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Why Are Most Drowning Victims Men? Sex Differences in Aquatic Skills and Behaviors

Jonathan Howland, PhD, MPH, Ralph Hingson, ScD, Thomas W. Mangione, PhD, Nicole Bell, ScD, MPH, and Sharon Bak, MPH

ABSTRACT

Men have higher drowning rates than women for most age groups. Data from a 1991 national household survey (n = 3042) on aquatic activities were used to examine hypotheses about differential drowning rates by sex. Men and women were compared by (1) exposure to aquatic environments; (2) frequency of aquatic activities involving, or potentially involving, submersion; (3) swimming training and ability; (4) aquatic risk-taking behaviors; and (5) alcohol use on or near the water. Men had elevated risks for exposure, risk taking, and alcohol use. It was concluded that several factors contribute to their relatively high drowning rates, including a possible interaction between overestimation of abilities and heavy alcohol use. (*Am J Public Health.* 1996;86:93–96)

Introduction

The unintentional injury death rate is twice as high for men as for women.[1] Drowning, which ranks fourth in unintentional injury deaths,[2] is no exception. Male drowning rates peak between ages 1 and 2 years, decline thereafter until age 10, and then increase sharply to a maximum during the late teens.[2] In contrast, female drowning rates peak by age 1 year and decline to a relatively low, consistent level. During late adolescence and early adulthood,[1] the ratio of male to female drowning rates is about 10:1 (Figure 1).

Data from our national survey of aquatic activities[3] were used to explore five hypotheses explaining sex differences in drowning rates. Men and women were compared by (1) exposure to aquatic environments; (2) frequency of aquatic activities involving, or potentially involving, submersion; (3) swimming training and ability; (4) aquatic risk-taking behaviors; and (5) alcohol use on or near the water.

Understanding sex differences in drowning may provide insight for developing effective interventions.

Methods

Data Collection

A household survey of adolescents (≥ 16 years) and adults was conducted in the summer of 1991 by random-digit dialing telephone calls using a two-stage Waksberg[4] procedure. Telephone exchanges were stratified by state. Only one eligible respondent was interviewed per household. Three thousand forty-two surveys were completed; the response rate was 70%.

Analysis

Exposure. Men and women were compared with respect to (1) the proportion reporting at least one aquatic activity during the prior year, and (2) the estimated number of days respondents engaged in aquatic activities during that year.

Submersion potential. Aquatic activities were divided by high exposure (e.g., boating, swimming, scuba diving) and low exposure (e.g., sunbathing, wading), depending on the likelihood of submersion. Men and women were compared on (1)

Jonathan Howland, Ralph Hingson, and Sharon Bak are with Boston University School of Public Health, Boston, Mass. Thomas W. Mangione and Nicole Bell are with JSI Research and Training Institute, Boston, Mass.

Requests for reprints should be sent to Jonathan Howland, PhD, MPH, Social and Behavioral Sciences Department, Boston University School of Public Health, 85 E Newton St, Boston, MA 02118.

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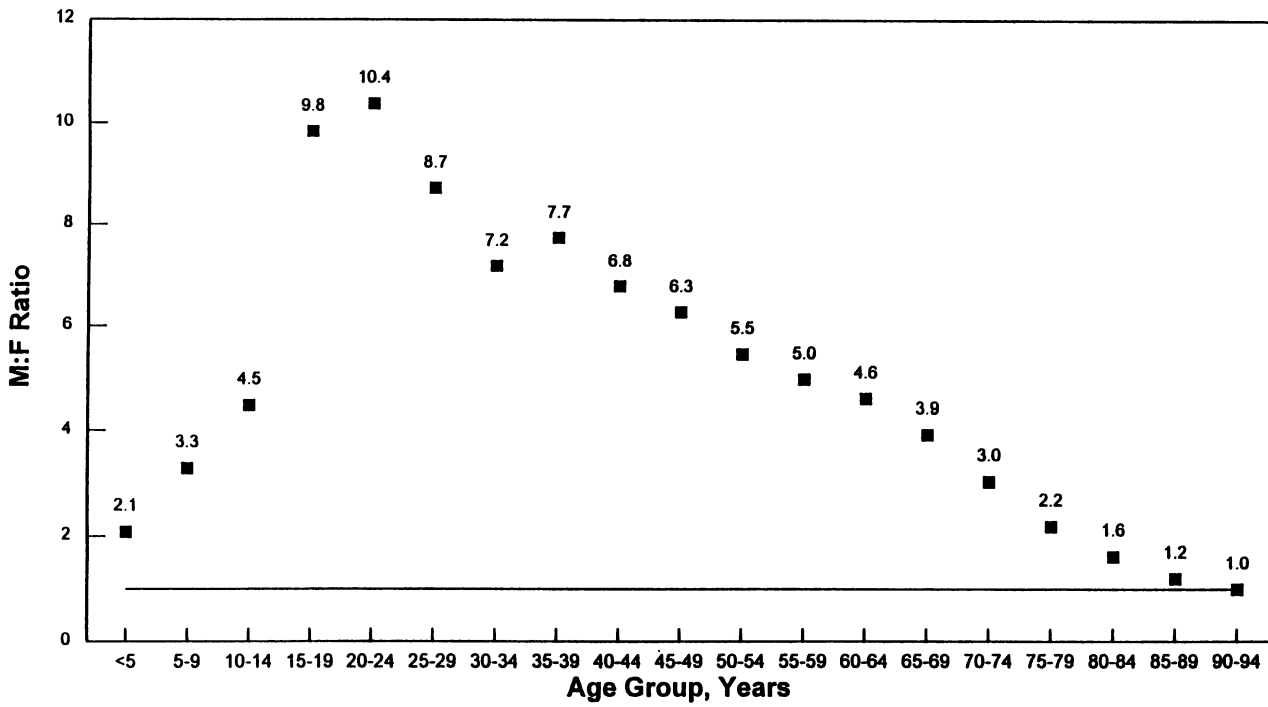

Note. No. female drowning victims = 9619; no. male victims = 49 640.
Source. Derived from National Center for Health Statistics Vital Statistics mortality data, 1979–1988.

FIGURE 1—Male to female drowning ratio, by age groups, 1979 through 1988.

TABLE 1—Men Compared with Women: Aquatic Exposure, Skills, Risk Taking, and Alcohol Use

Men Compared with Women	Relative Risk	95% Confidence Interval
Engaged in aquatic activity last year	1.47	1.25, 1.72
Engaged in high-exposure activity last year	1.54	1.38, 1.72
Know how to swim	1.24	1.20, 1.28
Had formal swimming lessons	0.84	0.78, 0.90
Self-rated swimming ability	1.07	0.99, 1.17
Self-rated swimming ability (those with lessons)	1.04	0.93, 1.17
Self-rated swimming ability (those without lessons)	1.23	1.10, 1.38
Can swim > 1/2 mile continuously	1.53	1.41, 1.66
Swam in natural body of water last time	1.21	1.06, 1.38
Swam alone last year	1.60	1.38, 1.86
Swam at night last year	1.10	0.99, 1.23
Drank alcohol when swimming alone	3.98	1.71, 9.22
Drank alcohol when swimming at night	1.21	0.97, 1.50
Drank when boating without life jacket	1.47	1.20, 1.80
Drank alcohol on last aquatic activity day	1.29	1.17, 1.42

high-exposure activity during the previous year, and (2) the estimated mean number of high-exposure activity days during this time.

Aquatic skills. Men and women were compared on (1) knowing how to swim, (2) having had formal swimming lessons, and (3) mean years of swimming lessons. They were also compared on self-rated swimming skills and their estimates of distances they could swim. Self-rated skills were also stratified by whether respondents had had swimming lessons.

Risk-taking behaviors. Men and women were compared on risk-taking behaviors, including where they last swam and whether, during the prior year, they swam alone or swam at night.

Alcohol use in aquatic settings. Men and women were compared on (1) aquatic alcohol use on their last aquatic activity day during the previous month; (2) amounts they reported drinking on this day; and whether, during the prior year, they (3) drank and swam alone; (4) drank and swam at night; or (5) drank when boating without a life jacket.

Statistical methods. Most analyses were stratified by age groups: 16 to 25 years and older than 25 years. Comparisons were reported as relative risks (RRs) for categorical data; *t* tests were used for the continuous variable.

Results

Respondents' ages ranged from 16 to 94 years; 45% were men; 81% of respondents identified themselves as White (non-Hispanic), 9.4% as African American, 5.1% as Hispanic, and 2.5% as Asian.

Exposure to Aquatic Environments

Men were significantly more likely than women to report aquatic activity during the prior year (RR = 1.47) (Table 1) although most respondents of both sexes reported at least one such activity (92% vs 86%).

Compared with women, men reported significantly more aquatic activity days for the prior year for most activity categories (Table 2). There were also significantly more total annual aquatic activity days among men aged 16 to 25 years (61.4 days vs 51.5 days; $P = .02$) and among those who were older than 25 years (50.5 days vs 37.4 days; $P = .00$).

TABLE 2—Estimated Mean Number of Aquatic Event Days during Prior Year, by Activity and Sex

Activity	Men (n = 1309)	Women (n = 1733)	P
Fishing from boat	3.84	1.17	.00
Fishing (other)	4.61	1.57	.00
Waterskiing	1.28	0.55	.00
Powerboating	3.84	2.07	.00
Swimming	10.91	8.96	.00
Wading	4.13	4.75	.03
Scuba diving	0.42	0.07	.00
Snorkeling	0.62	0.24	.00
Sunbathing	5.91	6.74	.01
Sailing	0.83	0.53	.01
Rowboating	0.92	0.41	.00
Canoeing	0.81	0.49	.00
Kayaking	0.06	0.07	.73
Surfboarding	0.37	0.08	.00
Windsurfing	0.23	0.07	.01
Jet skiing	0.44	0.21	.04
Tubing	0.68	0.48	.04
Walking/jogging/biking	6.27	5.48	.01
Hiking/camping	2.87	1.84	.00
Picnicking	2.97	3.31	.84
Ice skating	0.39	0.23	.04
Ice fishing	0.44	0.06	.00
Total	55.5	42.3	.00

Types of Aquatic Activity

Men were more likely than women to report at least one activity with potential for submersion (high exposure) during the prior year (82% vs 68%; RR = 1.54) (Table 1); and they reported a greater mean number of high-exposure aquatic activity days in both the younger age group (32 days vs 23 days; $P = .00$) and the older age group (23.7 days vs 13.9 days; $P = .00$). For activities involving boats, fishing, scuba, or surfboarding, the ratio of male to female activity days was more than 2:1 (Table 2).

Training and Skills

Ninety-three percent of men and 74% of women said they knew how to swim (RR = 1.24); however, 53% of male swimmers and 62% of female swimmers said they had taken formal swimming lessons (RR = 0.84) (Table 1). Moreover, of those who had taken swimming lessons, men took lessons for less time than women (2.9 years vs 3.3 years).

On a 5-point scale of self-rated swimming ability, men and women swimmers were about equal in identifying themselves as "excellent" or "very good" swimmers (31% vs 28%; RR = 1.07) (Table 1). When stratified by swimming lessons, men and women who had had lessons were not significantly different in rating themselves as "excellent" or "very good" swimmers (37% vs 35%; RR = 1.04) (Table 1). But among those who had not had lessons, men were significantly more likely than women to rate themselves as "excellent" or "very good" swimmers (24% vs 16%; RR = 1.23) (Table 1).

Among swimmers, 22% of men and 9% of women said they could swim continuously for half a mile or more (RR = 1.53) (Table 1).

Risk-Taking Behaviors

Of those who swam during the previous year (n = 2171), men were significantly more likely than women to report swimming in natural bodies of water as opposed to pools (49% vs 40%; RR = 1.21). Men were also significantly more likely to report swimming alone (31% vs 19%; RR = 1.60) and were more likely to report swimming at night (39% vs 35%; RR = 1.10) (Table 1).

TABLE 3—Mean Number of Drinks on Last Aquatic Activity Day among Those Who Had at Least One Drink (n = 521), by Age Group and Sex

Age Group	No.	Mean No. Drinks on Last Day (SD)	
		Men	Women
16–20 y	26	8.2 (5.9)	4.5 (3.4)
21–25 y	65	5.5 (3.8)	4.0 (2.9)
26–30 y	80	6.1 (6.7)	2.9 (1.9)
31–35 y	90	4.9 (4.5)	2.5 (1.7)
36–40 y	62	4.0 (4.3)	3.3 (3.9)
41–45 y	54	3.8 (2.3)	3.0 (3.0)
46–50 y	35	3.6 (2.6)	1.8 (0.9)
51–55 y	23	2.7 (1.4)	1.9 (0.6)
56–60 y	24	2.0 (0.9)	2.9 (1.7)
61–65 y	25	2.6 (2.1)	1.9 (0.8)
65+ y	37	2.3 (1.1)	1.3 (0.5)

Alcohol Use in Aquatic Settings

Thirty-three percent of men and 23% of women said they drank on their last aquatic activity day during the previous month (RR = 1.29) (Table 1). In reference to drinking that day, men reported drinking greater amounts than women; among the 16- to 25-year-olds, men reported an average of more than eight drinks compared with more than four drinks for women. The average number of drinks decreased for older men, but men consistently drank more than women, regardless of age (Table 3).

Men were significantly more likely to report drinking alcohol when swimming alone (15% vs 4%; RR = 3.98) and were more likely to say they drank when swimming at night (38% vs 32%; RR = 1.21). Of those who boated without a life jacket (n = 884), men were significantly more likely to report drinking at the time (44% vs 30%; RR = 1.47) (Table 1).

We found associations between drinking and several other aquatic risk-

taking behaviors, but for men only. Among men who swam on their last aquatic activity day, those who also drank on that day were significantly less likely than those who did not to swim where or when a lifeguard was on duty (26% vs 37%; RR = 0.60; 95% confidence interval [CI] = 0.48, 0.98). Among women, this difference was 20% vs 27% (RR = 0.76; 95% CI = 0.53, 1.08). Among men who went powerboating on their last aquatic activity day, those who drank that day were significantly less likely than those who did not to wear life jackets (9% vs 30%; RR = 0.36; 95% CI = 0.14, 0.92). Among women, there was virtually no difference in life jacket use by drinking (30% vs 30%; RR = 1.00; 95% CI = 0.48, 2.16).

Discussion

In 1990, there were 4685 US drowning deaths; 3854 were men and 831 were women.[1] We have explored several hypotheses for explaining the sex differences in drowning rates. Our results point to a combination of factors. Men have more opportunities to drown in that they have greater exposure to aquatic environments and, specifically, to high-exposure activities where submersion is possible. Young men are more apt than young women to take risks in aquatic settings. Men probably overestimate their swimming ability, thus possibly placing themselves in riskier aquatic situations than women. The differences in self-rated swimming ability between men and women who had not had lessons is intriguing and suggests that swimming lessons may initially serve to teach men that they do not know how to swim. Finally, men drink more alcohol than women on or near the water. The use of alcohol on the water is risky for a number of reasons[5] and may be particularly risky for men who are overconfident about their aquatic skills. Our finding that drinking is associated with aquatic risk taking for men but not for women could reflect either a difference in the amounts consumed, an interaction between alcohol and overconfidence, or both.

Men are more likely to be injured across a range of injury categories and age groups. The behavioral differences we identified no doubt reflect more fundamental factors distinguishing the sexes. Males and females are socialized differently with respect to risk taking. Evans[6] has suggested that testosterone may contribute to the relatively high vehicular crash rates among young men. Testosterone may similarly contribute to the peak male drowning rates during the late teen and early adult years. Yet preadolescent males also have higher injury rates than young females for many injury categories.[1]

We acknowledge the limitations of studies that rely on self-reported data; moreover, we have examined behaviors only among living respondents. Without comparisons to fatalities, we cannot know whether the behaviors observed are important risks for drowning. Nevertheless, relatively little is known about risks for drowning. By exploring behavioral differences by sex, we have been able to develop hypotheses for future case–control studies on the causes of drowning. □

Acknowledgments

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