

THE AGING DIVER: DO THE OLDER BECOME BOLDER?

LCdr Robert J Biersner, MSc, USN, Naval Submarine Medical Research Laboratory
Lt Mark L Dembert, MC, USNR, USS Grayback (SS-574)
ENS Mark D Browning, MC, USNR, National Naval Medical Center

"Research shows that young divers don't necessarily become old divers, and that the two groups do different types of diving."

Background

Not much is known about the medical, psychological, and performance effects of aging among US Navy divers. The possibility has been raised that several medical consequences of diving, especially decompression sickness and osteonecrosis, may be complications of the aging process.^{1,2} Both decompression sickness and osteonecrosis have been found to occur more frequently among older divers than among younger divers.^{1,2} The possibility exists however, that older divers may develop these adverse medical effects because they may make deeper, longer dives than younger divers. Such dives are known to result in a higher incidence of decompression sickness,^{1,3} which in turn may lead to other medical complications such as osteonecrosis.² The only available data on this topic show a slight relationship between age and deeper, longer diving; but this relationship is not statistically significant.³

Approach

To obtain more detailed information on the effects of ageing, data were collected on a group of 52 divers (both Divers First and Second Class) who were stationed in the New London, Connecticut area. They were asked to complete questionnaires about pre-service history (size of hometown, delinquency problems, age of enlistment, etc), service and diving history (awards and recognition for diving performance, serving as an experimental subject or testing diving equipment, years of diving experience, number of diving accidents, disciplinary actions, etc), General Classification Test (GCT) scores, age, marital status, and the Cornell Medical Index (CMI). The CMI is a list of 200 physical and psychological symptoms or problems, and the divers were asked to circle any symptoms that they had experienced in the past.

Diving performance was assessed using diving records maintained at the Naval Safety Center. Diving records covering the 5 year period from 1972 to 1976 were obtained, and the following information was extracted: Total number of dives, number of dives over 50 fsw, number of dives at surface temperatures of 40°F or less, and number of night dives. These four diving categories are measures of exceptional diving activity, either because these dives are physically or psychologically discomfoting, or because these conditions are associated with frequent diving accidents.^{1,3} The total number of dives in each of these four categories was then divided by the number of years each diver had been active in diving during this 5 year period. This correction provided a common basis for comparison. In addition the medical records of each diver were reviewed and the number of sick calls made for each year of diving experience over this 5 year period was documented. Care was taken to avoid counting repeated visits for the same disease or injury. Treatments for decompression sickness and routine physical examinations were also excluded from this tally.

The 52 divers were divided into three groups of nearly equal size according to age. To avoid the ambiguous and mixed results that could be associated with the middle section, which consisted of 17 divers between the ages of 26 and 32 years old, the group was dropped from the analysis. Only the youngest and oldest groups were compared. The youngest group contained 18 divers who ranged in age from 19 to 25 years of age. The oldest group consisted of 17 divers who were between 33 and 40 years old.

Findings

The average scores in each of the major diving categories are shown in Table 1. A statistical analysis of these results showed that the younger divers made significantly more dives and had more accidents per year of diving than did the older divers.⁴ Commensurate with the higher frequency of diving accidents, the younger divers also tended to make more sick calls per year of diving than did the older divers. This difference in sick calls was not, however, statistically significant. Also, the difference between younger and older divers in the number of dives made over 50 fsw was nearly significant (with the younger group diving deeper).⁵ The older divers, however, made significantly more night dives per year than the younger group. Although the results in Table 1 seem to show that the younger divers made more dives at cold surface temperatures than the older divers, the variability within each group for this type of diving made this difference insignificant. (Within the younger group, the number of dives at cold temperatures ranged from 0 to 42.5 per year, while for the older group this range was from 0 to 7.3.)

Although the finding that older divers have more years of diving experience than the younger group is not surprising, the difference in the years of service they had before they became divers was unexpected. This finding seems to argue that divers in the older age group wait a number of years after joining the Navy before qualifying in diving, while younger divers became diving qualified during the first enlistment. Older divers, however, remain qualified longer while younger divers appear to attrite from diving much earlier. This interpretation is supported by the small percentage of the older group who became divers during first enlistment (approximately 12%) compared to the younger group (100%), as well as the difference in total years of diving experience between the two groups.

In addition to the aforementioned findings, further comparisons showed that the two groups did not differ significantly from each other in verbal intelligence (GCT scores), self-reported medical problems (CMI scores), pre-Navy delinquency problems (truancies, high school disenrollment, traffic violations, and arrests for non-traffic crimes), Navy disciplinary actions (masts, reduction in rate, failure to obtain good conduct awards, and disenrollment from Navy schools), and special diving recognitions (awards for diving and participating as an experimental subject or testing diving equipment). These last two measures - Navy disciplinary actions and special diving recognition - were adjusted or divided by the total years of Naval service and total years of diving experience in order to make the comparisons more valid).

Implications

If the previous 5 years of diving experience for those divers who were stationed last year in the New London area can be taken as representative of US Navy divers as a whole, then some important implications for US Navy diving can be deduced from these findings. Contrary to previous assumptions, older divers do not make

more hazardous or arduous dives than younger divers. Younger divers do substantially more diving than older divers, and also do more diving to deeper depths. The only exception is night diving, which is more frequent for older divers compared to the younger group. The rationale for this exception is unknown. Perhaps diving supervisors believe that older divers will remain better oriented during night dives than younger divers. Or, perhaps the type of tasks to be performed at night (such as emergency search and rescue) are assigned to the older group because they may have more experience with or knowledge about the equipment to be salvaged. Another reason might be that they may be more familiar with the local geography.

The more frequent diving accidents reported by the younger divers are probably related to a combination of the more frequent and deeper diving than they do, as well as to inexperience. Decompression sickness was rare among both these groups (two cases in each group). Thus, not much can be said directly about decompression sickness and the possible complications of decompression sickness (such as osteonecrosis) for these groups. Most of these self-reported accidents involved stings, bites, squeezes, and trauma (such as cuts, sprains, and bruises). These types of accidents are related largely to environmental conditions and to the tasks that are performed, thereby involving a combination of heightened exposure to danger (which may be largely unavoidable) and task familiarity (which may be improved through better training or experience).

This situation, in which younger divers appear to be diving more frequently under more dangerous conditions and experiencing more accidents than older divers, may account for the finding that few of these younger divers last long enough to become members of the older group. They appear to join the diving ranks earlier (perhaps on impulse), volunteer for or are assigned to the more difficult diving situations, and then attrite more quickly from diving than the older group. Waiting as they do until after the first enlistment to volunteer for training older divers appear to be more cautious about becoming divers and may be more career-motivated than younger divers. Once qualified, they seem to have adopted a slower, more conservative diving pace than younger divers (at least as they grew older). As a result, older divers are more durable and suffered fewer ill effects from diving than younger divers.

These results, however, do not say much about what the older divers were like as young divers. Did they, too make more dangerous dives? If so, they may have remained in diving because of some motivational or personality difference between them and their peers? If, on the other hand, they did not differ much psychologically from their peers, then perhaps they were simply lucky and did not experience many of the fatiguing or dangerous diving conditions that their peers did (or at least not as often). Perhaps the difference lies in some combination of luck and psychology. Until more information is forthcoming, these results seem to be described best by paraphrasing the old adage, "There are old divers and there are bold divers, but there aren't many old, bold divers." As stated earlier, the question remains unanswered about the extent to which the diving activity of these two groups is voluntary or the result of differential supervision. Perhaps younger divers are routinely sent to diving billets that involve making more numerous and hazardous dives. An answer to this question would provide a better understanding of the psychological dynamics of the two groups and of the accelerated attrition that is occurring among younger divers.

These findings also indicate that the higher incidence of decompression sickness; and osteonecrosis found among older divers does not appear to be

related to more frequent exposure to deeper, longer dives. The higher incidence of decompression sickness (and other medical complications associated with decompression sickness) found among older divers would appear, therefore, to be related to some biochemical or physiological effect of the aging process. This interpretation should, however, be validated on a much larger group of older divers who have had more decompression sickness.

Acknowledgements

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References

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- 2 WH Hunter Jr, RJ Biersner, RI Sphar and CA Harvey. *Aseptic Bone Necrosis Among US Navy Divers: Survey of 934 Non-Randomly Selected Personnel*. Undersea Biomedical Research, in press.
3. TE Berghage, PA Rohrbaugh, AJ Bachrach and FW Armstrong. *Navy Diving: who's doing it and under what conditions*. Naval Medical Research Institute Reports, December 1975.
4. For those who are interested, significance was determined using t-tests for independent samples. A significant "t" is equal to at least 2.040 (at 33 degrees of freedom). "Significant" means that the probability that these differences occurred by chance is equal to or less than 5 in 100 (two-tailed test).
5. "T" was equal to 1,950; chance was therefore between 5 and 10 in 100.

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An unusual frostbite victim

Susie Wong has had rather too much of the English winter it seems, and is now on her way to Hong King despite a series of misadventures sufficient to deter the most independent of travellers. In the first place Susie, a 4 metre killer whale, had to leave her Clackton Wildlife Park pool on New Year's day when heavy seas and gales threatened to crack it and release her into the cold North Sea. She was packed into a giant metal cage (she weighs 2.5 tonnes!) swathed in wet blankets and had her head rubbed with a special grease to keep it moist during the journey to the airport. However the freezing temperatures dried the grease and she began to suffer, so the attendants stopped the truck and hosed her down till she recovered. Then they discovered that the truck's diesel fuel had frozen. In the end they reached the airport three hours too late for the plane. It is reported that she suffered no permanent damage from the frostbite and is getting over the experience. The public rarely gives a thought to the tribulations of their entertainers. But that' Sho Business!

TABLE 1
Diving Experience, Pre Service and Service History,
and Medical Information on Young and Old Divers

Diving Experience	Young Divers Av. Variability ^c	Old Divers Av. Variability	t ^a	Level of Significance ^b		
Yrs of Naval Service Before Qualifying as a Diver	2.17	1.69	7.88	3.59	6.088	Over 1 in 1000 (highly significant)
Yrs of Diving Experience	2.22	0.65	9.65	3.57	8.682	Over 1 in 1000 (highly significant)
Total No. of Dives/Yrd	38.13	19.19	22.51	15.77	2.622	Over 2 in 100 (moderately significant)
Dives/Yr at 40°F or less	5.94	10.55	1.63	1.93	1.659	Between 10 and 20 in 100 (not significant)
Night Dives/Yr	0.33	0.49	2.12	3.14	2.383	Over 5 in 100 (significant)
Dives/Yr below 50fsw	8.09	5.60	5.15	2.78	1.950	Between 5 and 10 in 100 (not signif.)
Diving Accidents/ Yr (self-report)	0.45	0.33	0.13	0.09	3.969	Over 1 in 1000 (highly significant)
Special Diving Recognitions/Yr	0.14	0.22	0.23	0.18	1.244	Between 20 and 40 in 100 (not significant)
<i>Pre-Service and Service History</i>						
Pre-Service Delinquency Problems	2.06	1.35	2.53	1.28	1.064	Between 20 and 40 in 100 (not significant)
<i>In-Service Disciplinary Actions</i>						
/Yr Service	0.08	0.15	0.10	0.15	0.566	
GCT scores	58.59	7.72	55.33	8.40	1.142	Between 20 and 40 in 100 (not significant)
<i>Medical Information</i>						
CMI scores	15.00	23.11	14.59	10.04	0.068	Near 50 in 100 (not significant)
Sick Calls/Yrs	2.29	2.26	1.54	0.96	1.266	Between 20 and 40 in 100 (not signif.)

a See footnote 4.

b See footnote 4.

c Variability is used to designate the spread of scores (standard deviation) around the average score; the lower the variability, the better (or more reliable) are the scores.

d "Yr" indicates per years of diving experience

PROJECT STICKYBEAK

Further reports are always welcome and will always remain CONFIDENTIAL as to source and victim. Cases are welcome whether serious or minor. Of the greatest interest are reports of instances where an Emergency Situation either occurred or seemed likely to occur. Comments and additional advice concerning cases in this or previous Provisional Reports are welcome.

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THOR HEYERDAHL, the Norwegian scientist and explorer who crossed two oceans in primitive craft says that insecticides and detergents are debilitating the seas. Heyerdahl was the main speaker at a weekend program in honour of the visit of King Olav V of Norway to Minneapolis, USA. He said future generations could be threatened with a shortage of fish and eventually oxygen when chemicals destroy vital ocean plant life.

(Australian: 13 October 1975)