Health-Promoting Leadership during an Infectious Disease Outbreak: A Cross-sectional Study of US Soldiers Deployed to Liberia

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Abstract

Background

Infectious disease outbreaks are uniquely stressful for non-medical essential employees. Promoting the health of these workers is vital to minimize their distress and to ensure they are able to continue in their professional capacity. One way to support worker health is for supervisors to engage in behaviors that promote their employees' behavioral health, wellbeing, and attitudes towards preventive medicine practices.

Methods

The present study examined if health-promoting leadership contributes to these outcomes in employees operating in an epidemic. Active-duty soldiers (N = 173) deployed to provide non-medical support in Liberia during the 2014 Ebola crisis completed surveys assessing posttraumatic stress disorder (PTSD), depression, anxiety, sleep problems, burnout, morale and attitudes, and rating their leaders on health-promoting behaviors. An exploratory factor analysis identified two leadership factors, one focused on psychological health and one on preventive medicine behaviors.

Results

Using mixed effects logistic regression, after adjusting for general leadership and soldier rank, health-promoting leadership focused on psychological health was associated with decreased odds of PTSD, depression, anxiety, and burnout, and increased odds of high morale and avoiding unnecessary risk. Health-promoting leadership behaviors focused on preventive medicine were associated with decreased odds of depression and anxiety, and increased odds of high morale, understanding the level of risk from disease, positive attitudes towards the deployment and preventive practices, and avoiding unnecessary risk.

Conclusions

Findings suggest health-promoting leadership behaviors could be valuable for employees responding to infectious disease outbreaks. Future research should examine whether training leaders in these skills can improve outcomes for non-medical employees in both military and civilian settings.

Background

Infectious disease outbreaks may prompt anxiety in those who have to function in their occupational roles while risking potential infection. Several previous studies have focused on stressors and behavioral health consequences experienced by medical staff responding to outbreaks of infectious disease, such

as Middle East Respiratory Syndrome(1), Severe Acute Respiratory Syndrome(2), Ebola(3, 4) and COVID-19(5–7). Medical professionals like physicians and nurses managing these outbreaks report elevated psychological distress(5, 8–10), posttraumatic stress symptoms(2, 8–11), depression and anxiety(4–6, 9), sleep problems(5, 6, 9), and burnout(7, 8). Studies have also documented that working in the context of an outbreak can place a strain on the team as a whole (12–14).

Moreover, there is some evidence that non-medical experts, such as clinical sanitation staff(3), also report anxiety and other behavioral health concerns. However, the degree to which the behavioral health of these non-medical groups is impacted by having to operate within the context of an infectious disease outbreak is less clear. Likewise, employees such as public transportation and delivery workers may be asked to function outside of the scope of their regular responsibilities. In their new roles, they may experience pressure to adapt to new unexpected demands in a setting where mistakes in following preventive measures have high-stakes consequences. Thus, it is important to understand the impact of these demands on employee behavioral health and what mitigates these effects.

One opportunity to understand this dynamic is the deployment of non-medical US Army units to Liberia in response to the Ebola outbreak of 2014. These soldiers were deployed as part of Operation United Assistance in which 3,000 service members built laboratories and Ebola treatment units, disseminated knowledge to local nationals on personal protective equipment, and provided logistical and security support(15, 16). In a survey conducted with these deployed soldiers, Sipos et al.(16) reported the range of stressors, behavioral health concerns, and attitudes toward the deployment. These attitudes included knowledge of preventive medicine measures and positive attitudes toward the deployment. Combined, these positive attitudes were inversely correlated with stressors and behavioral health. These data also offer an opportunity to examine factors that may mitigate the impact of stressors on behavioral health, burnout, sleep, morale and positive attitudes in personnel tasked with operating in high-stakes environments.

Military personnel understand that risk is part of their occupation. Studies of soldiers deploying to combat have documented these risks in terms of threats to physical safety(17, 18) and exposure to potentially traumatic events(19–21). Besides these high-risk stressors, daily challenges in the deployed context also include separation from family and friends(22–24), living in the deployed environment(23), uncertainty(25), and workload(23, 26). Stressors associated with responding to an epidemic offer some additional and unique challenges, including concerns about making difficult ethical decisions(27); witnessing the illness and death of others(1, 28); not feeling appreciated(4, 28, 29); feeling isolated(27, 28, 30); experiencing stigma(4, 10, 27, 29); fear of infecting family and friends(1, 8, 10, 28); and contracting and dying from the particular outbreak(2, 4, 30).

Indeed, infection is a real risk facing personnel responsible for responding to a disease outbreak. Engaging in preventive medicine practices at the individual and organizational level addresses risk. While organizations, including the military, can institute these practices, they rely on personnel to adopt them. Attitude is a core construct that drives intention according to the Theory of Planned Behavior(31) which

has successfully predicted health behaviors such as physical activity and diet(32), hand washing(33), and wearing gloves(34). Thus, attitudes about disease risk and preventive medicine measures may signal the willingness of personnel to comply with preventive medicine practices.

Given the stressors encountered by non-medical employees and the need to ensure that they follow preventive medicine practices, it is important to examine what influences employee adaptation during an epidemic. In a high-risk occupational context like the military, leadership is one key mitigating factor. Numerous studies have documented the role of leaders in influencing behavioral health and attitudes of military personnel(35–37).

While leadership in general is associated with better outcomes for military units, emerging research highlights the potential utility of focusing on specific leadership behaviors targeting specific domains. Domain-specific leadership has been studied in a variety of contexts from family-supportive supervisory behaviors(38) to safety leadership(39, 40). In the military, this concept has included combat operational stress control leadership(41), sleep leadership(42, 43), and health-promoting leadership(41, 44, 45). This research identifies specific areas that leaders can focus on to support relevant outcomes. Health-promoting leadership may offer an important perspective on behaviors that are associated with health-related outcomes during an infectious disease outbreak.

Health-promoting leadership is defined as the set of leader behaviors intended to support the maintenance of team member psychological and physical health and wellbeing while fulfilling professional responsibilities. This construct has been associated with decreased burnout symptoms, specifically exhaustion and depersonalization among medical staff deployed to Afghanistan(44). It was also associated with fewer depression and anxiety symptoms, more positive attitudes toward the mission, and more positive attitudes toward preventive medicine measures in soldiers quarantined for 21 days following deployment to Liberia, even after controlling for general leadership(45). Health-promoting leadership has also been associated with better mental health and positive attitudes for soldiers in quarantine following deployment over and above general leadership(45).

While these studies demonstrate that health-promoting leadership may be useful, there are several key remaining questions that address the utility of this construct in an applied setting. First, it is not clear whether health-promoting leadership is a single construct or composed of multiple factors. Second, it is not known whether health-promoting leadership is related to better outcomes *during* a mission in which units have to perform their tasks while confronted with the profound threat of infectious disease. Finally, while the relationship between health-promoting leadership and behavioral health(41), and attitudes toward quarantine(45) has been established, it is unknown whether these same leadership behaviors are associated with morale and attitudes toward disease risk and preventive medicine practices, over and above the role of general leadership. Addressing these questions can inform the development of leadership training to optimize the development of specific leadership strategies. Thus, the present study aims to examine the components of health-promoting leadership and identify which factors are associated with better behavioral health, wellbeing (defined in this study as sleep, burnout and morale),

and attitudes toward disease risk and preventive medicine practices in a sample of soldiers deployed to Liberia during the Ebola outbreak.

Methods

Study Design

As part of a study to determine key psychological stressors associated with deployment in support of a medical mission, soldiers completed anonymous and cross-sectional paper surveys(16). Study participants were all active duty soldiers supporting the U.S. response to the Ebola crisis in mainly non-medical roles. Surveys were administered in Liberia in February 2015. Participants were briefed in groups, provided an information sheet, and 84.8% (n = 173) provided informed consent and were included in the analytic sample. Study activities were reviewed and approved by the Walter Reed Army Institute of Research Institutional Review Board.

Measures

Demographics and Deployment Background

Demographic measures included age (18-24, 25-29, 30-39, 40 and older), rank (junior enlisted [rank E1-E4], non-commissioned officers [NCOs; rank E5-E9], and officer/warrant officer [rank O1 – O6/WO1 – CW5]) and gender (male, female). Background information about deployment included months on current deployment (ranged from less than one month to five months or more) and job category (medical, logistics, aviation, command and control, support, security/force protection, and other).

Health-Promoting Leadership

Health-promoting leadership measured soldiers' perceptions of leader behaviors focused on the preventive medicine goals of the mission as well as overall psychological health. This scale has been used in previous research with military units(44). Individual items are described in Table 2. Study participants were asked to rate their current team/unit leadership on 13 items in terms of how frequently they occurred (1 = *never* to 5 = *always*). Mean response scores for each of the 13 items were calculated. Cronbach's alpha for this scale was 0.96.

General Leadership

Soldiers' perceptions of general leadership behaviors were assessed using the four-item Walter Reed Army Institute of Research Leadership Scale (WRAIR-LS)-Short Form, a scale frequently used in research with military units(35, 41, 46). A sample item includes, "leader tells soldiers they have done a good job," and response options ranging from 1 = *never* to 5 = *always*. Negative items were reverse scored. Response scores were averaged. Internal consistency was 0.82.

Behavioral Health and Wellbeing

An adapted form of the 17-item posttraumatic stress disorder (PTSD) Checklist-Specific assessed PTSD symptoms(47, 48). The scale was dichotomized using a diagnostic algorithm for each cluster and overall score of 50 as the cutoff, which is consistent with other studies conducted with military populations(49). Internal consistency was 0.94.

The eight-item version of the Patient Health Questionnaire for Depression (PHQ-8) assessed depression symptoms of study participants(50). Items in the PHQ-8 are scored with four response options (0 = *not at all* to 3 = *nearly every day*). Items were summed, which resulted in a composite score ranging from 0 to 24. Respondents were indicated as a positive screen for depression if a summary score of 10 or more was met(51). Internal consistency was 0.90.

The seven-item Generalized Anxiety Disorder scale (GAD-7) assessed anxiety symptoms(52). Items were scored with four response options (0 = *not at all* to 3 = *nearly every day*). The seven items were summed, resulting in a composite score ranging from 0 to 21. Respondents were indicated as a positive score for anxiety if a summary score of 10 or more was met(53). Internal consistency was 0.92.

Sleep problems were measured using the seven-item Insomnia Severity Index(54). Items measured participants' difficulty falling asleep, staying asleep, and problems waking up too early, in addition to their satisfaction and distress regarding sleep problems. Each item was scored on a scale ranging from 0 to 4. The seven items were summed, resulting in a composite score ranging from 0 to 28. The summed scores were categorized to include no sleep problems (0-7), subthreshold insomnia (8-14), moderate insomnia (15-21), and severe insomnia (22-28) based on validated literature guidelines(54). The scale was further dichotomized to no sleep problems (0-14) and sleep problems (15-28). Internal consistency was 0.91.

Burnout was measured using a single item which asked soldiers to rate their level of burnout on a scale from 1 = *very low* to 5 = *very high*. The item was further dichotomized so that a response of three or below was considered low burnout and a score of four or higher was considered high burnout.

A single item measured morale. The item asked participants to rate their personal morale from on a scale from 1 = *very low* to 5 = *very high*. Morale was dichotomized so that a response of three or below was considered low morale and a score of four or above was considered high morale.

Attitudes toward Disease Risk and Preventive Medicine Practices

Three items ("I understand the level of risk from disease"; "I know what to do to protect myself from disease"; "this deployment will make a meaningful difference in fighting the Ebola epidemic") adapted from Castro(55) and Sipos(56) were selected to assess attitudes towards the deployment. Items were rated on a five-point scale from 1 = *strongly disagree* to 5 = *strongly agree*. The items were further dichotomized so that a score of four or higher was indicated as agreement.

A three-item scale developed for this study examined attitudes towards preventive medicine measures during deployment. Response questions included both positive ("taking our temperature twice a day makes sense to me") and negative ("taking our temperature twice a day is a waste of time"; "preventive

medicine measures recommended for this deployment are not practical") items with response options ranging from 1 = *strongly disagree* to 5 = *strongly agree*. A positive score was indicated by a response of four or higher for the first item, and a score of two or lower for the two negative items. Internal consistency was 0.73.

A single item developed for this study ("I avoided unnecessary risks on this mission") assessed preventive behaviors during deployment. Response options ranged from 1 = *strongly disagree* to 5 = *strongly agree*, and were dichotomized so that a score of four or higher was indicated as agreement.

Analysis

An exploratory factor analysis (extraction method: principal factor; rotation method: oblique promax with Kaiser normalization) of the health-promoting leadership scale was conducted. Two subscales were discovered: psychological health-promoting leadership and preventive medicine health-promoting leadership. Rotated factor loadings for each scale item are reported in Table 2. Internal consistency was 0.96 and 0.92 for the two factors, respectively.

The study aimed to examine the association between health-promoting leadership and behavioral health, attitudes, and behaviors of soldiers. The sample population is inherently hierarchical due to clustering effects by organizational unit, and therefore, assumptions of independence could not be met(57). Indeed, the main exposure of interest, health-promoting leadership, introduces non-independence, as clusters of participants in our sample had the same leaders. In order to account for non-independence, mixed effects logistic regression models were used to indicate associations between health-promoting leadership behaviors and outcomes of interest. Military units (companies nested within battalions) were modeled as the random intercepts. All models were adjusted for rank (junior enlisted, NCOs, and Officer/Warrant Officer) and general leadership (continuous). Other demographic and background covariates were tested for inclusion in the model but did not meet the criteria for confounding (i.e., associated with the exposure and outcome, change in odds ratios by > 10%). Listwise deletion was used to handle any missing data. All data analyses were conducted using STATA 14.

Results

Demographic and background data are shown in Table 1. Nearly all participants received training about infectious disease (99%), managing medical threats other than infectious disease (99%), managing emotional stress of deployment (96%), and cultural awareness (95%). Only 16% of respondents reported that they have experienced dealing with infectious disease threats on other missions.

Participants were asked to rank their current unit leaders on various behaviors. Health-promoting leadership items are displayed in Table 2. When examining health-promoting leadership as two separate factors, soldiers rated preventive medicine health-promoting leadership (M = 3.79, SD = 0.97) significantly higher than psychological health-promoting leadership (M = 3.28, SD = 1.06; $t(169) = 8.68$, $p < .001$).

Adjusted odds ratios (AORs) reporting the association between overall health-promoting leadership and measures of behavioral health, wellbeing and attitudes are displayed in Table 3. Overall, soldiers who rated health-promoting leadership higher had significantly reduced odds of PTSD, depression, anxiety, and high burnout, whereas health-promoting leadership increased the odds of high morale. Additionally, higher ratings of health-promoting leadership were associated with increased odds of both believing the deployment will make a meaningful difference in fighting the Ebola epidemic and avoiding unnecessary risks.

Results from the two health-promoting leadership factors are presented in Table 3. Increases in psychological health-promoting leadership ratings were associated with reduced odds of PTSD, depression and anxiety, and high burnout, as well as increased odds of high morale and avoiding unnecessary risks. Likewise, preventive medicine health-promoting leadership was associated with increased odds of high morale, and reduced odds of depression and anxiety, though the AORs were attenuated relative to psychological health-promoting leadership. In addition, increased ratings of preventive medicine health-promoting leadership was associated with increased odds of understanding the level of risk from disease, positive attitudes towards deployment making a meaningful difference, avoiding unnecessary risks, and positive attitudes towards preventive practices. Sleep problems and knowing how to protect oneself from disease were not associated with any health-promoting leadership behaviors.

Discussion

Working within an environment characterized by the threat of infectious disease can expose employees outside of the medical community to unusual occupational stressors, including the risk of infection. Thus, understanding how to help these employees function is essential given that they are expected to continue performing their jobs. The present study analyzed data from a survey of non-medical soldiers deployed to Liberia in response to an Ebola outbreak. Results documented that ratings of health-promoting leadership were associated with positive soldier behavioral health, wellbeing, and morale, even after controlling for general leadership. Such results are consistent with existing literature indicating that specific leader behaviors are associated with behavioral health and wellbeing outcomes(41, 44) and positive attitudes toward quarantine(45).

Results identified two health-promoting leadership factors. These factors differentially predicted study metrics, underscoring the need to consider specific leader behaviors when targeting specific employee outcomes. One health-promoting leadership factor focused on psychological health. This factor was associated with lower odds of soldiers reporting PTSD, depression, anxiety and burnout. These leadership behaviors were also associated with higher levels of morale and avoiding unnecessary risks. This finding suggests that leaders who encourage self-care and support team goals have soldiers with fewer behavioral health difficulties. In contrast, the other health-promoting leadership factor focused on preventive medicine. This factor was associated with lower odds of depression and anxiety, and higher odds of morale, avoiding unnecessary risks and positive attitudes toward preventive medicine practices.

This finding suggests that leaders who emphasize the importance of these measures and lead by example are more likely to have soldiers who follow these practices and feel positively about them.

These findings are consistent with research documenting the importance of perceived control in reducing stress(58) and increasing emotional wellbeing(59). They also suggest that leaders who focus on actions soldiers can take to reduce risk of infection may help reduce depression and anxiety as well. While both factors were associated with behavioral health measures, the factor focused on preventive medicine was more clearly linked with attitudes toward preventive medicine practices, suggesting that targeting specific leadership behaviors aimed at emphasizing preventive medicine practices may increase occupational safety among those responding to infectious disease outbreaks.

Interestingly, neither the overall health-promoting leadership scale nor the factors were associated with reports of sleep problems. This is consistent with findings from a study of soldiers in quarantine in which health-promoting leadership behaviors were not associated with insomnia(45). In contrast, studies examining sleep leadership have demonstrated links to sleep outcomes in military units(60). The current study's distinctive pattern of results further demonstrates the need to address leadership behaviors by focusing on domain-specific topics.

Another outcome which was not associated with health-promoting leadership behaviors was "knowing how to protect oneself from disease." While this result was unexpected given that one factor specifically emphasized preventive health, more than 90% of soldiers were confident in their knowledge of how to protect themselves. Thus, a ceiling effect may have prevented this particular item from being significantly predicted by leadership behaviors.

While there are strengths of the current study, including the unusual sample and identification of specific leader behaviors, there are limitations that must be taken into account. First, findings are based on self-reported data; although studies have shown that anonymous self-reported measures can be a valid indicator of mental health and attitudes among this population(61). Second, the data are cross sectional and cannot address questions of causality, although the fact that general leadership served as a control variable helps strengthen confidence in the observed associations. Third, the study sample may have reduced the power to observe effects of leadership behavior, although several significant associations were identified.

Despite these limitations, these findings offer direction for practical application such as leadership training programs. Although the study focused on the Ebola epidemic, the findings may be relevant to other epidemics, including the COVID-19 pandemic, by offering insight into how leaders can effectively support personnel in non-medical positions. For example, as of June 2020, more than 62,000 service members have responded to the COVID-19 pandemic, only 3,500 of these personnel are medical(62). This demonstrates that behavioral health, wellbeing, and attitudes in service members are relevant not only for medical personnel but for non-medical support when operating within an infectious disease context. Future research should assess the degree to which health-promoting leadership is related to employee outcomes in non-military settings given the unique nature of military culture(63, 64).

Conclusions

The COVID-19 pandemic has drawn attention to the vulnerability of essential workers such as supermarket cashiers, bus drivers, and custodial staff who provide vital support for their communities while confronting the threat of infectious disease. This increased risk may be outside the employee's typical scope of work, thus elevating the likelihood of behavioral health and wellbeing difficulties. Besides providing measures such as personal protective equipment, physical distancing, and hygiene resources, it may be useful for leaders to consider engaging in specific behaviors that support their employees during these difficult times. Such behaviors can be integrated into management training and company culture.

Indeed, results from the present study demonstrate that health-promoting behaviors are within the repertoire of supervisor actions given that many soldiers identified their leaders as frequently engaging in these behaviors. Still, approximately one in three soldiers reported that their leaders did not frequently engage in health-promoting behaviors, including encouraging preventive medicine practices, this suggests opportunities for improvement. Future research should examine the degree to which such these behaviors can be easily trained and encouraged in front-line supervisors, modeled on other domain-specific leadership training(60, 65). Future research should build on the health-promoting leadership behaviors included here and examine the relevance of additional behaviors specific to particular infectious disease outbreaks. More specific preventive medicine behaviors may enable organizations to identify a range of behaviors for front-line supervisors to emphasize in order to optimally support employee health and adaptation.

Abbreviations

AOR: Adjusted odds ratio; CI:Confidence interval; GAD-7:Generalized Anxiety Disorder scale (7-item); M:Mean; NCO:Non-commissioned officer; OR:Odds ratio; PHQ-8:Patient Health Questionnaire for Depression (eight-item); PTSD:Posttraumatic stress disorder; SD:Standard deviation; WRAIR-LS:Walter Reed Army Institute of Research Leadership Scale

Declarations

Ethics approval and consent to participate

There is no objection to the presentation and/or publication of this manuscript. The opinions or assertions contained herein are the private views of the author, and are not to be construed as official, or as reflecting true views of the Department of the Army or the Department of Defense. The investigators have adhered to the policies for protection of human subjects prescribed in AR 70 – 25. All study procedures have been reviewed by the Walter Reed Army Institute of Research Institutional Review Board. All participants provided consent prior to participation in any component of this study.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to the sensitive nature of military training operations and ongoing data analysis, but are available from the corresponding author on reasonable request.

Competing Interests:

None to report

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Authors' contributions:

ABA conceived of and presented idea. KYP oversaw and coordinated the data collection. MES analyzed and interpreted the data. LCB, ABA, and MES wrote the manuscript. All authors contributed substantial edits and approved of the final manuscript.

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Tables

Table 1: Frequencies of Demographics, Deployment Background, Behavioral Health and Wellbeing, and Attitudes Towards Disease Risk and Preventive Medicine Practices (N = 173)	
	n (%)[a]
Demographics	
Age	
18-24	74 (43)
25-29	41 (24)
30-39	47 (27)
40 and older	11 (6)
Rank	
Junior Enlisted	88 (51)
NCO	51 (30)
Officer/Warrant Officer	33 (19)
Gender	
Male	150 (88)
Female	20 (12)
Deployment Background	
Months on current deployment	
One month or less	2 (1)
Two months	57 (33)
Three months	87 (51)
Four months	23 (13)
Five months or more	3 (2)
Job Category	
Medical	7 (4)
Logistics	14 (8)
Aviation	127 (74)
Command and control	2 (1)
Support	17 (10)

Security/force protection	1 (1)
Other	3 (2)
Behavioral Health and Wellbeing	
PTSD	
No PTSD	166 (96)
PTSD	7 (4)
Depression	
No Depression	157 (91)
Depression	16 (9)
Anxiety	
No Anxiety	160 (92)
Anxiety	13 (8)
Sleep problems	
No sleep problems	149 (88)
Sleep problems	21 (12)
Burnout	
Low	115 (67)
High	57 (33)
Morale	
Low	106 (62)
High	66 (38)
Attitudes Towards Disease Risk and Preventive Medicine Practices	
I understand the level of risk from disease	
Disagree	17 (10)
Agree	151 (90)
I know what to do to protect myself from disease	
Disagree	14 (8)
Agree	152 (92)
This deployment will make a meaningful difference in fighting the Ebola epidemic	

Disagree	58 (35)
Agree	110 (65)
Attitudes towards preventive measures	
Negative	111 (64)
Positive	62 (36)
I avoided unnecessary risks on this mission	
Disagree	44 (26)
Agree	124 (74)

[a] Values may not add up to 173 due to missing data

NCO, Non-commissioned Officer; PTSD, Posttraumatic Stress Disorder

Table 2: Health-Promoting Leadership Scale Item Response Frequencies and Factor Analysis (N = 173)

	Response Frequency (%)[a]			Rotated Factor Loadings[b]	
Health-Promoting Leadership Items	Never or Seldom	Sometimes	Often or Always	Psychological Health-Promoting Leadership	Preventive Medicine Health-Promoting Leadership
Emphasize maintaining compassion	29	26	45	**0.8718**	-0.0385
Emphasize taking care of yourself mentally	19	29	51	**0.6886**	0.2728
Emphasize taking care of yourself physically	14	22	65	**0.5710**	0.3072
Remind you to take a break/recharge	29	24	47	**0.8267**	0.1000
Encourage you to get enough sleep	28	33	39	**0.9364**	0.0062
Give you specific guidance on how to improve	27	25	47	**0.7870**	0.1087
Reduce tension in the team/unit when emotions run high	30	28	42	**0.9208**	0.0044
Give you positive feedback about your accomplishments	27	25	49	**0.7694**	0.1733
Emphasize the importance of the humanitarian mission	28	28	43	**0.5731**	0.2192
Emphasize maintaining professional standards	6	21	73	0.1762	**0.6064**
Encourage soldiers to remind each other to use preventive medicine measures	15	21	63	0.0639	**0.8837**
Lead by example by using preventive medicine measures themselves	14	19	67	0.0651	**0.8172**
Place command emphasis on the importance of preventive medicine measures	14	24	63	0.0206	**0.9314**

[a]Percentages may not add up to 100% due to rounding.

[b]Extraction method; principal factor; Rotation method; Oblique promax with Kaiser normalization. Loadings larger than 0.40 are in bold.

Table 3: Odds Ratios, Adjusted Odds Ratios, and 95% Confidence Intervals (N = 173)

	Health-Promoting leadership		Psychological Health-Promoting Leadership[a]		Preventive Medicine Health-Promoting Leadership[a]	
	OR (95% CI)	AOR (95% CI)[a]	OR (95% CI)	AOR (95% CI)[b]	OR (95% CI)	AOR (95% CI)[b]
PTSD	**0.38 (0.17, 0.86)**	**0.29 (0.12, 0.73)**	**0.35 (0.15, 0.79)**	**0.27 (0.11, 0.66)**	0.65 (0.32, 1.32)	0.58 (0.26, 1.28)
Depression	**0.34 (0.18, 0.63)**	**0.31 (0.16, 0.60)**	**0.36 (0.20, 0.65)**	**0.33 (0.18, 0.62)**	**0.47 (0.28, 0.79)**	**0.46 (0.27, 0.80)**
Anxiety	**0.24 (0.11, 0.53)**	**0.17 (0.07, 0.44)**	**0.25 (0.11, 0.55)**	**0.20 (0.08, 0.48)**	**0.38 (0.21, 0.71)**	**0.31 (0.15, 0.65)**
Sleep problems	0.72 (0.44, 1.16)	0.66 (0.40, 1.09)	0.76 (0.49, 1.18)	0.70 (0.44, 1.11)	0.71 (0.44, 1.15)	0.66 (0.40, 1.10)
Burnout	**0.58 (0.40, 0.84)**	**0.54 (0.36, 0.81)**	**0.59 (0.42, 0.83)**	**0.54 (0.37, 0.79)**	0.71 (0.50, 1.02)	0.73 (0.50, 1.06)
Morale	**3.89 (2.38, 6.36)**	**3.81 (2.29, 6.33)**	**3.48 (2.23, 5.42)**	**3.45 (2.17, 5.47)**	**2.70 (1.71, 4.25)**	**2.59 (1.62, 4.13)**
I understand the level of risk from disease	1.24 (0.70, 2.21)	1.40 (0.75, 2.61)	1.06 (0.62, 1.80)	1.18 (0.66, 2.11)	1.69 (0.97, 2.93)	**1.82 (1.01, 3.30)**
I know what to do to protect myself from disease	1.06 (0.58, 1.93)	1.07 (0.56, 2.06)	0.90 (0.52, 1.58)	0.90 (0.50, 1.62)	1.53 (0.88, 2.68)	1.56 (0.85, 2.85)
This deployment will make a meaningful difference in fighting the Ebola epidemic	1.42	**1.51**	1.22	1.28	**1.79**	**1.91**

	(0.99, 2.04)	**(1.03, 2.21)**	(0.88, 1.69)	(0.91, 1.80)	**(1.23, 2.58)**	**(1.29, 2.82)**
Attitudes towards preventive measures against Ebola	1.43	1.45	1.29	1.31	**1.62**	**1.60**
	(0.99, 2.05)	(0.99, 2.11)	(0.93, 1.79)	(0.94, 1.84)	**(1.10, 2.40)**	**(1.08, 2.39)**
I avoided unnecessary risks	**1.80**	**1.98**	**1.52**	**1.63**	**2.17**	**2.37**
	(1.22, 2.65)	**(1.30, 3.01)**	**(1.07, 2.15)**	**(1.13, 2.37)**	**(1.46, 3.22)**	**(1.55, 3.63)**

[a]Psychological Health-Promoting and Preventive Medicine Health-Promoting Leadership are each factors of the overall Health-Promoting Leadership scale.

[b] Models adjusted for rank (junior enlisted; senior enlisted; officer or warrant officer) and general leadership (continuous)

P-values of < .05 are in bold

AOR, Adjusted Odds Ratio; CI, Confidence Interval; OR, Odds Ratio; PTSD, Posttraumatic stress disorder