A Research Agenda for the United States Coast Guard

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Historically, the United States Coast Guard has not been widely recognized as an armed force relative to the other services housed under the Department of Defense. However, the country's implementation of the Department of Homeland Security (DHS) has resulted in an increased awareness of the Coast Guard as a critical agency in the country's line of defense. In large part, this change has occurred because the Coast Guard has been incorporated as a part of DHS while thereby the agency was housed under the Department of Transportation. Consequently, many problems relating to the day-to-day operations of the Coast Guard have received significant attention. Therefore, there is a need to identify critical issues faced by the members of the Coast Guard. Through this effort, the current paper identifies areas of needed research and provides suggestions for ways they might be addressed by research psychologists.

Introduction

Prior to September 11, 2001, the United States Coast Guard was housed under the Department of Transportation rather than under the Department of Defense, as are the other armed forces. As such, the Coast Guard has gone unrecognized by many as an armed force of the United States. Historically, the Coast Guard has suffered from lack of funding, aging equipment, and deteriorated manpower. However, with the implementation of the Department of Homeland Security (DHS) after September 11 and the subsequent incorporation of the Coast Guard into the DHS, the service's profile has been heightened and resources have been increased. Under this new appointment, though still suffering from reduced manpower, the Coast Guard has been tasked with additional national security duties to perform along with an increase in the maritime safety, maritime security, and protection of natural resources missions that already perform. This increase in mission responsibility and national visibility necessitates identification of critical issues within the Coast Guard in need of research.

Thesis and Sources of Information

Search and rescue (SAR) tasks precede every other United States Coast Guard mission. The duties of a SAR station are primarily law enforcement, and environmental protection (R.J. Ruskovich, personal communication, September 20, 2003). SAR crews at these stations work in 24-hour shifts and may, be ready to respond to cases around the clock on each day of the year. According to Ruskovich, there are only three SAR crews at his previous station. They must be available to respond to all cases and be ready at 12 hours notice. He recalled an incident in which he had to travel in his helicopter to a 11 regular day/night hours and then responded to a nighttime SAR case that continued for another 12 hours. As is typical, reinforcements were not an option and Ruskovich speculates that this is common practice for most SAR stations in the USCG because many SAR cases occur at night after a full day of work.

Unfortunately, much of what is known about fatigue and shift work in these crews is anecdotal. In a missile report filed March 20, 2003 by Station Key West, fatigue was listed as the primary causative factor of the grounding of a SAR boat at 2:50 a.m. The coxswain driving the boat was underwater for 14.4 hours at the time of the incident. In another recent unclassified statement, D. A. Quigley, Chief of Boat Forces for the USCG.
noted the increasing number of major mishaps at the show-based stations. Coward states that the recent rash
of major mishaps was partly, at least, due to the increased standing time in the
air, and increased the already high workload of the unit commander. Coward cited long-term fatigue and decreased
work efficiency and mentioned that an increase in standing
Captain W. Frassell Webber (2001) of the USCG pub-
lished an article in which he discusses the serious prob-
lem that occurs when SAR personnel working 24-hour shifts are
required to make key decisions when fatigued. The
USCG Research and Development Center, in collabo-
rations with Group Woods Hole, determined from their
study described in Webber's (2001) article, that SAR
crews standing more than 12 hours of watch were "walk-
ing a tightrope of endurance." Any crew standing more
than 24 hours on duty could be ruined well past their
immediately in response to an increase in operational tempo (Webber, 2001).
While few studies have specifically focused on how
shift work affects the USCG SAR crews working 24-hour
pits shifts, much has been done to investigate and dem-
stantiate the deleterious effects of shift work (Goh, Tonu,
Lim, Law, & Lee, 2000; Ahrens, 1998; Tonsil & Ahren-
h, 1998; Morgan and Conof, 1974) and how to design
more effective shift schedules (Tonsil, 2001; Kraus, 1999;
Folsom, 1992). The USCG Research and Development
Center collaborated with Group Woods Hole, a senior
operations center, to investigate the effects of a 24-hour
watch schedule on SAR personnel. The participants were
wired activity monitors (WAMS) 24 hours a day for 30
days. The White's research team increased the number in
addition to work/rest schedules and sleep activity sched-
ules. From the data collected via the WAMS, the research-
ers were able to determine the total time spent awake,
alertness, and the number of fluctuations throughout
the sleep period. Sleep-wake profile analysis produced infor-
mation on the daily changes in sleep onset and wake
up times, percentage of sleep periods less than six
hours, and the incidence of disrupted sleep patterns (Webber 2001). During data collection, Group Woods
Woods Hole was called on to respond to the Egyptian recovery
operation. According to Webber, this type of events
allowed the researchers to collect data during both a
vessel operations tempo environment and during full-
scope emergency operations.
The Center found that no watch standers should engage in more than 12 hours on watch. These standing
longer shifts were "walking a tightrope of endurance" and,
after 24-hour watch, these watch standers could be
waffed up their "red zone" (the result of a pattern of sleep
and work cycles that induce performance decrements
and fatigue) for performance and decision making after
any increase in operational tempo (Webber, 2001). The
researchers also found that prevention of chronic decline
in performance and alertness would not be achieved with
the 24-hour watch standers did not receive a full 72 hours
off duty after a shift. During the recovery operation of Egyp-
tian, there was only no 24-hour shift exhibited acute
periods of suboptimal performance (Webber), the study concluded with the following statement: "Prolonged per-
formance in the Red Zone will result in fatigue that can
significantly reduce the safety of Group personnel and the entire mission continue.
In addition, research currently being conducted at the
Coast Guard's Research and Development center is focused on addressing crew endurance issues on board
commercial vessels or Coast Guard cutter vessels, both
operating in very different circumstances from those
under which search and rescue crews and now homeland
security crews operate. Research is needed to address the
effects of fatigue on SAR and homeland security crews.
Along with reducing fatigue, proper small boat han-
dling is essential to the success of both search and rescue
and homeland security missions. The U.S. Coast Guard
Academy provides simulated facilities for cadets to train
on the handling and navigation of Coast Guard vessels.
Facilities such as the Ship Control and Navigation System
(SCANTS) and Tow and Wave Tank are training facilities
accessible only to those cadets preparing to become
officers. Consequently, those enlisted Coast Guard men
and women responsible for the operation of the Coast
Guard's small boats (e.g., 47' Motor Lifeboat, 24'
Rigid Hull Inflatable Boat) are not provided with the
opportunity to receive more cost-effective simulated
training experience onboard their vessels. These cur-
cumstances are not uncommon for small vessels, thus ren-
ning training time limited and costly.
Many Coast Guard small boats operate out of search
and rescue districts which are over 270 miles from the
nearest large vessel. Training requirements of small ves-
sels are required to perform regular operations as well as
emergency operations on a daily basis. This pattern of
activity restricts available training time for potential em-
nurs. Fuel availability restrictions also affect limited
training time onboard small boats. The limitation of training
time could leave the training vessel, as well as the
training curricula to a lesser degree, without sufficient
practical situations in which to acquire and apply skills
and knowledge to real life situations. Furthermore, this
unpredictable availability of training time results in an
uneven skill distribution from one crew to another.
Recent interviews with Coast Guard subject matter
experts who operate small boats indicate the desire to
have access to an alternative method of training boat han-
dling, navigation, search and rescue decision making

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and crew leadership skills. Each of these areas might be addressed through the use of simulation.

Simulation is currently utilized in several areas, including medicine and aviation and the Coast Guard uses simulators to train pilots and sailors. Moreover, marine navigation and heading simulators as well as search and rescue simulators currently exist that might be adapted and made readily available to fill the needs of the Coast Guard. The merits of using simulation for medical and medical training have been demonstrated in the past (Jansberg, McGaghe, Jort, Meyer, Feler, Petruca, Waugh, Brown, Safford, Gesser, Gordon, & Eigar, 1999; Jentisch & Bowles, 1998). Research is needed to determine if indeed simulation provides a reasonable alternative to boat handling, crew leadership, search and rescue decision making, and navigation training and if so, will the use of a high-fidelity simulation provide better transfer of training than a low-fidelity simulation?

Discussion

The Coast Guard has achieved increased visibility and responsibility for the events of September 11. As such, critical issues in need of evaluation relating to the success of the Coast Guard in fulfilling their duty must be identified and addressed to optimize performance. The current paper identified such potential critical areas. There is a lack of research to identify and rectify situations of fatigue, unique to search and rescue and homeland security crews. In addition, there is an unstandardized and unpredictable availability of training on board small boats that carry out search and rescue and homeland security missions. As such, the need for alternative methods of training boat handling techniques, navigation skills, search and rescue decision making, and crew leadership has been expressed by the Coast Guard subject matter experts. Research is needed to confirm that these are indeed critical issues that face the Coast Guard and to identify additional unrecognized issues. Furthermore, research is needed to determine how most effectively address the issues. In the case of using simulators, the validity of using simulators must be determined along with the validity of using a high versus low fidelity simulator and the methodology for evaluating the simulator’s capability.

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References


