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(2)

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REPORT No. 90-42

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NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND
BETHESDA, MARYLAND

Associations Between Mood and Specific Health Composites During Navy Persian Gulf Operations

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Report No. 90-42, supported by the Naval Medical Research and Development Command, Bethesda MD, Department of the Navy, under research Work Unit No. 63206N.M0096, and the Office of Naval Technology, Department of the Navy, under research Work Unit No. 62233N.3P30. The views expressed in this report are those of the authors and do not reflect the official policy or position of the Department of the Navy, Department of Defense, or the U.S. Government.

SUMMARY

Background and Objectives

The association between mood and health symptoms has received attention from researchers concerned with military performance in extreme conditions, such as the heat and humidity encountered in the Persian Gulf. Previously conducted field studies using shipboard U.S. Navy personnel during at-sea operations in the Persian Gulf have shown that crewmembers experience mood changes such as psychological fatigue, feelings of confusion, tension/anxiety, and depression and additionally report degradations in general physical health. The objectives of this study were to: a) extend previous research by using specific health complaints rather than a general measure of health and b) examine the relationship between mood and specific health complaints among personnel deployed in the Persian Gulf.

Approach

Questionnaire data were collected from 104 volunteers serving aboard two U.S. Navy ships (AGF and an MSO) deployed in the Persian Gulf. Self-reported mood and health symptoms were provided by subjects as part of a larger questionnaire appraising reactions to sustained operations under high heat and humid conditions. Mood was assessed using the Profile of Mood States Tension/Anxiety and Fatigue scales. Health symptoms were measured using the Environmental Symptoms Questionnaire (ESQ), a 52-item inventory designed to sample subjective reactions and health symptomatology during exposure to extreme environments. The ESQ items were organized into 11 specific composites, and multiple regression procedures were used to determine the independent contribution of the two mood scales to the 11 specific health composites.

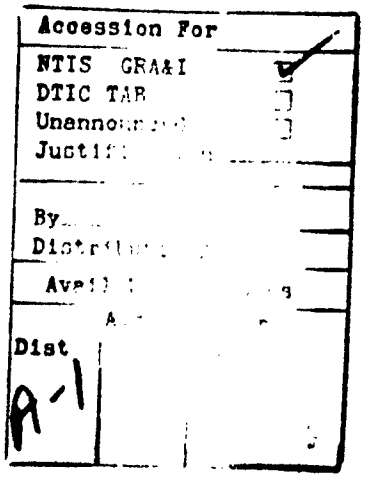
Results

Each health composite was significantly associated with one or both mood variables. Explained variance in the health symptoms composites ranged from 47% for Mental Strain to 6% for Nasal Distress. Tension/Anxiety and Fatigue each made unique contributions to the prediction of Mental Strain and Muscle Strain, with Tension/Anxiety accounting for the majority of the variance in these variables. Tension/Anxiety alone was associated with Respiratory

Distress, Headache, Gastrointestinal Distress, Eye/Sight Problems, Chills, and Nasal Distress. Fatigue alone was associated with Coordination Problems, Heat Distress, and Ear/Hearing Problems.

Conclusions

Data from past research indicate that the ability to regulate mood is an important requisite for maintaining positive self-appraised health. This study provided further support for the idea of a mood-health link, and points to the usefulness of employing multiple health complaint composites rather than general measures when assessing mood-health associations. It was found that Tension/Anxiety and Fatigue mood states differentially predicted 9 of 11 distinct health composites. Results suggest that strategies for altering mood (e.g., adequate periods of sleep, regulation of caffeine consumption, stress management training, exercise, and cognitive/behavioral interventions) might also have a positive effect on associated health complaints.



INTRODUCTION

Research on variables associated with diminished health has been prominent in the psychological literature for a considerable period of time. The effect of stress on individual health, for example, is thoroughly documented (Barefoot, Dodge, Peterson, Dahlstrom, & Williams, 1989; Friedman & Rosenman, 1974; Glaser, Kiecolt-Glaser, Stout, Tarr, Speicher, & Holiday, 1985; Glaser, Rice, Speicher, Stout, Kiecolt-Glaser, 1986; Haynes, Feinleib, & Kannel, 1980; Jemmott, Borysenko, McClelland, Chapman, Meyer, & Benson, 1985; Schleifer, Keller, McKegney, & Stein, 1979; Suarez & Williams, 1989). Another variable thought to spur health complaints is temporary mood (Verbrugge, 1985). Support for this relationship has been demonstrated in studies consistently showing associations between negative mood and self-reported health symptoms in both clinical and nonclinical populations (Katon, 1984; Leventhal & Nerenz, 1983; Mechanic, 1972). While the specific mechanisms involved are not yet clear (for a discussion see Croyle & Uretsky, 1987), the predominant conclusion from these studies is that negative mood is associated with health symptoms and is probably a causal factor in subjective health appraisals.

The association between mood and health symptoms has received some attention from researchers concerned with military performance in extreme conditions, such as the high heat and humidity found in the Persian Gulf. Previous field studies using shipboard U.S. Navy personnel during at-sea operations in the Persian Gulf have shown that crewmembers experience mood changes such as psychological fatigue, feelings of confusion, tension/anxiety, and depression, and additionally report degradations in physical health (Burr, Palinkas, Congleton, Kelleher, & Armstrong, 1989; Burr, Banta, Coyne, Hodgdon, & Chesson, 1990; Steele, Kobus, Banta, & Armstrong, 1989). Steele et al. (1989) reported associations between mood and a general measure of total somatic complaints among Navy personnel during sustained military operations while cruising the Persian Gulf. Burr et al. (1989) found Tension/Anxiety and Fatigue mood states to be related to total health symptoms on two U.S. Navy warships deployed in the Persian Gulf. While those investigators documented a relationship between mood and health symptoms

under adverse operational and environmental conditions, measures of health symptoms used in their studies were total health symptom measures as opposed to specific or localized complaints. The primary extension of this study was to examine the relationship between mood and clearly defined, specific health complaints among shipboard Navy personnel working in the extreme heat and humidity of the Persian Gulf.

METHODS

Participants

Questionnaire data were collected from a cross-sectional sample of 104 volunteers serving aboard a Minesweeper (MSO) and an auxiliary ship categorized as a Miscellaneous Command Ship (AGF) during Persian Gulf operations. Demographic information showed the average age of the subjects to be 25.5 years (SD=6.2) with a range from 19 to 45 years. This average age was similar to the mean age (26.2 years) reported for shipboard men in a Navy-wide random sample (Conway, Conway, & Dutton, 1988). The median enlisted paygrade for the study sample was E-5 (petty officer, second class), again comparable to the Navy-wide sample. Enlisted personnel comprised 93% of the present sample versus 95% of the Navy-wide shipboard sample. These comparisons indicated that the present sample, although small, was probably representative of typical Navy personnel assigned to ships.

Measures

Self-reported mood and health symptoms were provided by subjects as part of a larger questionnaire appraising reactions to sustained operations under high heat and humid conditions. All subjects were informed of the study objectives and methods and all gave informed consent. The nature of the ships' operations during the study period restricted the time and opportunities available to collect data from all personnel aboard both ships; consequently, questionnaires were administered to a portion of the crew aboard the AGF (N = 56) and the MSO (N = 48). Watch duty schedules aboard the ships were slightly modified to allow for group administration of the questionnaires.

Mood. Temporary mood was assessed using the Profile of Mood States (POMS), a factor-analytically derived scale measuring six fluctuating mood states: Tension/Anxiety, Depression, Anger, Vigor, Fatigue, and Confusion (McNair, Lorr, & Droppelman, 1981). In the present study, only the Tension/Anxiety and Fatigue subscales were administered because of the need for brevity and because only those two subscales had significantly predicted total health symptoms in an earlier study (Burr et al., 1989). The two mood subscales consisted of 16 adjectives to which participants rated their recent experience on a 5-point scale ranging from 0 (Not at all) to 4 (Extremely). A Tension/Anxiety score was computed as the mean of the ratings to the following adjectives: Tense, Shaky, On edge, Panicky, Relaxed (reversed scored), Uneasy, Restless, Nervous, and Anxious. Similarly, Fatigue mood scores were computed as the mean of ratings to the following: Worn out, Listless, Fatigued, Exhausted, Sluggish, Weary, and Bushed.

Health Symptom Composites. Health symptoms were measured using the Environmental Symptoms Questionnaire (ESQ), a 52-item inventory designed to sample subjective reactions and health symptomatology during exposure to extreme environments (Kobrick & Sampson, 1979). Participants rated the relative severity of each symptom on a scale ranging from 0 to 9, with 0 indicating no current experience with the symptom. Thirty-seven of the 52 ESQ items were organized into 11 specific composites based on previous data reduction procedures in which principal components analyses were used to identify symptom clusters (Steele et al., 1989). Scores for the composite symptom scales were created by computing the mean of the items comprising each scale. The resulting composites included Mental Strain, Heat Distress, Muscle Strain, Eye/Sight Problems, Headache, Ear/Hearing Problems, Nasal Distress, Gastrointestinal Distress, Respiratory Distress, Coordination Problems, and Chills. Appendix A shows the specific symptoms forming each composite, and Appendix B presents bivariate correlations and Cronbach's alpha estimates of internal consistency for the health symptom composites and mood factors.

Statistical Analysis

Multivariate and univariate procedures were used to investigate the association between mood and health composites. First, a multivariate analysis was performed to assess the overall association between the 11 health composites and the two mood factors. Multiple regression procedures were then used to determine the independent contribution of the two mood scales to specific health composites.

RESULTS

A multivariate analysis of variance procedure (Statistical Package for the Social Sciences, 1988) was used to compute Hotelling's T^2: $T^2(22,150) = 1.72$, $p = .000$. This test indicated that the mood variable set was significantly related to the dependent health composites, and justified more focused analyses.

Stepwise multiple regression procedures were used to assess the contribution of Tension/Anxiety and Fatigue mood states to the prediction of the 11 specific health composites. Table 1 presents the results ordered by variance accounted for by the two mood predictors. Explained variance in most of the health composites was quite large (e.g., 47% for Mental Strain and 35% for Respiratory Distress). In other prediction equations, the contribution of mood to health was more modest (e.g., 6% for Nasal Distress and 7% for Ear/Hearing Problems).

Tension/Anxiety and Fatigue each made unique contributions to the prediction of Mental Strain and Muscle Strain, with Tension/Anxiety accounting for the majority of the variance in these variables. Tension/Anxiety alone was associated with Respiratory Distress, Headache, Gastrointestinal Distress, Eye/Sight Problems, Chills, and Nasal Distress. Fatigue alone was associated with three health composites: Coordination Problems, Heat Distress, and Ear/Hearing Problems.

Table 1

Results of Stepwise Multiple Regression Predicting Health Symptom Composites from POMS-Tension/Anxiety and POMS-Fatigue in Navy Shipboard Personnel in the Persian Gulf

	R	R^2	R^2Ch	Beta
Mental Strain				
Tension/Anxiety	.6525	.4258	.4258*	.4173*
Fatigue	.6861	.4707	.0449*	.3165*
Respiratory Distress				
Tension/Anxiety	.5883	.3461	.3461*	.5883*
Muscle Strain				
Tension/Anxiety	.5467	.2989	.2989*	.3258*
Fatigue	.5817	.3384	.0395*	.2971*
Headache				
Tension/Anxiety	.5527	.3055	.3055*	.5527*
Coordination Problems				
Fatigue	.4844	.2346	.2346*	.4844*
Gastrointestinal Distress				
Tension/Anxiety	.4574	.2093	.2093*	.4574*
Eye/Sight Problems				
Tension/Anxiety	.4392	.1929	.1929*	.4392*
Heat Distress				
Fatigue	.4262	.1817	.1817*	.4262*
Chills				
Tension/Anxiety	.3154	.0995	.0995*	.3154*
Ear/Hearing Problems				
Fatigue	.2675	.0716	.0716*	.2675*
Nasal Distress				
Tension/Anxiety	.2385	.0569	.0569*	.2385*

*$p < .05$

DISCUSSION

Because of the implications of poor health on factors such as physical and cognitive performance, readiness, and morale during conditions of sustained operations, researchers have sought to examine determinants of health symptoms. Situational stress, for example, has received considerable attention as a contributor to health symptoms. Negative mood has also been identified as an important trigger of health complaints and may have a stronger impact than stressful events (Verbrugge, 1985). In general, data suggest that the ability to regulate mood is an important requisite for maintaining positive self-appraised health (Croyle and Uretsky, 1987).

The study provided further support for the idea of a mood-health link. Moreover, it was found that Tension/Anxiety and Fatigue mood states differentially predicted 9 of 11 distinct health composites. Results from this investigation point to the usefulness of employing multiple health complaint composites rather than global measures when assessing mood-health associations. Because investigators have demonstrated that mood states are momentary and can be affected by internal and external influences (Tuckman, 1988), research in the area may suggest techniques for altering mood, thereby mitigating their associated health symptoms. For example, strategies for reducing the Fatigue mood state (e.g., providing for adequate periods of sleep and rest, regulation of caffeine consumption, use of motivational techniques) might also result in less severe complaints of coordination problems and heat distress. Likewise, health symptoms uniquely associated with Tension/Anxiety might be reduced by strategies such as stress management training, exercise, and cognitive/behavioral interventions. Related to this is the recent finding that use of an individual cooling vest during Persian Gulf maneuvers reduced Tension/Anxiety (Burr et al., 1990): To the degree that such a device lessens negative mood, health symptoms may also be positively influenced.

ACKNOWLEDGMENTS

Several personnel made noteworthy contributions to this study; the authors want to especially thank HM3 Elmer Labranch, USN, for his hard work in the field and for his dedicated assistance during data entry and subsequent statistical analyses. Also making a significant contribution was HM1 Alvin Almada, USN, whose expertise in the laboratory, and hard work and dedication in the field are greatly appreciated.

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Appendix A

Health Symptom Composite Items

Mental Strain	- I have trouble concentrating. - I have trouble remembering. - I feel worried about something. - I feel irritable. - I feel tired. - I feel sleepy. - I had trouble sleeping last night.
Heat Distress	- I am sweating. - My hands are sweaty. - I feel warm.
Muscle Strain	- I feel weak. - My muscles are tense. - My muscles ache.
Eye/Sight Problems	- My eyes feel irritated. - My eyes are watery. - My vision is blurry.
Headache	- I have a headache. - My head is throbbing. - I feel lightheaded. - I feel nauseous.
Ear/Hearing Problems	- I have ringing in my ears. - My ears are blocked. - My ears ache. - I can't hear well.
Nasal Distress	- My nose is blocked. - My nose is running.
Gastrointestinal Distress	- I feel stomach pressure. - I have stomach pains. - My stomach is upset.
Respiratory Distress	- It is hard to breath. - My breathing seems fast. - My breathing seems irregular.
Coordination Problems	- My sense of balance is off. - I feel clumsy.
Chills	- My hands feel cold. - I feel chilly. - I am shivering.

Appendix B

Bivariate Correlations and Reliabilities for Health Symptom Composites and Mood Scales

		1	2	3	4	5	6	7	8	9	10	11	12	13
Cronbach's alpha		.80	.71	.84	.73	.86	.70	.71	.91	.93	.91	.79	.89	.92
1	Mental Strain	—												
2	Heat Distress	.59*	—											
3	Muscle Strain	.62*	.47*	—										
4	Eye/Sight Problems	.64*	.45*	.55*	—									
5	Headache	.45*	.41*	.58*	.44*	—								
6	Ear/Hearing Problems	.34*	.17*	.35*	.13	.26*	—							
7	Nasal Distress	.23*	.11	.22*	.28*	.38*	.16*	—						
8	Gastrointestinal Distress	.39*	.45*	.55*	.48*	.68*	.07	-.04	—					
9	Respiratory Distress	.48*	.37*	.56*	.49*	.69*	.27*	.25	.59*	—				
10	Coordination Problems	.52*	.36*	.50*	.45*	.44*	.35*	.26*	.24*	.37*	—			
11	Chills	.14	-.11	.20*	.09	.24*	.31*	.12	.19*	.27*	.23*	—		
12	Tension/Anxiety	.63*	.36*	.54*	.44*	.55*	.23*	.24*	.46*	.59*	.36*	.32*	—	
13	Fatigue	.65*	.43*	.55*	.34*	.43*	.27*	.09	.38*	.41*	.48*	.23*	74*	—

* $p < .05$

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b RESTRICTIVE MARKINGS N/A
2a. SECURITY CLASSIFICATION AUTHORITY N/A	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited.
2b DECLASSIFICATION/DOWNGRADING SCHEDULE N/A	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) Report No. 90-42	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a NAME OF PERFORMING ORGANIZATION Naval Health Research Center 6b OFFICE SYMBOL (If applicable) Code 30	7a. NAME OF MONITORING ORGANIZATION Chief, Bureau of Medicine and Surgery
6c. ADDRESS (City, State, and ZIP Code) P. O. Box 85122 San Diego, CA 92186-5122	7b. ADDRESS (City, State, and ZIP Code) Navy Department Washington, DC 20372-5120
8a NAME OF FUNDING/SPONSORING ORGANIZATION Naval Medical Research & Development Command 8b OFFICE SYMBOL (If applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c ADDRESS (City, State, and ZIP Code) NNMC Bethesda, MD 20889-5044	10 SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO: 63706N PROJECT NO: M0096 TASK NO: 03 WORK UNIT ACCESSION NO: DN248545

11 TITLE (Include Security Classification)
(U) Associations between mood and specific health composites during Navy Persian Gulf operations

12 PERSONAL AUTHOR(S) Burr, Ralph G.; Woodruff, Susan I.; Banta, Guy R.

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Interim	FROM 6/89 TO 9/89	15 December 1990	15

16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Mood, Health Symptoms, Persian Gulf, Profile of Mood States, Environmental Symptoms Questionnaire

19 ABSTRACT (Continue on reverse if necessary and identify by block number)
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20 DISTRIBUTION/AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION
☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	Unclassified
22a NAME OF RESPONSIBLE INDIVIDUAL Ralph G. Burr, M.A.	22b TELEPHONE (Include Area Code) (619) 553-9967 22c OFFICE SYMBOL Code 30

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