

The epidemiology of murder and suicide involving scuba diving

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ABSTRACT

Murder and suicide in involving scuba are extremely rare. A systematic search identified 19 published studies describing 4,339 recreational diving fatalities occurring between 1956 and 2011. Case vignettes identified three possible murders and eight likely suicides. These are summarised and the victims' demography described. Prevalences of 69 murders per 10⁵ diving fatalities and 184 suicides per 10⁵ diving fatalities are lower than found among all cause mortality in the USA and Australia.

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Key words: murder, suicide, mortality, scuba diving

INTRODUCTION

The most common type of diving fatality analysis is the case-series whereby a defined series of diving fatalities are briefly described, for example a series from a particular geographic location over a specified time period. Such analyses aim to identify potential risk factors particular to that geographic location, or new factors emerging during that time period, that may be addressed in some practical measure to improve diving safety [1].

It is unknown how the rates of murder and suicide underwater compare with those found in the wider population, nor if there are similarities between murders and/or suicides that might suggest potential avenues for improved prevention. In Australia between 2000 and 2009 the standardised death rate from suicide among all persons in the Australian population averaged 16.8 deaths per 10⁵ living males and 4.5 deaths per 10⁵ living females [2]. In the USA in 2009 the age-adjusted suicide rate per 10⁵ living persons was 19.2 for males and 4.9 for females [3]. In 2010 in Australia murder victims were recorded at rates of 1.2 per 10⁵ living males and 0.8 per 10⁵ living females [4]. Males were also more likely than females to commit murder, at

the rate of 2.3 offenders per 10⁵ males in 2006–2007 compared with 0.5 offenders per 10⁵ females [5].

Among all cause mortality between 2000 and 2010 in Australia, (not including 2009), 3,175/1,345,068 deaths (236 per 10⁵) were murder or manslaughter [4, 6]. In the USA there were 15,200 murders and manslaughters registered in 2009, out of 2,437,163 all-cause deaths (623 per 10⁵) [7, 8]. In Australia between 2001 and 2010 the proportion of all deaths at age ≥ 15 years attributed to suicide was 2.5% male deaths (2,500 per 10⁵), 0.8% female deaths (800 per 10⁵), and 1.7% (1,700 per 10⁵) deaths overall [2]. In 2009 in the USA 7,820/2,437,163 (321 per 10⁵) female deaths were due to suicide, and 29,089/2,437,163 (1,194 per 10⁵) male deaths [3, 9]. The aims of this study were to identify published diving fatality case vignettes for potential murders and suicides involving scuba diving, and to review the circumstances surrounding each.

MATERIALS AND METHODS

An electronic search was made of articles indexed by Allied and Complementary Medicine (AMED), Ovid Journals, CAB Abstracts, EMBASE, ERIC, Index to foreign legal period-

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icals (IFLP), Medline, and PsychInfo using the search terms “(div\$ or scuba) and (fatal\$ or risk or injur\$)”, and Google Scholar using the search terms “scuba AND (fatalities OR deaths)”. The Rubicon Foundation archive was also searched [10]. All identified publications were assessed for relevance and either rejected, downloaded from electronic archives, or acquired in hardcopy from libraries. Each publication’s reference list was then examined for additional potentially relevant publications, and those identified were then also similarly obtained. Where possible the authors of studies including cases of suspected murder or suicide were contacted for additional information. Based on the level of evidence, cases were classified as confirmed or suspected. Suicide cases were considered confirmed if a suicide note was found and authenticated (accepted as such by investigators) or if there was evidence of self-inflicted mortal injury or an intentional act leading to death. Other reported suicides were considered suspected if there was a history of previous attempts, known terminal illness, out of character behaviour, or otherwise unexplained strange mechanism of underwater death. Possible murder cases were classified confirmed based on court ruling. Cases reported in literature as suspected murder but without evidence established in a legal process were classified as suspected. The study protocol was approved by the University of Western Australia Human Research Ethics Committee and by the Institutional Review Board of Duke University, North Carolina.

RESULTS

Published reports or report series’ ($n = 19$) describing 4,339 recreational diving fatalities occurring between 1956 and 2011 were obtained [11–96]. Reports containing descriptive vignettes were searched by hand for the terms “Murder” or “Suicide”. The geographic location and period covered by each publication is presented in Table 1. The median length of time any individual report or series of reports covered was 11 years (range 1 to 33) and the median number of fatalities was 30 (range 7 to 2,139).

Of 4,339 diving fatalities 3 (69 per 10^5 fatalities) were thought potentially associated with murder and 8 (184 per 10^5 fatalities) were thought potentially associated with suicide. Table 2 presents demographic information regarding these 11 cases.

A brief description of each case now follows.

SUICIDES

Case S-1. Basic-trained diver with blood-alcohol level of 0.114% became lost in a deep cave, ran low on gas while his decompression obligation exceeded 90-min and was found with a knife wound to his chest consistent with attempted suicide. Cause of death was drowning.

Table 1. Recreational diving fatality reviews containing vignettes

Country or region	Period	Number
Australia [57]	1956–1966	25
Australia [12, 25–31, 69, 73, 74, 78]	1972–2004	357
British Columbia [71]	1959–1977	28
Germany [72]	2001–2006	7
New Zealand [63]	1961–1973	21
New Zealand [70]	1980–1994	123
New Zealand [96]	2000	7*
New Zealand [24]	2000–2006	40
Okinawa [60]	1989–1995	9 ^a
Okinawa [48]	1982–2007	40
Ontario [54–56, 79–95]	2004–2006	13
South-Australia [58]	2001–2002	9 ^a
Sweden [49]	1960–1976	30
UK [13–23, 75–77]	1998–2008	180
USA [53]	1965	86 ^a
USA [51, 52]	1970–1990	103 ^a
USA [64–68]	1970–1990	2,139
USA [11, 32–34, 36–47]	1991–2006	1,336
Western Australia [61]	1992–2005	24*
Total	1956–2011	4,339

*Included in another study and so not counted twice in the total number of fatalities

Case S-2. Possibly uncertified diver made a shore entry without a buddy and was not seen alive again. A suicide note was found among his belongings.

Case S-3. An experienced diver, visibly ill with a known terminal illness, “bounced” down to 175 fsw on air for 7 min followed by ascending very rapidly to the surface where he was incapacitated. He was declared dead at a local medical facility. Cause of death was listed as air embolism due to rapid ascent and scuba diving.

Case S-4. Experienced diver, a passenger in a car driven by a drunk driver who died, followed by a girlfriend who became pregnant to another and then spurned an offer of marriage in favour of abortion. He left a suicide note confirming his intentions.

Case S-5. Experienced diver, receiving medication for depression, previous unsuccessful suicide attempts, on this occasion the victim took greater care in his preparation, chaining his neck to a concrete mooring and leaving a suicide note with the keys in his car. Cause of death was drowning.

Table 2. Characteristics of underwater suicides and murders

Case	Year	Location	Age	Sex	Method	Reason
S-1*	2002	Croatia	31	M	Knife to chest	Lost in cave
S-2*	2002	-	26	M	Undetermined	-
S-3**	1998	-	52	M	Rapid ascent, embolism	Terminal illness
S-4*	1994	Australia	23	M	-	Depression
S-5*	1993	Australia	35	M	Chained neck to concrete block	Depression
S-6**	1990	New Zealand	33	F	Disappeared in 90 m	Psychotic history?
S-7**	1982	California	26	M	Disappeared	Suicidal
S-8*	1979	Florida	18	M	Gunshot	Mentally disturbed
M-9**	2008	Florida	51	F	Strangled	Unknown
M-10*	2003	Australia	26	F	Asphyxiation	Insurance?
M-11*	1999	Br. Virgin Is.	46	F	Drowning	Insurance?

*Confirmed; **Suspected; M – male; F – female

Case S-6. Experienced diver, possible psychotic history, separated from buddy in 60 m deep water.

Case S-7. Disappeared in 100-feet of water on the third dive of the day. The victim had a history of drug and alcohol abuse. Friends report that he had contemplated suicide for a number of weeks.

Case S-8. Lone diver from a rented and skippered boat, apparently shot himself in the head underwater with a handgun.

MURDERS

Case M-9. The diver and her boyfriend dived a reef from a charter boat. The victim was found on the surface bearing marks consistent with strangulation. Murder was suspected but no charges have yet been laid.

Case M-10. Inexperienced diver diving from a busy charter boat to a wreck in 27 m depth in a current. Husband allegedly held the victim's arms to deny her gas, cause of death asphyxiation, husband pleaded guilty to manslaughter, then pleaded not guilty in a second trial in another country.

Case M-11. Alleged violent struggle with husband while diving a shipwreck, husband found responsible by a civil jury, then found guilty of murder.

DISCUSSION

In 2010, among all Australian deaths, murder victims were recorded at rates of 236 per 10⁵, in 2009 in the USA 623 per 10⁵ deaths were due to murder or manslaughter, and yet in this sample there were no male victims and 69 murders per 10⁵ deaths overall, all females [4, 7, 8]. As in the wider population, males were more likely than females to commit murder, with three male and no female offenders identified [5]. How the prevalence of offenders among

living divers compares with the general population cannot be determined in his study due to the unknown size of the diving population. Among diving murders the obvious common theme involved the male partner in a relationship denying the female access to life-sustaining gas. Why this could be so may be a consequence of the assumption that murders involving scuba should be difficult to prove in court. In this small sample at least, that assumption would appear false although more murders involving scuba may have occurred and remain unreported.

While the true number of suicides that occur underwater remains discrete, as does the size of the diving population from which they are drawn, among these 4,339 diving fatalities identified by the literature search there was found a prevalence of 184 per 10⁵ diving fatalities potentially associated with suicide. This compares with 2,500 per 10⁵ male deaths and 800 per 10⁵ female deaths by suicide out of all cause mortality in the Australian population and 1,194 per 10⁵ male deaths, 321 per 10⁵ female deaths to suicide in the USA [2, 3, 9]. It is unlikely that non-divers would select scuba as a method for suicide, and not all divers who commit suicide would choose scuba as the method. Therefore, unless suicide were more common among divers than in the wider population, it should be no surprise that the proportion of suicides identified among diving fatalities is far less than the proportion of suicides found among non-diving fatalities. Due to the number of divers remaining discrete it is unknown how the suicide rate among living divers compared with that among the general population nor, indeed, how all-cause mortality among scuba divers compares with the general population.

In this study two suicides and one murder each occurred in American and Australian waters and so American and

Australian figures were quoted. Undoubtedly, both murder and suicide rates vary greatly worldwide. In addition, in this study the mere suspicion of murder formed the basis for inclusion whereas the Register of Births, Deaths, and Marriages includes only causes of death verified by each state's Coroner. Nevertheless, in two of the three cases in this study the offender was found guilty of murder or manslaughter.

Among the suicides 5/8 (62%) involved some premeditation and preparation. All-but-one were males, and the majority (n = 5, 62%) suffered depression or mental illness. A review of the crucial elements of suicide prevention noted that the 3 most significant population-attributable risks were [97]:

- admitted or recently discharged, psychiatric ward;
- alcohol abuse;
- recent suicide attempts.

Among suicide prevention interventions the most effective strategy is to restrict access to methods of suicide. Of the 8 suicides identified in this study 2 occurred whilst diving from commercial vessels though it is doubtful that pre-screening divers boarding charter boats might identify those most at risk. Pre-screening is likely to remain most effective during routine dive medicals.

CONCLUSIONS

Both murders and suicides appear significantly less common among diving fatalities than among the all cause mortality of the wider population. Suicide involving scuba appears to be so rare that effective screening is unlikely in any setting other than during medical assessment.

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