

Upper Limb Movements in Experimental Falls among Older Adults

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Introduction. Recent data suggests arm bracing increases the risk of head injuries in long-term care residents. This contradicts the commonly held belief that upper limb movements (ULMs) are protective against fall-related head impact (HI) and injuries.

Methods. This study analyzes ULMs and head-to-ground impacts in video-recorded experimentally induced falls among older adults. Participants completed six experimental falls in the directions of backward, left, and right (two in each direction) with standardized lean-and-release paradigm. Falls were video recorded. Two independent researchers characterized ULMs and HI in video-recorded falls using a standardized video analysis tool.

Results. 166 falls from 29 participants (73.1 ± 5.8 years, 25 females, 4 males) were included in the final analysis. 35 falls exhibited no ULMs, of which 32 (91.4%) had HI with 27 (84.4%) being “severe”. The remaining 131 falls exhibited ULMs, of which 58 (44.3%) had HI with 30 (51.7%) being “severe”. When ULMs presented, forearm was the primary site of greatest energy absorption in falls (56/131 falls), among which 16.1% had HI. Notably, 46 falls had no apparent energy absorbed when ULMs presented, among which 71.7% had HI.

Conclusions. Results suggest older adults tend to present ULMs during falls. ULMs, particularly when significant energy is absorbed by the forearm, could reduce the likelihood and severity of head-to-ground impacts in experimental induced falls. This study displays potential benefits of ULMs to prevent fall-related head injuries. Environmental factors may affect ULMs in real-world falls, necessitating further study.