
Keeping Your Cool, Part II

Personality and panic in recreational scuba diving

One manifestation of panic in many divers will be a change in breathing response that can lead to unconsciousness. While many divers experience no warning before passing out, hyperventilation and labored breathing are common before unconsciousness.

Some researchers believe that hypoventilation (i.e., underbreathing), not hyperventilation (overbreathing), is a more likely cause of unconsciousness. In fact, hyperventilation might actually produce hypoventilation and subsequent CO₂ buildup. Anxiety can cause or be a response to CO₂ buildup. Individuals may fail to recognize buildup and fall unconscious.

People classified as either “hypoventilators” or “hyperventilators” are especially susceptible to breathing problems and unconsciousness while diving.

Panic

Instructors should discourage students who manifest panic during instruction from continuing training until the panic behavior is treated and managed. However, this still would not detect those with subtle problems. Nor would it identify those who might panic when confronted with significant stressors after training. Surely, real diving stressors exceed those that can be ethically justified in a beginning scuba class.

Furthermore, some trained divers who panic for the first time under stressful circumstances do so late in their diving career. A rapid ascent without exhaling is one example of panic. While a poorly trained or careless diver

may make such an ascent, so may an experienced diver due to heavy work of breathing, distraction on ascent, or panic. Even U.S. Navy divers with comprehensive training and many years of experience have, in error, performed rapid ascents leading to embolisms.

Psychology of Panic

My associates and I surveyed 245 experienced recreational divers to establish their psychological characteristics and diving behavior and to quantify the frequency of panic behavior. Our sample included:

- 72 females (29%) and 173 males (71%).
- Both groups averaged 34 years of age.
- Males had been diving for an average of 7 years vs. 5 years for the females.
- The average maximum depth on a single dive by the females was 112 feet and 118 feet for men.
- The males reported an average of 546 psi remaining following a dive, while the females reported 691 PSI.
- The lowest post-dive PSI for men was 171 PSI, compared to 258 for females.

A majority of these divers — 54 percent (133) — reported one or more panic episodes. The proportion of females (64%) experiencing panic was significantly higher than the proportion of males (50%).

However, the percentage of males (48%) who perceived the

panic episodes as life-threatening was higher than the percentage reported by the female divers (35%).

Female and male divers did not differ on personality tests measuring anxiety, which is important since anxiety is associated with diver panic. In addition, both groups were above the population average on the measure of vigor, and below the norms for depression, anger, confusion and fatigue. Both male and female divers possessed the stereotypical “iceberg” profile found in other sport groups. Some participants did score high when tested on their tendency toward anxious reactions. Whether they would be more likely to panic if confronted with a stressor would be governed largely by their subsequent behavior.

Studies do not support the notion that scuba diving, itself, is stressful and characterized by high anxiety. For example, students enrolled in a beginning scuba class actually score below the norms on tests designed to measure anxious temperament (trait anxiety) of the tendency for an anxious response (state anxiety). It’s the response to stressors that matters.

External stressors might occur when a diver:

- is suddenly entrapped in a kelp bed or fishing net;
- experiences a sudden loss of vision in a cave or shipwreck as a consequence of silt being disturbed;
- is confronted by a shark;
- cannot breathe due to a malfunctioning regulator;
- has his regulator removed by another diver who suddenly panics.

An internal stressor, not as readily apparent, might be where a diver:

- experiences vertigo;
- suddenly begins to hyperventilate;
- experiences blurred vision;
- develops a sensation of suffocation;
- has a case of frank panic for no apparent reason.

One's perception of these events is mediated by his or her understanding and appraisal, which is influenced in part by past experience and training. Whether he or she might panic is predictable based on results of a questionnaire developed by Charles D. Spielberger, the State-Trait Anxiety Inventory.

Anxiety, Stress and Performance

Individuals with high proneness toward anxiety will be more likely to experience greater anxiety than individuals with low proneness. At the same time, a stressor perceived as threatening to one individual and results in anxiety or panic, may be perceived as exhilarating or pleasurable to another person. Because perception governs response, "knowing" what to do is not enough.

However, there is evidence suggesting that divers who score low on measures of anxiety have better performance scores on buddy breathing, bail-out exercises, and open water tests than divers who score high on anxiety tests. However, researcher Tom Griffiths found that the exercises typically employed in beginning courses are not sufficiently stressful to provoke increases in anxiety. He says this is "potentially dangerous" in that instructors may not have an opportunity to evaluate whether

students can deal with stressful diving conditions.

In another study, Griffiths concludes that "respiration rate is a highly effective measure of underwater stress in beginning scuba divers." And in another study he reports that increased experience resulted in lower respiration rates. Furthermore, other factors being the same (e.g., body surface area, lean mass), one would expect an anxious diver to use more air than a relaxed diver, and independent of anxiety level, one would expect a skilled diver

Given the extreme environment for scuba diving, it is clear why panic may occur.

to use less air than an inexperienced diver.

Yet in my research, I discovered a paradoxical result when I measured anxiety and then put divers to work on bicycles underwater: the higher the divers' anxiety proneness, the lower the respiration rate (though they used more air per breath). Is it possible that experienced divers who are characterized by high anxiety, may consciously or unconsciously slow their breathing rate as a coping strategy? Respiration rate could prove to be an important variable in evaluating stress responses in divers, however the findings are not consistent.

Psychological Interventions

Individuals can be trained to use various psychological procedures to cope with stress and it would be useful to explore whether

this works when facing unexpected stressors underwater. It would seem, for example, that an individual trained in some form of relaxation response could arrest anxiety-provoking responses such as hyperventilation or tachycardia and regain control of his or her response to a given stressor.

Underwater, we know that performance on various psychomotor and cognitive tasks is impaired when compared with execution of the same task on the surface. These differences are dependent on many interrelated factors such as the retention of CO₂ and nitrogen narcosis. Water temperature and type of protective clothing worn influence performance as well as anxiety responses.

Given the extreme environment for scuba diving, it is clear why panic may occur. It's easy to understand why a diver suddenly exposed to an unanticipated stressor (e.g., loss of visibility, entrapment, dyspnea, loss of air supply, vertigo, physical injury, and so on) may panic. Furthermore, panic can be fueled by heavy work and respiratory activity.

It should be possible to teach divers to monitor perceived exertion to avoid overwork, which in turn could minimize the likelihood of hyperventilation. That will be the topic of Part III.

Dr. William P. Morgan's work was funded by the University of Wisconsin Sea Grant Institute and federal and state grants. We thank the Journal of Sports Medicine for permission to excerpt. A full reprint, with footnotes, may be ordered from Dr. William P. Morgan, Sport Psychology Laboratory, Department of Kinesiology, University of Wisconsin-Madison, 2000 Observatory Drive, Madison, WI 53706 (608-262-7737, fax 608-262-1656, e-mail sportpsy@macc.wisc.edu).