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Underwater disorientation as induced by two helicopter ditching devices

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Abstract

Background: Spatial orientation is based on the integration of concordant and redundant information from the visual, vestibular, and somatosensory systems. When a person is submerged underwater, somatosensory cues are reduced, and vestibular cues are ambiguous with respect to upright or inverted position. Visual cues may be lost as a result of reduced ambient light. Underwater disorientation has been cited as one of the major factors that could inhibit emergency egress after a helicopter ditching into water. One countermeasure to familiarize aircrew with underwater disorientation is emergency egress training. This study examined the relative degree of underwater disorientation induced by the Modular Egress Training Simulator (METS) and the Shallow Water Egress Trainer (SWET).

Methods: There were 36 healthy subjects (28 males and 8 females) who participated in the study. Underwater disorientation was quantified by measuring the deviation of subjective vertical-pointing from the gravitational vertical, time to egress, and subjective reports of disorientation and ease of egress. A repeated measure design was employed with seat position (SWET chair, METS window, and METS aisle) as the sole factor.

Results: Subjective response data indicated that the degree of disorientation is rated significantly higher, and the ease of egress is rated worse from the two METS seat positions than from the SWET. This is supported by the findings that subjective vertical-pointing accuracy is worse in the METS seat positions than in the SWET ($p < 0.01$). The time to egress is longer from the two METS seat positions than from SWET ($p < 0.01$).

Conclusion: Our results indicate that the METS device is effective for inducing underwater disorientation as provoked by simulated helicopter ditching. disorientation, vestibular, subjective pointing.

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