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Perceptions of Risks of Drinking and Boating among Massachusetts Boaters

SYNOPSIS

Objectives. Public policy has treated drinking and boating as though it were analogous to drinking and driving. Accordingly, recent Federal and state laws to prevent drinking and boating have focused solely on alcohol use by the boat operator. This study was designed to determine boaters' knowledge about the epidemiology of boating fatalities and how boaters perceive the risks of drinking and boating.

Methods. In the summer of 1995, the authors conducted a survey by mail of a random sample of 600 owners of boats registered in Massachusetts.

Results. Survey results indicated that boaters believe passengers can safely drink more than operators. Respondents also thought that people on boats at rest can safely drink more than people on boats underway.

Conclusions. The results of this study could be helpful in designing future boating safety campaigns by identifying gaps in knowledge about the risks of drinking and boating for both operators and passengers.

During the 1980s there were dramatic reductions in both traffic fatalities¹ and recreational boating fatalities.² These trends continue to the present. Substantial evidence documents the effectiveness of Federal and state policies in reducing fatalities due to car crashes; these policies have included seat belt legislation,³ reductions in legal speed limits,⁴ design and manufacture specifications,⁵ age 21 drinking laws,⁶ and other deterrents to drunken driving.⁶

While there has been less research on the impact of boating safety legislation, it is likely that these Federal and state policies account for much of the reduction in boating fatalities. Beginning with passage of the Safe Boating Act in 1971, there have been a series of policy interventions intended to increase the seaworthiness of pleasure boats, to increase the use of emergency equipment such as personal flotation devices, and to decrease behaviors thought to contribute to the risks of boating injury such as drinking and boating.² Recreational boating fatalities declined 55% from 1754 in 1973 (the highest annual total since 1961, when Coast Guard tracking began) to a record low of 784 in 1994.² This decline has occurred despite a steady increase in the estimated number of recreational boats in use.²

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Epidemiological, physiological, and behavioral research have made a convincing case for the role of alcohol in traffic crashes, but there is less evidence on alcohol's contribution to boating fatalities.⁷⁻¹⁴ Nevertheless, what evidence there is, is suggestive. Somewhere between 25% and 50% of people who died in boating-related incidents showed evidence of alcohol consumption.⁸ A study of four states with comprehensive alcohol testing for injury deaths found that 60% of people who died in boating-related incidents had elevated blood alcohol concentrations (BACs) and 30% met the definition of intoxication (BACs >0.1).⁷ Of those killed on weekend nights, 54% were intoxicated. A study conducted on behalf of the Coast Guard in 1988-1989 compared the BACs of people in California who died in recreational boating incidents with those of randomly selected boaters (controls) disembarking at points where, or close to where, those who died had embarked. Those who died were 2.9 times as likely as controls to have been drinking and 10.6 times as likely to have had BACs in excess of 0.1.⁷

Recently, boating safety advocates have focused attention on reducing "drinking and boating" as a strategy for reducing recreational boating injuries and deaths. The Coast Guard Authorization Act of 1984 (Public Law 98-557) amended Title 46, United States Code, Chapter 23 (Operation of Vessels Generally) in two important ways: (a) That portion of the Code dealing with negligent operation was expanded to include a section specific to operating a vessel while intoxicated, and (b) The new section directed the Secretary of Transportation to develop regulations prescribing standards for determining intoxication. In 1987 (effective 1988), the Coast Guard established both behavioral measures and BAC standards (0.1% for recreational, and 0.04 for commercial, boaters).² Sanctions included a civil penalty up to \$1000 and a criminal penalty up to \$5000, up to one year imprisonment, or both.² Subsequently, 46 states and three U. S. territories have passed similar legislation establishing BAC standards for intoxication in operators of vessels. More recently, several major beer companies have helped to sponsor "designated boater" programs.¹⁵

Since the analogy to drunken driving has influenced strategies to reduce drunken boating, the focus has been on the boat operator. But this analogy may limit the effectiveness of efforts to reduce alcohol-related boating injuries and fatalities; drinking and driving and drinking and boating are

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not completely analogous. The drunken passenger in a vehicle on land is relatively safe as long as the driver is unimpaired. But this is by no means the case on boats. A drunken passenger is at risk for falling off a boat and drowning regardless of the sobriety of the boat operator. Of the 784 people who were killed in boating incidents in 1994, 26% (208) died as a result of falls overboard, and only 20.8% (163) as a result of a collision with other boats or objects. Over one-third occurred while boats were drifting (31%), anchored (5%), or docked (2%), and operator fault could be established in only 49% of cases (with fault undetermined in 26%).² These data are consistent with long-term trends.²

Moreover, it is clear from a variety of surveys of boaters that drinking while boating is much more common than drinking while driving. Almost half of boaters report drinking on at least some outings.¹⁶⁻²⁰ In a 1991 national random digit dial household survey, about 20% of respondents who said that they had boated during the prior month reported that they had been drinking on the day they last boated.²¹ In contrast, the results of a 1986

national roadside breath testing survey showed that only 8.3% of weekend nighttime drivers had BACs in excess of 0.05.²²

Drinking and boating strategies that focus on operators to the exclusion of passengers could promote the idea that drinking passengers are safe.¹⁵ Boating fatality statistics clearly indicate this is a misconception. Behavioral and physiological research support this conclusion: drinking promotes risk-taking behaviors and drinking impairs balance—a sense already challenged on a boat rocked by wave motion. Moreover, the traditional avenues of boating education do little to correct misconceptions of the risks for drinking passengers. A review of boater training and educational materials found little mention of alcohol; when it was mentioned, the focus tended to be on operators instead of crew or passengers.¹⁵

To learn more about boaters' understanding of the risks of drinking while boating, we surveyed a random sample of boat owners whose vessels were registered with the state of Massachusetts. Our study was designed to determine what these boaters knew about the epidemiology of boating fatalities and how they perceived the risks of drinking and boating. The results of this study can be helpful in designing future boating safety campaigns by identifying gaps in knowledge about these risks.

Methods

Survey design. Using a statistical package random selection function, we selected a sample ($N=600$) of recreational boat owners from a list of the 132,760 boats registered in Massachusetts as in 1993. The registration data were purchased from the Division of Law Enforcement, Massachusetts Department of Fisheries, Wildlife and Environmental Law Enforcement. Registration is mandatory for all powered vessels moored in Massachusetts waters. Failure to register can result in fines of up to \$250 and/or confiscation of vessels. Because the communities in which boats are moored share in the revenue from registration fees, enforcement is conducted by local harbor masters as well as by state environmental police.

We mailed a questionnaire to registered boaters' home addresses as obtained from the Massachusetts boat registration list. The mailing included a cover letter, the questionnaire, and a stamped, self-addressed return envelope. Two subsequent follow-up mailings were sent to non-respondents; the second included a \$1.00 bill.

Questionnaire. The questionnaire consisted of 12 questions about alcohol and recreational boating and four questions about the respondent. A copy of the instrument is available from the authors on request.

Drinking and passenger safety. To determine whether respondents thought that passengers could safely drink more than boat operators, we asked them to estimate for both groups the number of drinks it was safe to consume immediately before or during a two-hour outing, assuming fair weather and water conditions. We also asked respondents to estimate the highest number of drinks it was safe to consume within a two-hour period if the boat were moored, anchored, or docked, again assuming fair weather and water conditions.

Knowledge of federal drinking and boating law. To assess boaters' awareness of the Federal drinking and boating legislation, we asked respondents whether there was such a law and, if so, the levels of sanctions under the law. We also asked a true-false question about laws against operating a boat while intoxicated.

Epidemiology of boating fatalities. We asked a series of questions to determine boaters' familiarity with alcohol's role in boating fatalities.

Respondent characteristics. We asked respondents for their age in years, their gender, and how many days they expected to use their boat in 1995. We also asked about boating instruction, including whether they had participated in Power Squadron—the official boating course of the Coast Guard Auxiliary.

Results

Of the 600 surveys mailed, 105 (17%) were undeliverable because the intended recipients had moved and the post office was no longer forwarding their mail, and 5 (0.8%) were returned because the intended recipient had died. Of the remaining 490 boat owners, 136 (28%) did not respond, and 354 completed and returned the questionnaire, for a response rate of 72% (354/490).

Ninety percent (319) of respondents were male. The mean age of respondents was 49 (50 for men and 47 for women). Respondents estimated that they would use their boats for an average of 41.5 days during 1995. Fifty percent of respondents reported having had some formal boating instruction,

13% had received instruction from Power Squadron alone, 21% had received other formal instruction, and 15% said they had received Power Squadron plus some other form of formal boating instruction. (See Table for survey questions and responses.)

Perceived risks of drinking. The effects of alcohol on a boat operator's performance may be modified by many factors, including weather, the operator's boating experience, the operator's weight, and whether food accompanies drinking. Accordingly, there is no precise amount of alcohol that can be specified as safe. Nevertheless, our purpose was to determine whether respondents differentiated between operators and passengers in estimating safe exposure levels.

When asked how many drinks it was safe to consume immediately before or during a two-hour boat outing, assuming fair weather and water conditions, as a group, respondents indicated a significantly greater mean number of drinks for passengers (1.5) than for operators (0.57, $P=0.0001$). Only 5% of respondents thought that it was safe for an operator to have three or more drinks while boating, while 24% thought that it was safe for a passenger to have that amount.

The mean number of drinks respondents estimated it was safe to drink when boats were anchored, moored, or docked was 2.2.

Recreational boaters are not well informed about the risks of drinking and boating, about Federal drinking and boating laws, or about the epidemiology of boating fatalities.

Results of 1995 Massachusetts boaters survey

Questions about alcohol consumption Responses (mean number of drinks)

Number of drinks safe for operator	0.6
Number of drinks safe for passenger	1.5
Number of drinks safe when boat is moored/docked	2.2

Questions about risks of drinking and boating and about Federal legislation Percent of respondents choosing each answer

It is safe for passengers to drink as long as the boat operator does not drink:	
Disagree strongly ^a	21.7
Disagree somewhat ^a	24.5
Neither agree nor disagree	11.1
Agree somewhat	34.8
Agree strongly	7.7
Under Federal law, intoxicated boat operator is:	
Not subject to fine if operating own boat	3.4
Subject to fine ≤ \$50	9.9
Subject to fine ≤ \$500; no jail	20.7
Subject to fine ≤ \$5000 and 1 yr. jail ^a	20.1
There is no Federal law	45.2
Percent recreational boating fatalities caused by operator error:	
0–25%	7.2
26%–50% ^{ab}	13.0
51%–75%	25.4
76%–100%	18.2
Don't know	36.0
Most recreational boating deaths happen when boats crash into another boat or object:	
True	57.4
False ^a	18.3
Don't know	24.0
Most recreational boating deaths happen when boats are drifting, anchored, or moored:	
True	8.6
False ^a	55.6
Don't know	35.5
There are no laws against operating a boat while intoxicated as long as the operator is not carrying passengers for a fee:	
True	8.9
False ^a	70.7
Don't know	20.3
The percent of people who die in recreational boating accidents found to have alcohol in their blood is around:	
0–30%	16.8
31%–60% ^a	50.5
61%–100%	31.4
If you fall overboard when you have been drinking, the alcohol will help maintain body temperature:	
True	0.9
False ^a	91.1
Don't know	7.7
Compared to indoors, alcohol affects you less when you are boating because you are in the fresh air:	
True	3.7
False ^a	87.7
Don't know	8.3

^aCorrect answer.

^bIn 1994, 49% of recreational boating fatalities were caused by operator error.

NOTE: N ranges from 325 to 354 because some respondents did not answer every question.

Respondents were divided when asked if they agreed or disagreed that it was safe for passengers to drink as long as the boat operator did not drink: 21% strongly disagreed, 24% somewhat disagreed, 35% somewhat agreed, and 8% strongly agreed. Eleven percent neither agreed nor disagreed.

Knowledge of federal drinking and boating law. We gave respondents several statements that reflected provisions of Federal law pertaining to drinking and boating. Only 20% knew that an intoxicated boater was subject to a fine of up to \$5000 and one year in jail (the correct answer), while 45% thought there was no Federal drinking and boating law. Three percent incorrectly assumed that an intoxicated boater was not subject to a fine if operating his/her own boat, 10% thought that an intoxicated boater was subject to a fine of no more than \$50, and 21% said that an intoxicated boater was subject to a fine of up to \$500, but not subject to jail.

Nine percent of respondents agreed with the incorrect statement that there are no laws prohibiting operation of a boat while intoxicated as long as the operator is not carrying passengers for a fee, 71% correctly indicated that this statement was false, and 20% did not know.

Causes of boating fatalities. According to the Coast Guard's annual reports on boating fatalities, about 50% of fatalities can be attributed to operator error, and the source of error is undetermined in about another 20%.¹⁵ Seven percent of respondents estimated that 25% or fewer of boating fatalities are caused by operator error, 13% estimated between 26% and 50%, 25% estimated between 51% and 75%, and 18% estimated between 74% and 100%. More than a third of respondents (36%) said that they did not know the answer to this question.

Fifty-seven percent of respondents felt it was true that most recreational boating fatalities happen when a boat crashes into another boat, 18% indicated that this was false, and 24% did not know. In fact, in 1994, only 21% of the 784 boating fatalities reported by the Coast Guard involved collisions.²

According to the Coast Guard's annual report for 1994, 31% of fatalities occurred while boats were drifting, another 5% while boats were anchored, and another 2% while boats were docked.² Nine percent of respondents agreed with the statement that most boating fatalities occur when boats are drifting, anchored, or moored, 56% correctly indicated that this was false, and 36% did not know.

Alcohol and boating fatalities. According to a 1992 Coast Guard Study, 60% of people who died in boating-related incidents had elevated blood alcohol, half of whom were intoxicated, with a blood alcohol level higher than 0.1%.⁷

Seventeen percent of respondents said that between 0 and 30% of people who die in boating-related incidents are found to have alcohol in their blood, 51% thought the correct figure was between 31% and 60%, and 31% thought the figure was between 61% and 100%.

Effects of alcohol. Less than one percent of respondents believed that alcohol help maintain body temperature if one falls overboard after drinking, 91% correctly indicated that this is not true, and 8% said they did not know.

Only four percent agreed with the incorrect statement that alcohol has less effect when boating than when indoors because of exposure to fresh air, 88% correctly indicated that this statement was false, and 8% answered, "Don't know."

Research by the Coast Guard suggests a synergistic effect whereby exposure to the elements while boating increases the impairing effect of alcohol.¹⁰

Discussion

The present study is, to our knowledge, the first published report comparing boaters' perceptions of the risks to operators and passengers of drinking and boating. Our findings indicate that, in general, recreational boaters are not well informed about the risks of drinking and boating, about Federal drinking and boating laws, or about the epidemiology of boating fatalities. These findings are particularly noteworthy given the fact that the respondents tended to be experienced boaters.

Although the 1994 annual Coast Guard report on recreational boating accidents² does not distinguish whether those who died were operators or passengers, the fact that a quarter of the deaths were due to falls overboard suggests that passengers are at risk. Passengers may be at more risk than operators for falls overboard because they are freer than the helmsman to move about the boat. Nevertheless, most respondents thought that passengers could safely drink more than boat operators, and almost half thought that it was safe for passengers to drink as long as the operator did not drink. Moreover, despite the fact that about a third of fatalities occur when boats are moored, anchored, or docked, respondents thought that people could drink more if a boat were at rest than if underway.

Most respondents thought that passengers could safely drink more than boat operators.

Boaters clearly equate boating and vehicular fatalities. Almost half of our respondents thought that 50% to 100% of boating fatalities were due to operator error, while the data indicate the actual proportion to be between 25% and 50%. Over half of our respondents thought that most recreational boating deaths occur as a result of collisions with other vessels or objects, while, in fact, only approximately 20% result from collisions.

Not enough boaters are aware of the Federal drinking and boating law. Almost half did not think there was such a law, and only 20% were aware of the penalties of the law.

Boaters were more accurate in their assessments of the effects of drinking and boating. Less than one percent thought that alcohol helps maintain body temperature when victims fall overboard, and only 4% thought that alcohol has less effect outdoors on a boat than indoors on land. By dilating blood vessels, alcohol exacerbates hypothermia. Studies have shown that drinking on boats increases the effects of alcohol in degrading boat operators' performance.¹⁰

The public needs more information about the risks of drinking and boating. An important and influential source of boater education is the U.S. Coast Guard Auxiliary's Power Squadron course. Among the respondents to our survey, 28% had taken this course. Nationwide, about 70,000 participate in Power Squadron courses annually.²³ These courses provide a wealth of useful information about boat handling and safety. The 11th (1995) edition of the course manual contains a section on substance abuse (not use), which cautions that "drugs and alcohol have no place on a boat." Nonetheless, the course presents no information on the Federal drinking and boating laws and no information on risks to passengers beyond stating that intoxicated people who fall off boats are more likely to become disoriented than sober people who fall off of boats.²⁴ The role of alcohol in precipitating the fall is not discussed. Moreover, none of the course's test questions address alcohol use or drinking and boating laws. Many boating manuals are equally lacking in their discussion of drinking and boating.

We have suggested in previous reports that the current policy focus on boat operators' drinking may convey the impression that passengers can drink safely as long as the helmsman is sober.¹⁵ The findings of the present study, while limited to Massachusetts boaters, indicate that many boaters may have erroneous perceptions about the risks of drinking and boating and about the circumstances of fatal boating events. Increasing state and Federal resources for boater safety education could help to correct these perceptions. Expanding the discussion of alcohol in existing educational materials would be a first step toward a better educated boating public.

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