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COLLISION AT SEA: THE TRAUMATIC AFTEREFFECTS

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REPORT NO. 81-39

APR 1 4 1982
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Collision at Sea: The Traumatic Aftereffects

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Report Number 81-39
supported by Naval Medical Research and Development Command,
Department of the Navy, under Research Work Unit M0099-PN.001-1163.
The views presented in this paper are those of the authors.
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Summary

Problem

On the night of 22 November 1975, the aircraft carrier USS Kennedy and the guided missile cruiser USS Belknap collided while on maneuvers in the Mediterranean. At the time of the collision, there were 336 men aboard the Belknap of whom two died of burns and 46 suffered injuries, burns, or smoke inhalation. One man aboard the Kennedy died of smoke inhalation. Given the magnitude of this disaster, the loss of lives, injuries, extensive damage to the ship, and the frightening, chaotic circumstances, it was hypothesized that survivors of the disabled Belknap would suffer psychiatric difficulties in the years following the disaster.

Objective

The purpose of this longitudinal study was to examine the psychological effects of this collision by comparing the subsequent performance and psychiatric hospitalizations of the officers and crew of the Belknap with those of the crew of a similar ship, the USS Yarnell, during a 3-year follow-up period. Another objective of this study was to identify the similarities and differences on hospitalizations after dividing the Belknap crew into seven postcollision disposition groups.

Approach

The participants for this study included 25 officers and 311 enlisted men who were aboard the Belknap at the time of the collision. These men were divided into seven postcollision disposition groups which were based on whether or not the individual was injured, evacuated, returned to the ship, or remained with the ship when it was towed to Naples and/or Philadelphia. The control group consisted of the 387 officers and men of the Yarnell.

For individuals on both ships, the following information was extracted from the inpatient and career history computer files maintained at this Center. The information included primary diagnoses of all hospitalizations, Medical Board and Physical Evaluation Board actions, cause of death, aptitude scores, promotions, demotions, unauthorized absences, and reason for separation from the service. Comparative analyses between the two ships were conducted for both the 3-year precollision period (the baseline) and the 3-year postcollision period.

Results

Results of the *t* test indicated that there were no significant differences in mean values for either the preentry or service-related variables. Because of the small number of postcollision unauthorized absences and desertions, it was not meaningful to conduct statistical analyses between crews. It was noted, however, that the rate of unauthorized absences did not increase among the Belknap crew after the collision. Comparisons of percentages of separations revealed no significant differences between the two crews for men who were separated from active duty during the 3-year postcollision period.

For the comparisons of hospitalizations during the 3-year precollision period, one man from the Belknap crew and eight men from the Yarnell were hospitalized for psychiatric reasons. Following the collision date, 13 men from the Yarnell were admitted (three for alcoholism, three for schizophrenias, three for transient situational disturbance, and four for other psychiatric disorders) whereas 18 men from the Belknap had at least one psychiatric hospitalization. In contrast to the reasons for psychiatric hospitalizations among the Yarnell crew, the men on the Belknap were hospitalized primarily for neuroses (13 of the 18 men) and situational disturbance (4 of the 18). A χ^2 value of 14.51 ($p < .001$) was obtained in comparing the numbers of men hospitalized for neuroses between the two ships. None of the 18 Belknap crew had been hospitalized during the precollision period.

Comparisons also were made between the crews on Physical Evaluation and Medical Board actions, which reflected the extent of severity of each individual's psychiatric impairment or his prognosis. Eight men from the Belknap and four from from the Yarnell were separated from service for psychiatric reasons after appearing before a Physical Evaluation Board.

Seven of the eight Belknap separations were for neuroses. For Medical Board actions, there were 12 appearances among the Belknap men and only four for the Yarnell.

In comparing the numbers and types of psychiatric hospitalizations, Medical Boards, and Physical Evaluation Boards across the seven postcollision groups of the Belknap crew, the differences suggested that the risk of being hospitalized or appearing before a reviewing board for neurosis or transient situational disturbance was much greater than for any other psychiatric disorder. Of the seven postcollision disposition groups, the category with the highest percentage of psychiatric incidents was the uninjuried group that was evacuated after the collision, returned to the ship, and then flown back to the U.S.

Conclusion

Results of this study showed that for those survivors of a collision at sea there was a significantly greater risk of suffering a psychiatric hospitalization or separation from service for neuroses than was observed for members of a control ship. Also reported were the differences in psychiatric hospitalizations and board appearances among the various postcollision disposition groups. These differences were discussed in terms of the following considerations: (1) the reactions to a crisis situation, (2) treatment, and (3) other factors associated with post-traumatic stress disorder. Of greatest importance is the immediacy of the treatment for survivors of a disaster and ensuring that a support system is available. It is to be hoped that immediate intervention and therapy were available after the recent USS Nimitz disaster. With officers and men numbering thousands, the subsequent psychological effects could be far-reaching.

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Collision at Sea: The Traumatic Aftereffects

On the night of 22 November 1975, the aircraft carrier USS Kennedy and the guided missile cruiser USS Belknap collided in the Mediterranean during maneuvers. The collision occurred as one of the ships, both heretofore on a parallel course, altered position without warning, striking the port side of the other.

The normal shipboard routine and relatively calm atmosphere of the Belknap immediately changed to one filled with confusion, fear, cries from the wounded and dying, oily smoke, and fire. Although the resulting damage to the aircraft carrier was minimal, the Belknap sustained extensive damage, caused when the overhanging structure of the Kennedy's hangar and flight decks tore away much of the cruiser's superstructure. Destroyed along with the superstructure were the air intake system to the boilers, electrical and communication lines, and fuel lines which flooded the deck and below-decks with fuel that immediately burst into flames. During the ensuing 2½ hours, fires continued to burn, reflashing from time to time throughout the night.

At the time of the collision, there were 336 men aboard the Belknap. Of these, six men died of burns that night and another man died within 2 weeks. Forty-six crewmen suffered injuries, burns, or smoke inhalation and were air-evacuated to medical facilities ashore or to other ships in the area. Of these, five were expected to have permanent disabilities.

On 23 November, the Belknap was towed first to Sigonella, Italy, and then a week later to Naples where she remained until January 1976 when she was towed to the Philadelphia Naval Shipyard for repairs. Throughout this period, some men were granted emergency leave, many were flown back to the United States, and some remained with the ship. Many of the injured also returned to the ship after release from medical treatment. There were 55 men aboard the Belknap when she was towed to Philadelphia.

Given the magnitude of this disaster, the loss of lives, injuries, extensive damage to the ship, and the frightening, chaotic circumstances, it was hypothesized that there would be psychiatric difficulties among the survivors. Another hypothesis was that the probability of psychiatric problems occurring would be related to the survivors' postcollision disposition (e.g., evacuation or remaining with the ship). To be more specific, the purpose of this longitudinal study was to examine the psychological effects of this collision at sea by comparing the subsequent performance and psychiatric hospitalizations of the officers and men of the Belknap with those of the crew of a similar ship, the USS Yarnell, during a 3-year follow-up period. The other objective of this study was to identify the similarities and differences on these indices after dividing the Belknap crew into seven postcollision disposition groups.

Disaster and Post-Traumatic Stress Disorder

In order to ensure that as many aspects as possible of a crisis situation were considered during the development of of the experimental design for this study, the following four topical areas in the scientific literature were reviewed: (a) reactions to a crisis situation, (b) treatment considerations, (c) long-term effects of exposure to a disaster, and (d) personality and demographic factors associated with post-traumatic stress disorder. Each of these topics is presented in summarized form and will be addressed in this study.

The immediate response of victims of natural and man-made disasters, such as a collision at sea, is fairly well documented. The symptoms are generally predictable and, in fact, have been described in considerable detail by many researchers; Horowtiz (1) and Caplan (2) are cited as two well-known social scientists working in this area. According to Caplan, the immediate reaction to a crisis is characterized by disorientation and distraction, followed by the invocation of fight or flight responses. Phase two involves increasing levels of turmoil and uncertainty as well as such emotional responses as guilt, anxiety, or depression. In the third stage, victims explore available options for reordering their activities and relationships. The final phase is long-term adaptation and return to equilibrium.

It has been known for many years that the best time to initiate treatment for a trauma victim is immediately. Although

it takes little time to induce a high level of anxiety in an individual, the period of time required to experience relief can be considerable. This period of high anxiety can be shortened by prompt and germane treatment. The alleviation of crisis reaction symptoms can be effected systematically through such methods as those described by Horowitz (3), Herschowitz (4), and Korner (5). Korner suggests that victims first be allowed to express their emotions by engaging in a "good cry," for example. Next, victims should be allowed to perceive others around them as supportive. Finally, victims should be encouraged to exercise cognitive and rational tools to minimize the duration of the state of confusion. Through such techniques, the duration and severity of a crisis situation can be minimized. Because of the importance of early crisis intervention, which includes keeping survivors of a disaster together to work out their feelings, staff members of the Department of Psychiatry, Naval Regional Medical Center, Portsmouth, Virginia, proposed that an intervention team be formed to be on call for immediate departure to the scene of a maritime disaster. In 1976, the Special Psychiatric Rapid Intervention Team (SPRINT) was established; it was composed of a psychiatrist, resident psychiatrist, psychologist, nurse, and psychiatric technician. Others, including a chaplain, later joined the team. The team has been activated on three occasions, all of which involved Coast Guard accidents.

Because of the limited number of longitudinal studies in this area, the long-term effects of exposure to crises are not well understood. Drabek (6) and Taylor (7) suggest that normally healthy individuals may emerge from a crisis with increased self-esteem and confidence. Lifton and Olson (8), Rongeil (9), and Gleser, Green, and Winget (10), however, report that after 2 years many people affected by the Buffalo Creek flood complained of nightmares, increased anxiety, and diminished appreciation of their lives. Many of these same symptoms also were documented for victims of the Andria Doria sinking (11) as well as for survivors of German concentration camps (12,13), the atomic bombing of Hiroshima (14), and the Coconut Grove fire (15).

Among 35 surviving crewmen of the Belknap who were seen at naval mental health clinics in Philadelphia and Norfolk prior to August 1976, similar complaints to those noted above were recorded: "severe anxiety"; "crying spells"; "chronic apprehension which occurs at sea"; "sounds of the ship being repaired and the smell of torches causing anxiety"; "nightmares of the collision"; "decreased sleep, tension, and jumpiness"; "does not care to go to sea anymore"; "anger, insomnia, and increasing nightmares"; and "jumpy concerning normal ship noises, creaking, etc."

The aforementioned complaints correspond with symptoms included in the definition of the post-traumatic stress disorder, a diagnosis that appeared for the first time in the 1980 Diagnostic and Statistical Manual of Mental Disorders (16). In the manual's definition, the characteristic symptoms of the post-traumatic stress disorder involve a reexperiencing of the traumatic event, a numbing of responsiveness to, or a reduced involvement with, the external world; and a variety of autonomic, dysphoric, or cognitive symptoms. These symptoms may emerge immediately after the event and subside during the following 6-month period (acute) or begin months after the trauma and/or persist for months (delayed or chronic).

Over the years, researchers have debated the question of whether reactions to crises are more dependent on an individual's predisposition to psychological impairment (16) or on the magnitude of the event in question. Hocking (17) concludes that the severity of the event is the more important factor. Consequently, even individuals with no history of mental disturbance would be adversely affected by a situation if the magnitude is greater than that with which they can cope. In other words, every individual has a "breaking point," as noted by Horowitz (3), who in referring to concentration camp survivors, states that "persons with any personality configuration before the stress will have symptoms" at a later time. This conclusion is supported by the work of Rahe, Mahan, and Arthur (18) who have described the additive effects of life events in contributing to the incidence of illness. Janey, Masuda, and Holmes (19) have measured "life change units" among earthquake victims and a control group who had not been exposed to disaster. The earthquake victims manifested a higher mean level of "life change levels" and also a higher level of illness incidence. A study of U.S. Air Force prisoners of war in Vietnam (20) also has shown that the severity of the stress is more important than predisposing person-

ality factors in the development of post-traumatic stress psychiatric disturbances.

METHOD

Participants

Participants in this study included 25 officers and 311 enlisted men who were aboard the USS Belknap on 22 November 1973 when she and the aircraft carrier USS Kennedy collided. The control group consisted of 387 officers and crew of the USS Yarnell, a ship that had a mission similar to that of the Belknap. Because of this similarity, the officers and enlisted men of the two ships would be expected to have comparable work and career experiences, which served as the rationale for selecting the Yarnell as the control ship.

The men on the Belknap were divided into 15 postcollision criterion groups. The bases for this classification were: (a) whether or not the individual was injured and (b) his subsequent disposition during the 2-month postcollision period before the ship was towed to Philadelphia. Because of the small numbers in several of the specific categories, the subsamples were collapsed into three groups of men who were injured and evacuated and four groups of men who were not injured. The subsequent dispositions of those injured and evacuated included: (a) returned immediately to the U.S., (b) returned to the ship and then flown to the U.S., or (c) returned to the ship and remained aboard while in transit to Philadelphia; the categories of uninjured men were (d) immediately returned to the U.S., (e) evacuated, returned to the ship, and then flown to the U.S., (f) remained with the ship while it was towed to Sigonella and Naples and then flown to the U.S., or (g) remained with the ship both in transit to Naples and to the U.S.

Procedure

For individuals on both ships, data were extracted from the medical inpatient and the career history computer files maintained at the Naval Health Research Center, San Diego. Information selected from the medical inpatient file covered a 3-year period prior to the collision (22 November 1972 to 22 November 1975) and 3 years subsequent to the disaster. This period of time was considered to be of sufficient duration to establish both a baseline and an adequate follow-up phase. It also should be noted that not all crew members were assigned to the Belknap during the entire 3-year precollision period; however, this limitation would apply as well to the crew of the Yarnell. Data included the following: Primary diagnoses of all hospitalizations, Medical Board and Physical Evaluation Board actions, and causes of death. The service history variables extracted from the computer files consisted of the preentry characteristics of educational achievement, General Classification Test score, Armed Forces Qualification Test score (both of these tests are aptitude measures), and age at the time of enlistment as well as such service-related items as months of service, pay grade, reason for separation from service, marital status, and numbers of promotions, demotions, unauthorized absences, and desertions.

In order to determine the subsequent effects that appear to be attributable to this traumatic event, a series of comparisons was conducted between the two ships using the above data. For the first or baseline phase, means for personnel variables were compared by t tests to establish whether or not the crews of the two ships differed which, if true, might bias the results of the analyses. Another baseline comparison was conducted, using either the χ^2 technique or the test for differences between proportions, to establish whether or not there were significant differences between the two ships on the number of men hospitalized for psychiatric reasons during the 3-year precollision period. During the second phase of this study, or the postcollision follow-up period, similar computations were performed to determine if there were significantly more men who were hospitalized for psychiatric reasons or appeared before a Medical or Physical Evaluation Board among the crew of the Belknap than for the crew of the Yarnell. Other postcollision comparisons between ships consisted of calculating the proportions of separations from active duty and comparing these values to establish whether or not the crew from the Belknap suffered significantly higher percentages of separations for reasons that might be associated with the collision.

In addition, another facet of the study involved an examination of the reasons for all psychiatric hospitalizations

and medical board actions that occurred during the postcollision follow-up period among the seven disposition groups. Of major concern in these comparisons was the issue of whether evacuation from the ship or staying aboard after the incident might affect psychiatric hospitalization rates.

RESULTS

Personnel Variables and Service-Related Comparisons

The means, standard deviations, and t values for personnel characteristics of the crews of the two ships are presented in Table 1. As shown, there were no significant differences in the mean values for either the preentry or service-related variables. Because of the small number of postcollision unauthorized absences and desertions, particularly among the Belknap crew, it was not meaningful to conduct statistical analyses between crews. It was noted, however, that the rate of unauthorized absences did not increase among the Belknap crew after the collision. Another comparison between the two ships showed that there was no significant difference on the marital status variable for the hospitalized men. Because support systems have been cited as important in enhancing the subsequent adjustment of disaster victims, it was anticipated that married men would have fewer postcollision hospitalizations than single men. Results of a comparative analysis did not lend support to this hypothesis ($z = 1.27$).

Table 1

Comparisons of Personnel Characteristics for

Crews of a Navy Ship Involved in a Collision and a Control Ship

	USS BELKNAP		USS YARNELL		
Characteristic	Mean	S.D.	Mean	S.D.	t[a]
Highest education	11.83	1.06	11.81	.97	.26
General Classification Test[b]	55.02	8.82	55.02	9.40	0.0
Armed Forces Qualification Test[c]	62.13	19.44	62.99	20.27	- .50
Age at enlistment	18.69	1.74	18.74	1.81	- .36
Months of service	67.17	65.42	69.13	70.23	.37
Pay grade	3.70	1.76	3.78	1.65	- .64
Number of promotions	2.70	1.25	2.57	1.30	1.30
Number of demotions	.26	.61	.27	.57	.24
Number of UAs and AWOLs	.39	.93	.50	1.02	-1.42
Number of desertions	.08	.34	.14	.48	-1.87

[a] $t = 1.96$ for $p < .05$; therefore, all t values are nonsignificant.

[b] Verbal aptitude test.

[c] Military aptitude.

Comparisons of percentages of separations revealed no significant differences between the two crews for men who were separated from active duty during the 3-year follow-up period. Results of analyses to determine the significance of the differences in proportions between the two ships are presented in Table 2. Although it was hypothesized that the crew of the Belknap would experience more separations, particularly for medical reasons, the proportions for the two ships were not significantly different. The z values for the comparison of medical separations as well as other comparisons were nonsignificant as can be seen in the table.

Table 2

Comparison of Postcollision Performance for Crews of a Navy Ship Involved in a Collision and a Control Ship

	USS BELKNAP		USS YARNELL		
	Number	Percent	Number	Percent	z
Effective enlistees	254	86.39	321	87.23	- .57
On active duty	116	39.46	140	38.04	.50
Medical separations	12	4.08	10	2.72	1.40
Other honorable separations	126	42.86	171	46.47	1.37
Noneffective enlistees (separations for unsuitability, misconduct, bad conduct, etc.)	40	13.60	47	12.77	.57

Clinical Findings: Comparisons between Ships

During the 3-year precollision period, one man from the Belknap crew and eight men from the Yarnell were hospitalized for psychiatric reasons. The sole hospitalization for the Belknap crew was for alcoholism while the reasons for hospitalization among the Yarnell complement included five for alcoholism, two for personality disorders, and one for neuroses. Subsequent to the date of the collision, 13 men from the Yarnell were hospitalized for psychiatric reasons, of which three were for alcoholism, three for schizophrenias, three for transient situational disturbance, two for personality disorders, and two for special symptoms. One of these men had been hospitalized during the precollision period. There were no postcollision hospitalizations for neuroses.

Among the Belknap crew, there were 18 men hospitalized during the 3-year postcollision period. In contrast to the Yarnell findings, the reasons for the hospitalizations differed dramatically. Of the 18 men, 13 were hospitalized during the 3-year postcollision period for neuroses, four were for transient situational disturbance, and one for alcoholism. This disproportionate number of men diagnosed with neuroses resulted in a χ^2 value of 14.51 ($p < .001$) in comparing the numbers of men hospitalized for neuroses between the two ships. Seven of these hospitalizations occurred during the first year subsequent to the collision, followed by three admissions for each of the other 2 years of the follow-up period. None of the Belknap crew members had been hospitalized during the precollision period.

In addition to the comparisons on the number and reasons for each man's hospitalization, another research objective was to examine the differences between ships in the prognosis or severity of each individual's psychiatric impairment. For this phase of the study, comparisons were conducted between the crews of the two ships on Physical Evaluation and Medical Board actions. A Physical Evaluation Board typically represents the final phase in the process of being released from active duty for medical reasons, a procedure that usually is preceded by a Medical Board or a hospitalization, or both. The Medical Board recommends whether or not an individual should continue on active duty.

During the postcollision period, eight men from the Belknap and four from the Yarnell were separated from service for psychiatric reasons after appearing before a Physical Evaluation Board. Seven of the eight Belknap separations were for neuroses and the other was for psychosis whereas three of the Yarnell separations were for schizophrenias and one for special symptoms. All 12 men received severance pay.

In comparing Medical Board actions, there were 12 appearances before such a reviewing board among the Belknap men and only four for the Yarnell. Thus, these results showed that in addition to an elevated number of hospitalizations for neuroses among the Belknap members the number of Physical Evaluation Boards was double that of the Yarnell and the number of Medical Boards was three times greater for the Belknap than for the Yarnell crew during the 3-year postcollision period.

In general, it can be concluded that among the disaster survivors there was an elevated risk of post-traumatic disorder and that these postc. sion adjustment difficulties tended to persist for many individuals. In the case of eight men, for example, these psychiatric problems continued to the point where they were released from active duty after appearing before a Physical Evaluation Board. The persistent nature of these psychiatric problems is illustrated by the following example, which describes the sequence of psychiatric incidents for an enlisted man whom we refer to as Steven. Prior to the collision, Steven had no history of psychiatric impairment. At the time of the collision, he was uninjured but, nevertheless, was evacuated and flown back to the U.S. Early in 1976, he was hospitalized for anxiety neurosis; approximately 6 months later he again was hospitalized--this time for paranoia. In January 1977, Steven appeared before a Physical Evaluation Board with the diagnosis of psychosis (acute paranoid reaction) and was separated from service with severance pay.

Clinical Findings: Comparisons among Postcollision Groups on the Belknap

Table 3 is a presentation of the numbers and types of psychiatric hospitalizations, Medical Boards, and Physical Evaluation Boards across the seven postcollision groups. Overall, the differences in this table suggested that the risk of being hospitalized or appearing before a reviewing board for neurosis (or post-traumatic stress disorder) or transient situational disturbance is much greater than for any other psychiatric diagnosis. Second, for those who were injured, being returned to the ship after medical evacuation and treatment seemed to result in fewer subsequent psychiatric hospitalizations or board appearances, and remaining with the ship all the way back to the U.S. was the most favorable disposition condition. The category with the highest percentage of psychiatric incidents, on the other hand, was the uninjured group that was evacuated after the collision, returned to the ship, and then flown back to the U.S. It may be that this group had insufficient time on the ship to work through the successive phases of a postcrisis reaction. These trends with regard to postcollision disposition, however, can only be considered suggestive because of the lack of information concerning the selective criteria for evacuating or returning a man to the ship. The small numbers of individuals in most of the seven disposition groups precluded the testing for statistical significance among groups.

Table 3

Frequency and Percentage Distributions of Psychiatric Hospitalizations and Board Actions during a 3-Year Follow-up by Disposition Category for Officers and Enlisted Men of the USS Belknap[a]

Postcollision Disposition	Total Onboard	Total Hosp.[c]	% Hosp.[d]	Diagnostic Group[b]: Psych.	Neur.	T.S.D.	A or D Abuse	Psych. Obser.
Injured and Evacuated								
Returned immediately to U.S.	27	7	26	1	5	1	0	0
Returned to ship, flown to U.S.	12	0	0	0	0	0	0	0
Rode ship to U.S.	7	0	0	0	0	0	0	0
Not Injured								
Returned immediately to U.S.	157	18	11	0	16	2	0	0
Evacuated, Returned to ship, flown to U.S.	8	6	75	2	3	1	0	0
Rode ship to Naples, flown to U.S.	70	5	7	0	1	1	2	1
Rode ship to U.S.	48	1	2	0	0	1	0	0
Died	7							
Total	336	37		3	25	6	2	1

[a]Psychiatric hospitalizations and Medical and Physical Evaluation Board Actions.

[b]Diagnostic Group: Psych. = Psychosis; Neur. = Neurosis; T.S.D. = Transient Situational Disturbance; A or D Abuse = Alcohol or Drug Abuse; Psych. Obser. = Psychiatric Observation.

[c]Total hospitalizations for psychiatric reasons, including Medical and Physical Evaluation Board Actions.

[d]Percent hospitalized of total aboard.

DISCUSSION

Results of this study showed that for those officers and crewmen who survived the collision between the USS Belknap and the USS Kennedy there was a significantly greater risk of suffering a psychiatric hospitalization or a separation from service for neuroses than was observed for members of a control ship. Comparisons of hospitalizations across the 3-year precollision period revealed that the Belknap crew had only one hospitalization (for alcoholism) whereas 18 men were hospitalized during the 3-year postcollision follow-up period. Results of comparisons for the crew of the Yarnell differed in that there were eight men hospitalized during the precollision period and 13 during the postcollision period. Reasons for the Yarnell crew hospitalizations corresponded fairly closely with those presented in a recent publication which reported that hospitalization rates for mental disorders among Navy enlisted men typically were the highest for alcoholism and personality disorders--while relatively few admissions were observed for neuroses (21). By way of contrast, the postcollision hospitalizations of the Belknap crew were primarily for neuroses (13 of 18 men) and transient situational disturbance. These results alone pointed up the association between a disaster and the traumatic aftereffects. Moreoever, none of these 18 men had been hospitalized during the precollision period which provided support for the hypothesis that the more important contributing factor to psychological impairment subsequent to a disaster was the magnitude of the event and not a history of mental disorders.

Personnel or demographic characteristics also seemed to contribute minimally, if at all, to the relationship between a disaster and subsequent psychological difficulties. That is, in comparisons between the two crews there were no significant differences on the variables examined for this study, such as education, aptitude, or pay grade. In addition to the historical factor, therefore, none of these variables was considered a predisposing characteristic associated with post-traumatic psychological impairment. Thus, such results suggested that the historical and demographic factors were unrelated to the traumatic aftereffects of a collision at sea.

There also were no significant differences between the two ships on numbers of promotions, demotions, unauthorized absences, and desertions during the postcollision period. Moreover, the proportions of both effective and noneffective enlisted men were comparable between the Belknap and Yarnell which was based on the finding that the postcollision noneffective rates of the two ships were not significantly different. With such results, it was concluded that the collision had relatively little impact on the absenteeism and noneffective performance rates among the Belknap crew.

The psychological effects of the collision, however, were pointed up very clearly by the elevated numbers of psychiatric hospitalizations for neuroses among the officers and men of the Belknap. As discussed above, the relative incidence of neuroses among all Navy men generally was low which differed considerably from the results reported here in that 13 of the 18 hospitalized men were admitted for neuroses during the 3-year postcollision period. It also was noted that at two naval outpatient clinics, 35 men from the Belknap had been seen for psychiatric reasons during the first 8 months following the collision. The symptomatology reported by these men reflected quite vividly those symptoms characterizing the post-traumatic stress disorder described at the outset.

Other findings showed that the Belknap crew experienced an elevated number of Medical and Physical Evaluation Board actions (20 as compared with 8 for the Yarnell crew) during the 3-year postcollision period. Such results suggested that the posttraumatic effects of this maritime collision not only were evidenced by a high rate of neuroses but also by the large number of appearances before these reviewing boards during the 3-year postcollision follow-up period.

Also reported in this study were the differences in psychiatric hospitalizations and board appearances among the various postcollision disposition groups. For example, individuals who remained with the ship while it was towed to Italy or to Philadelphia had the lowest numbers of psychiatric hospitalizations for both the injured and uninjured. On the other hand, the evacuation of individuals seemed to have a detrimental effect on the subsequent adjustment of many victims as noted by the higher percentages of hospitalizations for these groups. Although the numbers were small, the group

with the worst prognosis was the one in which uninjured individuals were evacuated, returned to the ship, and then flown back to the U.S.

In explaining these differences, it is important to recall three of the considerations discussed in the introduction: (a) the reactions to a crisis situation, (b) treatment, and (c) other factors associated with post-traumatic stress disorder. First, several authors reported that symptoms throughout various stages of a crisis reaction are sequential and generally predictable which suggested that eventual recovery might be impaired if individuals were removed from the scene before resolution of an earlier stage had been reached. Although the data identifying each man's subsequent location during the postcollision period were available, there was no information on his reactions to the crisis, which would prevent a meaningful interpretation of these circumstances.

Second, all researchers involved in evaluating treatment of disaster survivors emphasized the importance of immediacy in psychiatric care delivery. On the basis of this conviction and as a result of concern for individuals involved in maritime disasters, the SPRINT was formed to provide immediate and essential treatment to survivors. This team, which was trained specifically to provide crisis intervention and to deal with the reactions of victims to a disaster, was not in existence at the time of the Belknap-Kennedy collision. It seems likely that if such psychiatric assistance had been available, there would have been fewer postcollision psychiatric hospitalizations and separations from service. Although SPRINT has intervened in three Coast Guard disasters to date, there has been no study of the subsequent health and performance status of the officers and enlisted men involved. Longitudinal studies, similar to the present effort, should be undertaken to evaluate the effectiveness of such interventions in reducing long-term psychological effects. Comparisons of psychiatric hospitalizations could readily be conducted between the crews of the Coast Guard vessels and the crew of the Belknap which would provide meaningful evaluative data on the SPRINT intervention.

Third, other factors associated with the psychological effects of a disaster need to be considered, such as the importance of ensuring survivors that a support system is available. In evacuating a large proportion of the crew, many of these men left friends behind and, as a result, were removed from an environment that could supply important sources of support. The death and serious injury of their shipmates also resulted in a loss of other potential sources of support to the survivors. And finally, the evacuation of many men back to the U.S. and reassignment to another duty station may have created yet another stressful event to add to an already high life change level (17). For those who were flown back to the U.S. after the collision, the combination of the devastating events associated with the tragedy, the loss of shipmates, and the reassignment probably contributed to their subsequent psychiatric hospitalizations. Under these highly stressful circumstances, it is surprising that the numbers of postcollision psychiatric hospitalizations were not greater.

In conclusion, the results of this study provide ample support for the issues described both in the introduction and summarized in the discussion section. Lessons learned from the survivors of past catastrophes should be applied at the time of the next disaster if the long-term psychological effects of these occurrences are to be reduced. As disasters become increasingly more frequent, it will be essential for communities to provide the needed care and support afforded by a team of crisis intervention specialists, such as the Navy's SPRINT. It is to be hoped that immediate intervention and therapy were available after the recent USS Nimitz disaster. With a crew and officership of thousands, the subsequent psychological effects could be far-reaching.

REFERENCES

1. Horowitz MJ: Stress Response Syndromes. New York, Jason Aronson, Inc., 1976
2. Caplan G: Principles of Preventive Psychiatry. New York, Basic Books, 1964
3. Horowitz MJ: Phase oriented treatment of stress response syndrome. Am J Psychotherapy 27:506-515, 1973
4. Hirschowtiz R: Crisis theory: a formulation. Psychiatric Annals 3:36-47, 1973
5. Korner I: Crisis reduction and the psychological consultant, in Crisis Intervention, Vol. 2. Edited by Specter G, Clairborn W. New York, Behavioral Publications, 1972
6. Drabek T, Key W, Erickson P, Crewe J: Longitudinal Impact of Disaster on Family Functioning. Denver, University of Denver, 1973
7. Taylor VA: Good news about disasters. Psychology Today 11:93, 1977
8. Lifton R, Olson E: The human meaning of total disaster, the Buffalo Creek experience. Psychiatry 39:1-18, 1976
9. Rongell L: Discussion of the Buffalo Creek disaster: the course of psychic trauma. Am J Psychiatry 133:313-316, 1976
10. Gleser GC, Green B, Winget C: Prolonged psychological effects of disaster. New York, Academic Press, 1981
11. Friedman P, Linn L: Some psychiatric notes on the Andrea Doria disaster. Am J Psychiatry 144:426-432, 1957
12. Eitinger L: Acute and chronic psychiatric and psychosomatic reactions in concentration camp survivors, in Society, Stress, and Disease. Edited by Levi L. New York, Oxford University Press, 1971
13. Chodoff P: Late effects of the concentration camp syndrome. Arch Gen Psychiatry 8:323-333, 1963
14. Lifton RJ: Psychological effects of the atomic bomb in Hiroshima. Daedalus 92:462-497, 1963
15. Adler A: Neuropsychiatric complications in victims of Boston's Cocoanut Grove disaster. JAMA 123:1098-1101, 1943
16. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders (Third Edition). Washington, DC, American Psychiatric Association, 1980
17. Hocking F: Psychiatric aspects of extreme environmental stress. Dis Nerv Syst 31:542-545, 1970
18. Rahe RH, Mahan JL, Arthur RJ: Prediction of near-future health changes from subject's preceding life changes. J Psychosom Res 14:401-406, 1970
19. Janny J, Masuda M, Holmes T: Impact of natural catastrophe on life events. J Human Stress, June:22-34, 1977
20. Ursano RJ, Boydston J, Wheatley R: Psychiatric illness in U.S. Air Force Vietnam prisoners of war: a five-year follow-up. Am J Psychiatry 138:310-314, 1981
21. Hoiberg A: Sex and occupational differences in hospitalization rates among Navy enlisted personnel. J Occupa Med 22: 685-692, 1980

FOOTNOTE

[1]The authors are listed in alphabetical order which will be reversed in the next co-authored publication.

ACKNOWLEDGMENT

Special thanks are extended to the following individuals for their many contributions to this research project: John House, Camille Kim Cook, Steven Perard, Lawrence A. Palinkas, E. K. Eric Gunderson, and Patricia E. Polak.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 81-39	2. GOVT ACCESSION NO. AD-A113 514	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Collision at Sea: The Traumatic Aftereffects		5. TYPE OF REPORT & PERIOD COVERED Interim
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Anne Hoiberg and Brian G. McCaughey		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Health Research Center P.O. Box 85122 San Diego, California 92138		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS M0099-PN/001-1163
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Medical Research and Development Command Bethesda, Maryland 20014		12. REPORT DATE November 1981
		13. NUMBER OF PAGES 13
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) Bureau of Medicine and Surgery Department of the Navy Washington, D.C. 20372		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Post-traumatic stress disorder
Neurosis
Naval personnel
Collision at sea

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The objective of this longitudinal study was to examine the psychological effects of a collision at sea by comparing the subsequent performance and health patterns of the officers and crew of the USS Belknap (N = 336) with those of the USS Yarnell (N = 387) during a 3-year follow-up period. Results showed that there was a significantly greater risk of suffering a psychiatric hospitalization or a separation from service for psychiatric reasons among the officers and men of the disabled Belknap than was observed for mem-

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S/N 0102-LF-014-6601

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bers of the Yarnell. Other comparisons revealed no significant differences between the ships on subsequent numbers of promotions, demotions, unauthorized absences, desertions, and noneffective enlistees as well as on several precollision service-related or preentry variables. Within group comparisons showed that the postcollision group with the least favorable prognosis was the uninjuried group that was evacuated, returned to the ship, and then flown back to the U.S. Future disaster studies should be designed to evaluate the effectiveness of an early crisis intervention, such as the Special Psychiatric Rapid Intervention Team (SPRINT), in reducing long-term psychological effects.