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In Reply to Dr Schrimpf

To the Editor:

As noted by Dr. Schrimpf in his response¹ to our article,² our investigation of group size and avalanche risk did not adequately differentiate *group* risk from *individual* risk. We appreciate Dr. Schrimpf's input and support his remarks in this context. In our study, we found that the risk of an avalanche accident increases with group size (based on an analysis of accidents with at least 1 backcountry recreationist caught in the avalanche). However, we did not report the number of people per group who were caught or killed in these accidents and thus did not report individual risk. It is plausible that survival chances are higher for recreationists in large groups compared with small groups due to more resources for companion rescue.

Based on our dataset from the Swiss avalanche database (winter 2003–2004 to winter 2012–2013, 446 accidents), an individual's chance of survival increases with increasing group size: 76% for individuals travelling alone, 88% for those in groups of 2, 92% for those in groups of 3, 96% for those in groups of 4, 100% for those in groups of 5 (there were no fatalities in 5-person groups), and 97% for those in groups of 6 or more. If we combine these numbers with the findings from our study² and Dr. Schrimpf's comment,¹ we conclude that a group's risk of being involved in an avalanche accident is higher for larger groups than for smaller groups and increases approximately according to group size, while survival chances also increase with group size. Hence, the risk of an individual being involved, or dying, in an avalanche accident is independent of group size.

This has two main implications:

1. Larger groups cause relatively more accidents than smaller groups. According to Harvey et al.,³ we mentioned 5 different causes of increasing risk in large groups that are either related to snowpack properties or to communication and aspects of decision-making. Large groups should adopt strategies to reduce load on the snow cover (eg, spacing between single skiers or skiing steep slopes 1 by 1). They

should also be aware that they are particularly prone to group decision pitfalls and use strategies to reduce this risk, such as the group check tool SOCIAL.⁴

2. Backcountry users travelling by themselves or in small groups should be aware of lower survival chances (statistically) compared with larger groups and make decisions accordingly.

Finally, recreationists should not forget that severe avalanche accidents not only affect the individual(s) involved in an avalanche, but also the physical and mental health of fellow group members.

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