compliant survey programming software, StudyTrax™. Each participant received a \$60 check for completing the baseline survey and \$70 for each of the next two annual surveys (\$200 per person/\$400 couple over the study period). The protocol was approved by the University at Buffalo Institutional Review Board, the Army Human Research Protections Office, Office of the Chief, Army Reserve, and the Adjutant General of the National Guard.

### Measures

**Anger** We assessed anger with the Adult Anger Short Form from the Emotional Distress Scale of the Patient-Reported Outcomes Measurement Information System (PROMIS)

**Table 1** Characteristics of US Army Reserve and National Guard Soldiers

	Never-deployed ( <i>n</i> = 135) % ( <i>n</i> ) or mean ( $\pm$ SD)	Ever-deployed ( <i>n</i> = 225) % ( <i>n</i> ) or mean ( $\pm$ SD)	Significance test <sup>a</sup> <i>p</i> values
Sex			
Male	70.4% (95)	91.1% (205)	<b>&lt;0.001</b>
Female	29.6% (40)	8.9% (20)	
Age, years	29.6 ( $\pm$ 5.5)	35.8 ( $\pm$ 5.9)	<b>&lt;0.001</b>
Race/ethnicity			
Non-Hispanic European American	78.2% (104)	83.3% (184)	0.143
Non-Hispanic African American	8.3% (11)	4.5% (10)	
Hispanic	6.0% (8)	8.6% (19)	
Other	7.5% (10)	3.6% (8)	
Years of Military Service at Baseline	5.0 ( $\pm$ 3.5)	12.7 ( $\pm$ 5.7)	<b>&lt;0.001</b>
Education			
High School Graduate	11.1% (15)	9.3% (21)	0.199
Some College	44.4% (60)	54.2% (122)	
College Degree	44.4% (60)	36.4% (82)	
Total Family Income			
$\leq$ \$19,999	5.5% (7)	0.9% (2)	<b>&lt;0.001</b>
\$20,000–\$59,999	43.8% (56)	23.7% (52)	
\$60,000–\$99,999	34.4% (44)	48.0% (105)	
$\geq$ \$100,000	16.4% (21)	27.4% (60)	
Relationship status			
Married or cohabitating	90.4% (122)	93.3% (210)	0.310
Separated or divorced	9.6% (13)	6.7% (15)	
Rank			
Enlisted	83.7% (113)	80.9% (182)	0.501
Officer	16.3% (22)	19.1% (43)	
Military occupational specialty			
Aviation	4.4% (6)	5.8% (13)	0.055
Civil Affairs	5.2% (7)	5.3% (12)	
Command	1.5% (2)	3.6% (8)	
Engineer	9.6% (13)	6.7% (15)	
Infantry	5.9% (8)	6.7% (15)	
Information operations	1.5% (2)	0.9% (2)	
Logistics	4.4% (6)	12.0% (27)	
Medical	13.3% (18)	7.1% (16)	
Military intelligence	4.4% (6)	4.0% (9)	
Military police	10.4% (14)	9.3% (21)	
Personnel	5.9% (8)	7.1% (16)	
Signal	8.9% (12)	3.1% (7)	
Support	15.6% (21)	11.1% (25)	
Training	2.2% (3)	6.7% (15)	
Other	6.7% (9)	10.7% (24)	
Length of most recent deployment, months	NA	10.7 ( $\pm$ 2.8)	NA
Location of most recent deployment			
Afghanistan		42.7% (96)	NA
Iraq		34.7% (78)	
Other	NA	20.0% (45)	
PROMIS Anger Score	15.5 ( $\pm$ 6.1)	17.9 ( $\pm$ 7.2)	<b>0.002</b>
Anxiety Score	3.9 ( $\pm$ 5.8)	4.7 ( $\pm$ 6.2)	0.269
PHQ-8 Score	2.8 ( $\pm$ 4.6)	3.6 ( $\pm$ 4.5)	0.083

**Table 1** (continued)

	Never-deployed ( $n=135$ ) % ( $n$ ) or mean ( $\pm SD$ )	Ever-deployed ( $n=225$ ) % ( $n$ ) or mean ( $\pm SD$ )	Significance test <sup>a</sup> $p$ values
PCL-5 Score	7.5 ( $\pm 12.2$ )	10.0 ( $\pm 12.8$ )	0.067
DRRI Unit Social Support Score	45.7 ( $\pm 12.3$ )	45.5 ( $\pm 11.4$ )	0.893
MAT Score	115.4 ( $\pm 27.4$ )	110.1 ( $\pm 29.2$ )	0.105
Dispositional Resiliency Scale Score	31.6 ( $\pm 5.9$ )	30.8 ( $\pm 6.0$ )	0.230

Bold values indicate statistical significance

<sup>a</sup> $t$  tests for differences in means, chi-square tests for differences in distributions; NA not applicable

[36]. This 8-item measure assesses the frequency of various states of anger in the past 7 days. Items include statements such as “I was irritated more than people knew” and “I felt angrier than I thought I should.” Each item was scored 1–5 on a Likert scale with responses ranging from “Never” to “Always.” Total scores can range from 8 to 40, with higher scores indicating greater anger. Examination of the ecological validity of this measure demonstrates that 7-day recall of anger using the PROMIS was well-correlated with daily ratings of anger,  $r=0.73$ – $0.83$ ,  $p<0.001$  [37]. PROMIS anger score was considered as a count variable in all analyses ( $\alpha=0.94$ ).

**Anxiety** We assessed anxiety with the 10-item Severity Measure for Generalized Anxiety Disorder [38]. The items examine the past 7 days on a Likert scale scored 0–4 ranging from “Never” to “All of the time.” Example items include “Felt moments of sudden terror, fear or fright” and “Felt anxious, worried, or nervous.” Scores range from 0 to 40, with higher scores indicating a greater severity of anxiety. Preliminary evidence demonstrates that these measures have high internal consistency, unidimensionality, and convergent and discriminant validity [39]. We entered the anxiety score as a count variable in all analyses ( $\alpha=0.91$ ).

**Depression** We assessed depression using the 8-item Patient Health Questionnaire (PHQ-8) [40], a modified version of the 9-item Patient Health Questionnaire (PHQ-9) [41]. The PHQ-8 assesses the frequency with which the respondent has been affected by depressed states over the last 2 weeks, such as “Feeling down, depressed, or hopeless” and “Feeling bad about yourself.” The PHQ-8 has been shown to be a valid and reliable measure of current depression for use in the general population [40]. Items are scored 0–3 on a Likert scale ranging from “Not at all” to “Nearly every day.” Scores range from 0 to 24, with higher scores indicating a greater severity of depression. We entered a depression score as a count variable in all analyses ( $\alpha=0.91$ ).

**Posttraumatic stress** We assessed posttraumatic stress using the 20-item Posttraumatic Stress Disorder Checklist (PCL-5) [42, 43] which evaluates the 20 DSM-5 symptoms of PTSD across symptom clusters. Respondents are asked to indicate how much they are bothered by each PTSD symptom over the last month. Example items include “Repeated,

disturbing, and unwanted memories of the stressful experience” and “Having strong negative feelings such as fear, horror, anger, guilt, or shame.” Items are scored 0–4 on a Likert scale ranging from “Not at all” to “Extremely.” We used the total symptom severity scoring method and scores range from 0 to 80, with higher scores indicating a greater PTSD symptoms. The PCL-5 has been shown to be valid in reliable among military populations [42, 44]. We entered total PCL-5 score as a count variable in all analyses ( $\alpha=0.95$ ).

**Unit support** The Deployment Risk & Resiliency Inventory-2 (DRRI-2) [45] is comprised of 17 individual scales that assess risk and resiliency factors associated with military stressors. The subscales have been validated for use in nonclinical military populations [46] and can be administered independently of the larger 17-measure inventory. We assessed soldiers’ perceived social support from unit leaders and unit members using the 12-item Unit Support Scale from the DRRI-2 [45]. 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 unit is like a family to me,” “My service is appreciated by the leaders in my unit,” and “I feel valued by my fellow unit members”. This subscale was originally created to assess unit support in the context of deployment, but we modified the prompt to ask about these experiences more generally to soldiers who have and have not previously been deployed. Unit support was parameterized as a count variable for our analyses ( $\alpha=0.97$ ).

**Marital satisfaction** We used the Marital Adjustment Test (MAT) to assess soldiers’ relationship functioning at baseline [47]. This 15-item scale 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. 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.” Marital satisfaction was entered as a count variable for all analyses ( $\alpha=0.77$ ).

**Psychological hardiness** We assessed psychological hardiness at baseline with the 15-item Dispositional Resiliency Scale (DRS-15) [32, 48]. This measure includes subscales for three constructs: commitment (a tendency to involve oneself in activities in life and as having a genuine interest in and curiosity about the surrounding world), control (a tendency to believe and act as if one can influence the events taking place around oneself through one’s own efforts), and challenge (a tendency to believe that change, rather than stability, is the normal mode of life and constitutes motivating opportunities for personal growth rather than threats to security). Responses ranging from “Not true at all” to “Completely true.” Example items include: “Most of my life gets spent doing things that are meaningful” (commitment), “By working hard you can nearly always achieve your goals” (control), and “I enjoy the challenge when I have to do more than one thing at a time” (challenge). Responses are summed for a total psychological hardiness score ranging from 0 to 45, with higher scores indicating greater dispositional resiliency. This scale has been shown to have good test–retest reliability, which is important to note given that it intends to assess a stable characteristic [32, 48]. For all analyses, we entered the psychological hardiness score as a count variable ( $\alpha = 0.79$ ).

**Deployment status** Participants were asked if they had ever been deployed at each yearly survey. We dichotomized deployment status (ever/never) and included as a binary variable in all analyses.

**Covariates** We included sex, age, income, and years of military service as covariates in our model. While male and female soldiers are both at risk to develop psychiatric disorders, male Guard soldiers are more likely to develop substance use disorders, while female Guard soldiers are more likely to develop mood disorders [8]. Soldiers self-reported biological sex (male/female) at baseline and sex was included as a dichotomous variable in our models. National data also show some differences in mental health by age and income [49]. Soldiers self-reported age and family income at baseline. Greater time-in-service may contribute to resilience to the effects of deployment; a recent study demonstrated that soldiers were more likely to attempt suicide when they were deployed within the first 12 months of service compared to when they were deployed after this time period [50]. Participants in the current study reported length of time in any military service branch at baseline and a cumulative sum across all service branches was created.

## Analytic approach

We performed all analyses using Stata version 15.1 software (Stata Corporation, College Station, TX). First, we calculated descriptive statistics to characterize the sample. We then calculated Pearson correlations to describe the relationships between each of the following observed variables: anger, anxiety, depression, PTSD, unit support, marital satisfaction, psychological hardiness, sex, age, income, years of military service, and deployment status. Given that all of the variables of interest were observed (measured) and that anger, anxiety, depression, and PTSD have shared symptomatology and variance, we used a multivariate path analysis approach to examine the effects of resiliency factors on these mental health outcomes, concurrently. We examined the simultaneous effects of unit support, marital satisfaction, and psychological hardiness (observed exogenous variables) on four mental health outcomes: anger, anxiety, depression, and PTSD symptomatology (observed endogenous variables). All mental health outcomes were measured as count variables that can only take non-negative integer values in a limited range; therefore, we used a negative binomial structural equation model. We also included sex, age, income, and years of military service as control variables in the final model. Lastly, we tested for differences in the relationship between resiliency factors and mental health outcomes on the basis of deployment status (never-deployed vs. ever-deployed) by adding interaction terms to the model. We examined the model for fit and adjusted as indicated. Risk ratios (RRs), 95% confidence intervals (CIs), and *p* values are reported. To further interpret and explain significant interaction effects, we also examined the conditional effects of resiliency factors on mental health outcomes by deployment status.

## Results

### Descriptive information on observed variables

The mean anger score among this sample of USAR/NG soldiers was 17.0 (SD = 6.9), substantially higher than the general population [36]. Anxiety scores were also suggestive of significant symptomatology. Over two-thirds of the sample reported symptoms consistent with mild or worse anxiety (51.9% mild, 13.1 moderate, 2.8% severe, and 0.6% extreme). Likewise, over one-quarter of the sample reported symptoms that were consistent with mild or worse depression (15.8% mild, 8.3% moderate, 2.2% moderately severe, and 1.1% severe). Further, 1 in 8 participants met *DSM-5* criteria for PTSD, including 8.0% of soldiers that have previously been deployed and 7.4% of never-deployed soldiers. Additional details, including tests for differences in observed

variables on the basis of deployment status are presented in Table 1. Correlations among observed endogenous and exogenous variables are also shown in Table 2.

### Effects of resiliency factors on mental health symptomatology

A path analysis demonstrated statistically significant paths between each of the aforementioned resiliency factors and the mental health outcomes (Model 1, Table 3). The addition of interaction terms to test for differences in these relationships on the basis of deployment status yielded several statistically significant interactions between psychological hardiness and deployment status (Model 2). The removal of non-significant interactions from the path analysis produced a superior fitting model (Model 3), with the lowest estimates for Akaike’s Information Criterion (AIC) and Bayesian Information Criterion (BIC) of the models fitted.

All three resiliency factors were associated with lower mental health symptomatology. Unit support had a direct effect on anger (RR = 0.99, 95% CI 0.99, 0.99;  $p < 0.01$ ), anxiety (RR = 0.98, 95% CI 0.97, 0.99;  $p < 0.001$ ), depression (RR = 0.98, 95% CI 0.97, 0.99;  $p < 0.01$ ), and PTSD (RR = 0.98, 95% CI 0.96, 0.99;  $p < 0.01$ ). Marital satisfaction was also negatively associated with anger (RR = 0.99, 95% CI 0.99, 0.99;  $p < 0.001$ ), anxiety (RR = 0.99, 95% CI 0.98, 0.99;  $p < 0.001$ ), depression (RR = 0.99, 95% CI 0.98, 0.99;  $p < 0.001$ ), and PTSD (RR = 0.99, 95% CI: 0.98, 0.99;  $p < 0.001$ ). Likewise, psychological hardiness had a direct effect on each of the following mental health outcomes: anger (RR = 0.98, 95% CI 0.97, 0.99;  $p < 0.001$ ), anxiety (RR = 0.89, 95% CI 0.85, 0.93;  $p < 0.001$ ), depression (RR = 0.87, 95% CI 0.83, 0.91;  $p < 0.001$ ), and PTSD (RR = 0.87, 95% CI 0.83, 0.92;  $p < 0.001$ ). Deployment status had a significant interaction with psychological hardiness on anxiety (RR = 1.07, 95% CI 1.02, 1.13;  $p < 0.05$ ), depression (RR = 1.09, 95% CI 1.03, 1.15;  $p < 0.01$ ), and PTSD (RR = 1.10, 95% CI 1.04, 1.17;  $p < 0.01$ ). There were no significant interactions between deployment status and unit support or between deployment status and marital satisfaction on any of the mental health outcomes ( $ps > 0.05$ ) (Fig. 1).

Further examination of the conditional effects of psychological hardiness on anxiety (Fig. 2), depression (Fig. 3), and PTSD (Fig. 4) by deployment status demonstrated a consistent moderating effect. While greater psychological hardiness was associated with less anxiety, depression, and PTSD symptomatology among both never- and ever-deployed soldiers, the effects of psychological hardiness were even stronger among soldiers who had never been deployed.

**Table 2** Correlations among variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Anger	1.00											
2. Anxiety	<b>0.57***</b>	1.00										
3. Depression	<b>0.63***</b>	<b>0.71***</b>	1.00									
4. PTSD	<b>0.58***</b>	<b>0.80***</b>	<b>0.76***</b>	1.00								
5. Unit Support	- <b>0.23***</b>	- <b>0.22***</b>	- <b>0.19***</b>	- <b>0.16**</b>	1.00							
6. Marital Satisfaction	- <b>0.50***</b>	- <b>0.35***</b>	- <b>0.39***</b>	- <b>0.38***</b>	<b>0.11*</b>	1.00						
7. Psychological Hardiness	- <b>0.44***</b>	- <b>0.36***</b>	- <b>0.42***</b>	- <b>0.36***</b>	<b>0.24***</b>	<b>0.29***</b>	1.00					
8. Sex <sup>a</sup>	<b>0.11*</b>	0.06	0.04	0.02	-0.04	-0.10	-0.02	1.00				
9. Age	0.02	-0.04	0.00	0.03	0.06	0.05	0.00	- <b>0.16**</b>	1.00			
10. Income	-0.02	-0.02	-0.06	-0.03	0.08	0.01	0.03	-0.07	<b>0.32***</b>	1.00		
11. Years of Military Service	<b>0.14**</b>	0.04	0.09	<b>0.13*</b>	0.01	-0.02	-0.07	- <b>0.16**</b>	<b>0.79***</b>	<b>0.27***</b>	1.00	
12. Deployment Status	- <b>0.17**</b>	0.06	0.09	0.10	-0.01	-0.09	-0.06	- <b>0.27***</b>	<b>0.46***</b>	<b>0.24***</b>	<b>0.60***</b>	1.00

Bold values indicate statistical significance

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

<sup>a</sup>Males coded as 0, females coded as 1

**Table 3** Path analysis model fit indices

	<i>df</i>	Log likelihood	AIC	BIC
Model 1	40	– 3330.08	6740.16	6890.77
Model 2	52	– 3316.02	6736.04	6931.83
Model 3	44	– 3317.86	6723.73	6889.39

*Model 1* Initial model examining effects of resiliency factors on mental health outcomes

*Model 2* Addition of interactions between deployment status and each resiliency factor on mental health outcomes

*Model 3* Removal of non-significant interactions

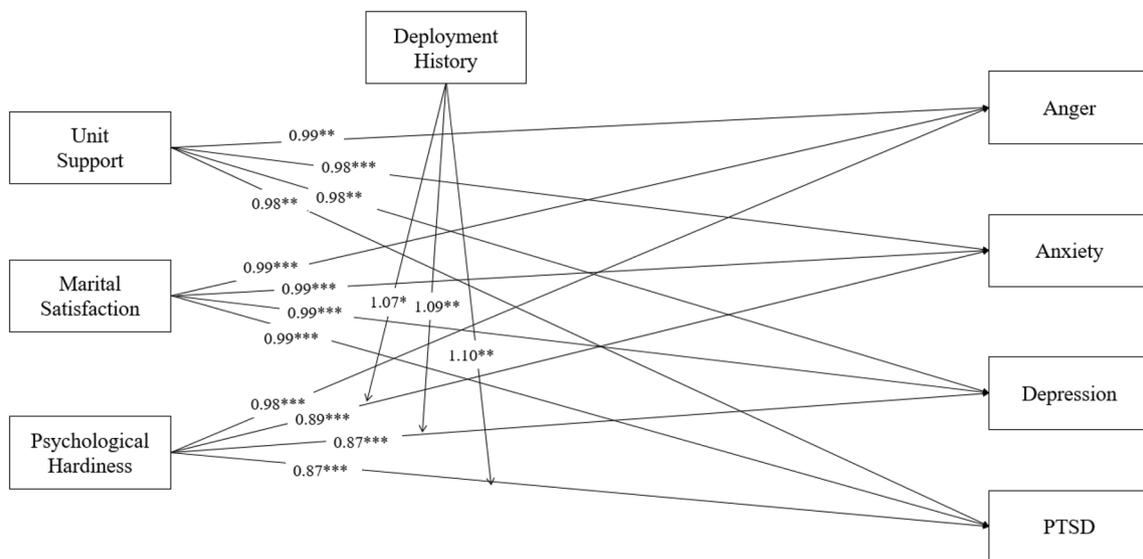
*df* degrees of freedom, *AIC* Akaike’s Information Criterion, *BIC* Bayesian Information Criterion

### Discussion

We examined the relationships between resiliency factors and a range of mental health outcomes among a heterogeneous sample of USAR/NG soldiers who have and have not experienced deployment. Our findings demonstrate that while anger, anxiety, depression, and PTSD symptomatology are prevalent among both never- and ever-deployed service members, unit support, marital satisfaction, and psychological hardiness are all associated with less mental health symptomatology among USAR/NG soldiers who have and have not experienced deployment. Further, our findings suggest that although each of these resiliency factors was associated with better mental health

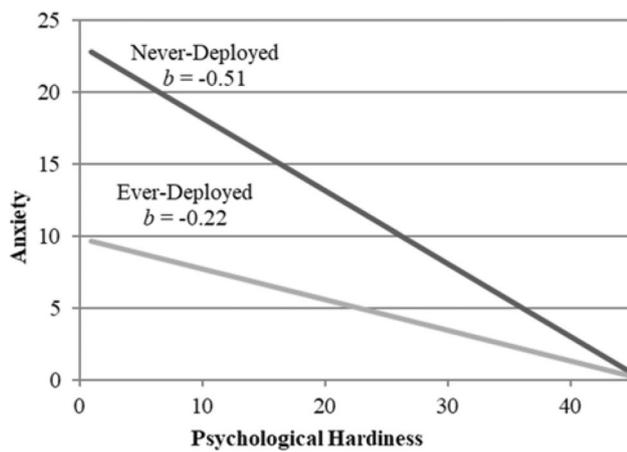
outcomes, psychological hardiness had the greatest effect size. To our knowledge, no other studies have examined the role of resiliency factors among USAR/NG soldiers as a whole or subsequently tested for differences according to deployment status. Overall, our results support the notion of resiliency to military-related stress as described in the Bioecological Model of Deployment Risk and Resilience [13], and expands the applicability of this framework outside of the context of deployment.

Interestingly, our findings demonstrate that psychological hardiness may be even more important to consider among USAR/NG soldiers who have never been deployed. This is important to note, as findings from several large studies have demonstrated that the prevalence of new-onset depression [51] and suicide [52] are higher among never-deployed service members than their previously deployed counterparts. Psychological hardiness may be critical for those who have not experienced a traumatic event, but are susceptible to anticipatory stress. Research conducted by Tillman and colleagues [53] showed that clinicians who imagined a patient dying by suicide endorsed greater distress than clinicians who actually experienced the death of a patient death by suicide. Moreover, it has been well-established that how an individual evaluates a potentially stressful situation is associated with his or her actual response [54]. For example, soldiers’ perception of combat experiences as traumatic has been shown to be a greater contributor to adverse post-deployment outcomes than actual combat exposure [25]. Further, psychological hardiness has been shown to affect these types of appraisals [55]—potentially reducing the deleterious

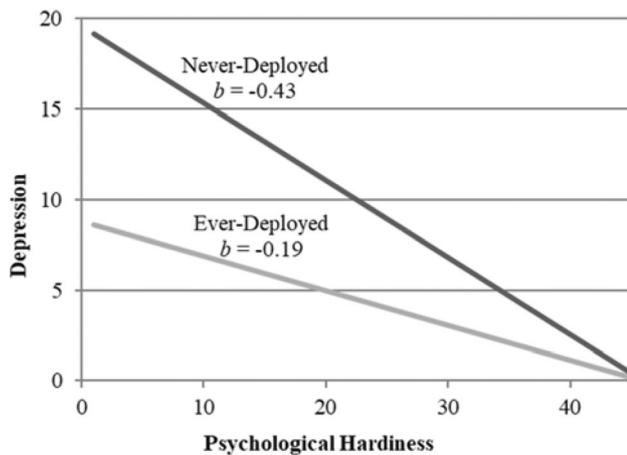


**Fig. 1** Path analysis examining associations between resiliency factors and mental health outcomes and interaction effects of deployment status. Risk ratios and significance level are presented. All paths were estimated, but only significant paths were retained and shown

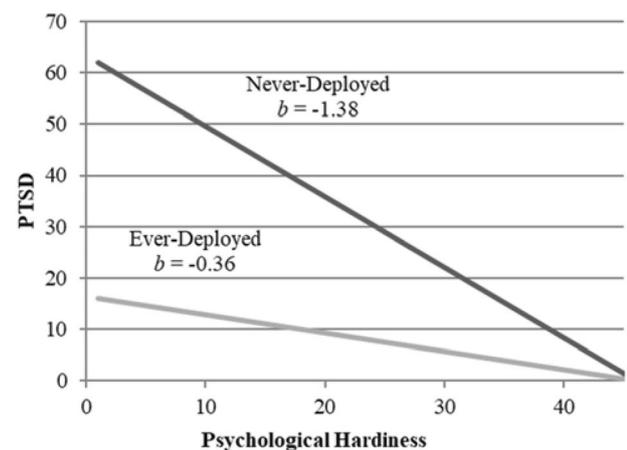
above (\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ). Sex, age, income, and years of military service were also included as control variables in the final model (not included in diagram for visual clarity)



**Fig. 2** Conditional effect of psychological hardiness on anxiety symptomatology by deployment status



**Fig. 3** Conditional effect of psychological hardiness on depression symptomatology by deployment status



**Fig. 4** Conditional effect of psychological hardiness on PTSD symptomatology by deployment status

effects of both anticipatory and experienced stress on mental health. Prior research has also demonstrated that negative emotions related to having never been deployed (i.e., feelings of guilt, decreased value, decreased connectedness, and decreased camaraderie within their unit) are associated with greater mental health symptomatology among USAR/NG soldiers [56]. These non-deployment emotions have also been associated with alcohol problems among USAR/NG soldiers [57]. Taken together with the findings of this study, the research suggests that psychological hardiness and non-deployment emotions may be interconnected. Future research is needed to untangle possible mediating and moderating relations among never-deployed service members. Alternatively, service members who have been deployed may be more likely to receive resilience-promoting interventions [58], which might also contribute to the observed similarities between USAR/NG soldiers who have and have not been deployed.

### Clinical implications

Our findings demonstrating that greater resiliency is associated with better mental health among USAR/NG soldiers are significant, as the literature suggests that interpersonal and intrapersonal resiliency factors are largely modifiable [58–63]. For example, a recent comprehensive review illustrates that improving the team dynamics of military units has been a growing area of research for decades, ultimately leading to the development of multiple evidence-based interventions focused on enhancing relationships between unit members and leadership through improved communication, cross-training, and the building of self-awareness to diagnose team performance problems and develop solutions [59]. The US military also provides family readiness programs during the pre-, peri-, and post-deployment periods to service members and their families, which have been shown to improve aspects of family relationships, caregiving/parenting, and the family environment [64]. However, one study demonstrated that USAR/NG soldiers who had never been deployed were less than half as likely to access these services than USAR/NG soldiers who had previously been deployed [58]. Additionally, while data show that psychological hardiness tends to be relatively stable over time for both ever- and never-deployed service members [66], multiple intervention studies across various populations have demonstrated that psychological hardiness can be significantly improved through targeted hardiness training, buffering the effects of job-related stress [60–62]. Further, we are not aware of any existing military interventions that specifically focus on marital satisfaction, despite existing research among nonmilitary populations which suggests that marital satisfaction may have longitudinally protective effects on both partners [65].

Our findings also have implications for improved public health interventions for service members. Results demonstrate that unit support, marital satisfaction, and psychological hardiness are all potential intervention targets for a strengths-based approach to promoting psychological well-being among USAR/NG soldiers. While existing deployment support programs are essential to the health and well-being of service members who experience deployment, our findings suggest that there are important interpersonal and intrapersonal factors to consider, regardless of deployment status. Given that never-deployed soldiers are at similar or even higher risk for psychiatric morbidity than their previously deployed counterparts [12, 51, 52], we recommend a focus on building resiliency factors universally. Psychological hardiness demonstrated the greatest effect size of the resiliency factors examined in this research, and thus may have the most clinical significance. Interventions for USAR/NG soldiers should consider strengthening soldiers' military and personal relationships, but building individual psychological hardiness may be even more critical. Although much of the military resiliency intervention research has previously focused on the context of deployment, future work should also examine the effects of these programs on service members who have never been deployed.

This study possessed several strengths that should be noted. First, our multivariate path analysis approach allowed us to consider the shared symptomatology and variance among anger, anxiety, depression, and PTSD and examine the simultaneous effects of multiple resiliency factors on these mental health outcomes, concurrently. Second, our sample was diverse and included female soldiers and soldiers of various races/ethnicities. This research extended the literature on a high risk but understudied population. Additionally, the collection of sensitive information via confidential surveys and validated tools allowed us to accurately estimate the effects of resiliency factors on mental health symptomatology.

The data presented here are subject to some limitations. First, all data were self-reported and mental health symptomatology were not clinically verified. However, data were collected using validated tools via a confidential survey. Second, this study was cross-sectional, so temporal relationships cannot be examined. It is possible that increased psychiatric symptomatology contributed to a reduced social functioning and capacity to manage life stressors, resulting in strained relationships with military peers and intimate partners. However, as longitudinal data become available from Operation: SAFETY, we will be able to more closely examine the directionality of these relationships. Third, generalizability may be limited because all participants were either married or living as married. However, national data show that the majority of U.S. service members are married

[20]. Finally, the mechanisms by which resiliency factors affect mental health were not examined here, and warrant additional research.

Overall, our findings provide important evidence supporting the notion that interpersonal and intrapersonal resiliency factors may be protective against poor mental health among USAR/NG soldiers more broadly, regardless of deployment status. Consideration should be given to never-deployed service members who may be less likely to seek and receive resilience-building interventions. Future research should include the examination of the longitudinal relationships between resiliency factors on mental health. Additionally, more research is needed to understand the unique risk and protective factors of never-deployed service members.

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## Compliance with ethical standards

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

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