Human factors in avalanche avoidance and survival: consequences of violating the rules of safe travel

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Using hundreds of historical avalanche accident records from USA and Canada, we examined human factors – avalanche victims’ behavior prior to, during, and after an avalanche – which may contribute to the occurrence of avalanche accidents and serious adverse outcomes (e.g., injuries and deaths). Each avalanche accident was coded for the presence or absence of human factors influential in avalanche avoidance (e.g., more than one person on the slope, insufficient spacing, standing exposed, travel alone, familiarity with terrain) and survival (e.g., failure to carry beacons, probes, or shovels). In addition, we coded the number of descriptive parameters for each accident including participants (e.g., number of males and females), activity (e.g., skiing, snowmobiling), avalanche safety training level, and number of participants caught, injured, or killed. The results showed that a large proportion of accident victims violated some basic rules of safe travel in avalanche terrain, e.g., more than one person traveling across the slope simultaneously and insufficient spacing between participants. These violations were common in both commercially-led groups and self-guided recreational groups. A substantial number of victims also traveled alone, and therefore, rescuers were unavailable following burial by an avalanche. In sum, our results show that the number of avalanche accident injuries and death can be substantially reduced if avalanche safety training courses focus more attention on highlighting the importance of human factors in causing avalanche accident deaths and reducing survival.