



CARE Panel Report 2024

Sharing is CARE-ing

Recreational backcountry riding (motorised and non-motorised) is a rapidly growing activity. This is wonderful, as it means that more and more people get to enjoy the wonders of mountains dressed in white. The growth in the industry further means new economic opportunities for mountain communities. However, more people out in the mountains also means that more are exposed to avalanche hazard.

90% of all fatal avalanches in the US and Europe was caused by someone in the victims' group

Almost all recreational avalanche accidents were caused by someone in the victims' group. This shows that people sometimes make disastrous decisions in avalanche terrain. It is easy to think that 'people are stupid', but making decisions, and especially learning how to make good decisions, in avalanche terrain is hard. The reason is that while riders get ample feedback on the quality of their *riding experiences*, they rarely receive feedback on the quality of their *decisions* because snow has a tendency to stay put, even when it could

equally well have slid. In addition, when nature does provide clear feedback in terms of an avalanche, few survive to learn from the experience. While learning is more challenging in avalanche terrain than in more benign learning environments, it does not mean that it is impossible. We just need to understand how to accomplish this.

The **CARE panel** consists of people, who engage in activities in terrain where avalanches may be a concern, and who are willing to share their thoughts and experiences, thereby helping others.

To do this, we need to study *how* people make decisions and *why* mistakes occur. The CARE panel project was launched in late autumn 2020 by the Center for Avalanche Research and Education (CARE) at UiT - the Arctic university of Norway, with the Swedish EPA as a collaboration partner. The project follows a large sample of people, with different skills and experiences, for a prolonged time period. Following the same people over time is important both because learning takes time, and because it is only if we do this that we can understand how people learn to make good decisions, why they sometimes make mistakes, and how their experiences affect them. In addition, we need to know what the

person knew before a certain experience (e.g., a course) and what new knowledge they acquired as a consequence of the course. Ideally, we further need to compare similar individuals who did and did not have a learning experience to rule out that the learning would not have taken place in the absence of the experience.

Taken together, the CARE panel will allow us to produce and convey knowledge that will help people make better decisions in avalanche terrain, minimising accidents and ultimately saving lives.

This is the second CARE panel report. The aim of this report is to provide an overview of the panel as it looks today, and not to go deep into the analysis of mechanisms. We present more advanced analyses in our scientific papers. The information in the report stems from three different information sources: the recruitment study, the annual follow-up study and a GPS study.

Demographics of the CARE Panel 2024

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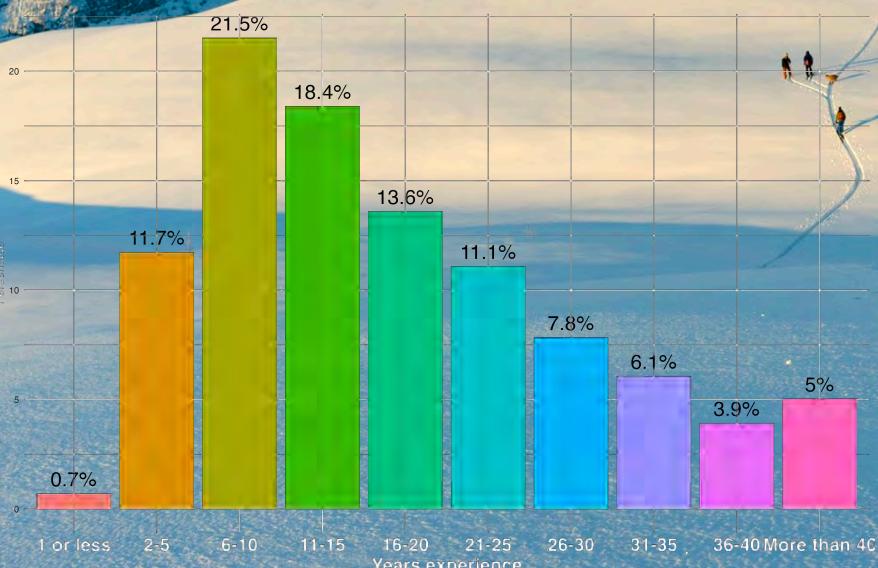
individuals have registered in the CARE panel as of October 2024

34

The median panelist is 34 years old, the oldest is 74.

72%

identify as male



66% have more than 10 years experience of riding in terrain where avalanches may be a concern.

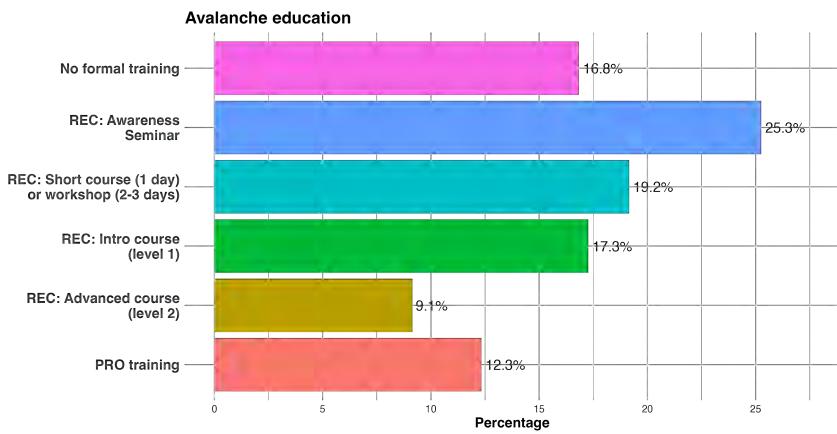
Photo: Martin Stefan

90% are downhill skiers or snowboarders. 2% are sledders.



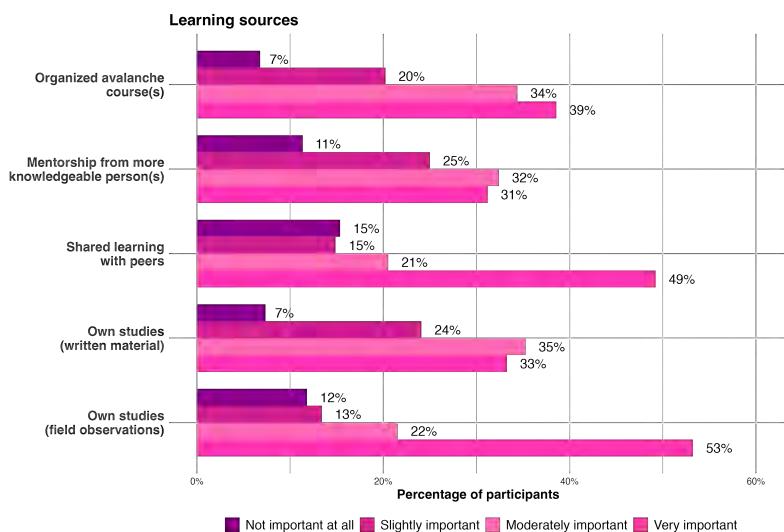
Skills & training

39% of CARE panelists have formal avalanche training. **This is an increase of 9 percentage points (pp)** since 2022. 17% have taken a level 1 REC avalanche course. 12% have PRO training.



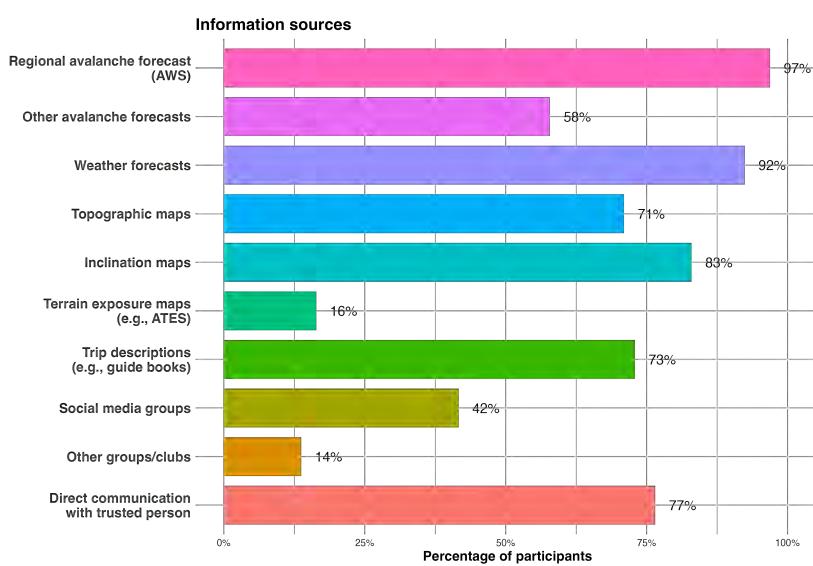
Learning by doing, together, is important!

Most CARE panelists develop their avalanche risk mitigation skills by learning from multiple sources. Over 70% of participants feel that organised avalanche courses, shared learning with peers and own studies (written material and field studies) are important or very important for developing skills in avalanche risk mitigation.



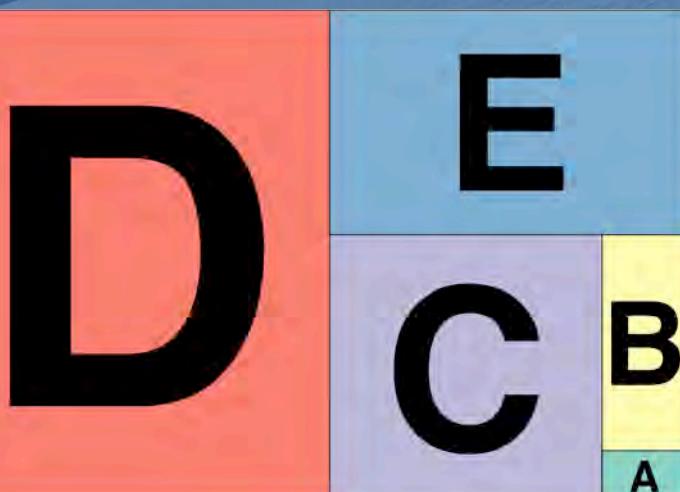
Regional avalanche forecasts are used by nearly all

Nearly all (97%) state that they typically consult the regional avalanche forecast and the weather forecast prior to making a tour. The majority also use inclination maps (83%) or topographic maps (71%) and discuss avalanche conditions with people they trust (77%). 42% use information from social media. Relatively few (16%) use terrain classification maps.



Skills & training continued

76% self-identify as advanced users of the avalanche forecast (D or E). 4% say that they mainly focus on the danger level. Only about 1 % say that it is not typical for them to consult avalanche information when making backcountry travel plans.



Scale for self-assessed avalanche bulletin user type

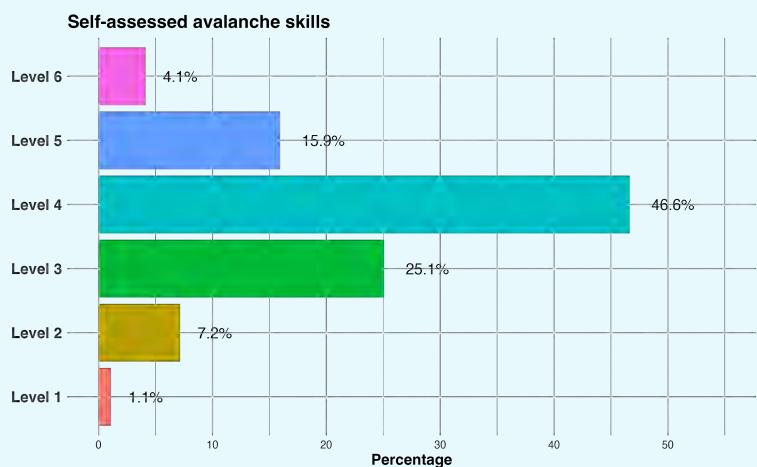
A	It is not typical for me to consult avalanche bulletin information (or any other source of information about the avalanche conditions) when making my backcountry travel plans
B	I typically incorporate the danger rating into my plans to determine whether or not it is safe to travel in the backcountry
C	I typically combine the danger rating from the forecast with knowledge of how avalanche prone an area is to determine where to travel in the backcountry.
D	I typically make a decision about where or when to go based on: (a) the specific nature of the avalanche conditions reported in the bulletin, (b) where they exist in the mountains, and (c) whether I feel that I can manage my travel in the terrain given these conditions
E	I typically use information about the specific nature of the avalanche conditions as a starting point for continuous assessment to confirm or disconfirm this forecast where I am travelling.

Scale for self-assessed skills in assessment and mitigation of avalanche danger

Level 1	Does not have any experience in, or knowledge of, avalanche danger assessment
Level 2	AWARE that avalanche danger is assessed on a scale from 1 = low to 5 = extreme, and that most avalanches occur in terrain steeper than 30°. KNOWS that fresh avalanches are a sign of avalanche danger.
Level 3	<i>In addition to level 2:</i> AWARE of the different kinds of avalanche problems. Can identify key avalanche terrain (start zones, run-out zones, and terrain traps). Knows how to INTERPRET obvious warning signs (e.g., fresh avalanches, shooting cracks, whumpf sounds).
Level 4	<i>In addition to level 3:</i> UNDERSTANDS the difference between different avalanche problems. KNOWS and how to respond to these avalanche problems with their terrain choices. Has BASIC knowledge of how weak layers form in the snow. Has BASIC skills in techniques to detect weak layers in the snow, and less obvious danger signs (e.g., wind-loaded snow).
Level 5	<i>In addition to level 4:</i> at large UNDERSTANDS how weak layers in the snow are formed and develop over time. Has ADVANCED knowledge in techniques to identify and interpret weak layers in the snow for your immediate surroundings (LOCALLY), and can use the terrain to mitigate these.
Level 6	<i>In addition to level 5:</i> Has a PROFOUND knowledge of snow metamorphosis and avalanche dynamics. Is PROFICIENT in using information about weather and terrain to forecast the avalanche danger on a REGIONAL level. In other words, the individual's skills are on par with those of an avalanche forecaster. Can adjust terrain choices to mitigate the avalanche problem, regardless of the avalanche problem.

92% say that they know how to identify avalanche terrain and can interpret obvious signs of avalanche danger. 67% report that they have basic to advanced knowledge of snow dynamics, an increase of 8 pp from 2022.

Photo: Andrea Mannberg

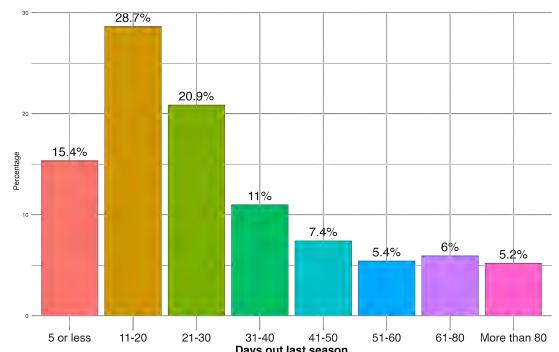
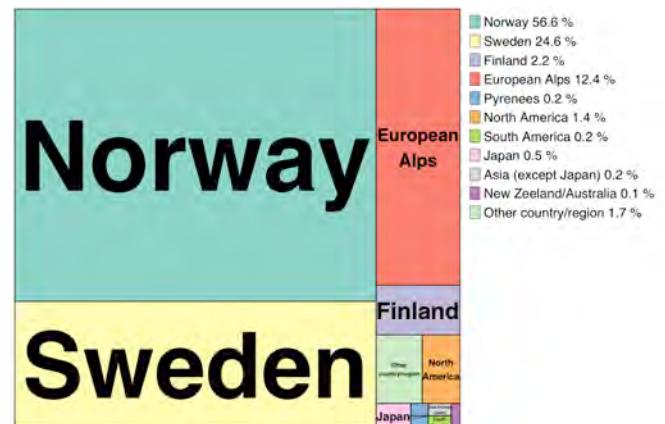


Riding during the season

57% of the CARE panelists rode in Norway, 25% in Sweden, and 12% in the European alps during the season 2022/2023.

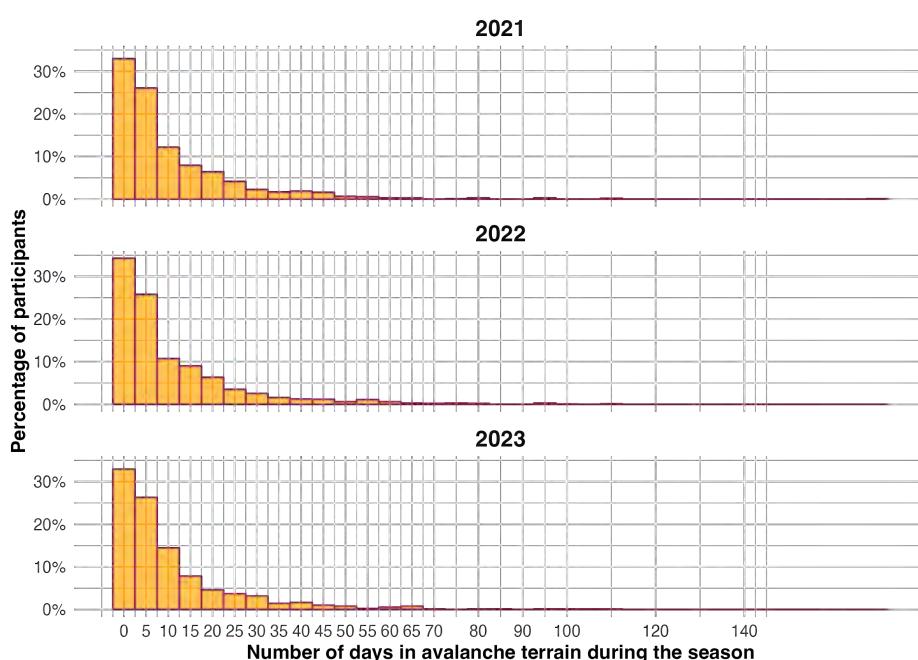
49% of the participants rode 11 - 30 days. About 16% rode either 5 days or less, or more than 50 days

Photo: Andrea Mannberg



Nearly 1/3 CARE panelists stay out of avalanche terrain

Each year, we ask the panelists to guesstimate the share of their tours that went through avalanche terrain (0%, 1-10%, ..., 91 - 100%). The below graph combines this information (using the mid-point of the scale) with the number of days out to get an idea of the number of days in avalanche terrain. Over 30% of the panelists do not travel in avalanche terrain at all, and more than 50% ride less than 10 days in avalanche terrain. However, some panelists spend over 50 days in avalanche terrain each season. The distribution appears to be relatively stable from season to season.



Avalanche experiences 2021 - 2023

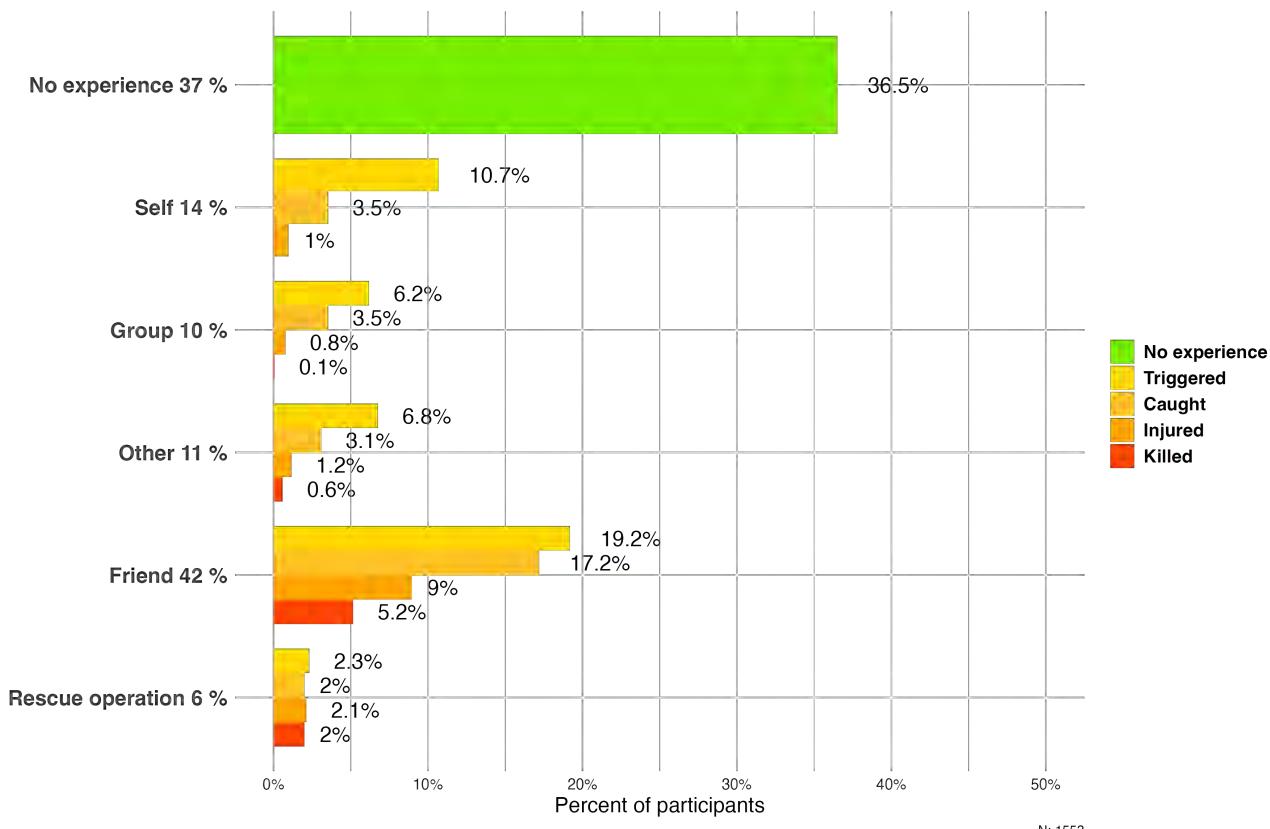
64% have experienced at least one avalanche incident in the period 2021- 2023

80 people know someone who was killed in an avalanche between 2021 and 2023

Photo: Andrea Mannberg

In each annual survey, we ask the CARE panelists about their avalanche experiences during the season. 1553 participants have provided information on their experiences of avalanches during the period 2021 - 2023. 36.5% of our participants have not experienced any avalanche incidents during the period. In other words, 63.6% have had experiences.

42% of the panelist have friends who where involved in incidents or accidents during the three seasons. 9% know someone who got injured and 5.2% (N = 80) know someone who died in an avalanche accident. 14% have triggered an avalanche themselves, and 10% have been in on a tour where someone else in the group triggered an avalanche. Luckily few have experiences where someone got injured (less than 2%) or killed on a tour that they participated in. However, slightly over 2% have been in situations where someone in another group was killed (either recreationally, or as part of a rescue operation).



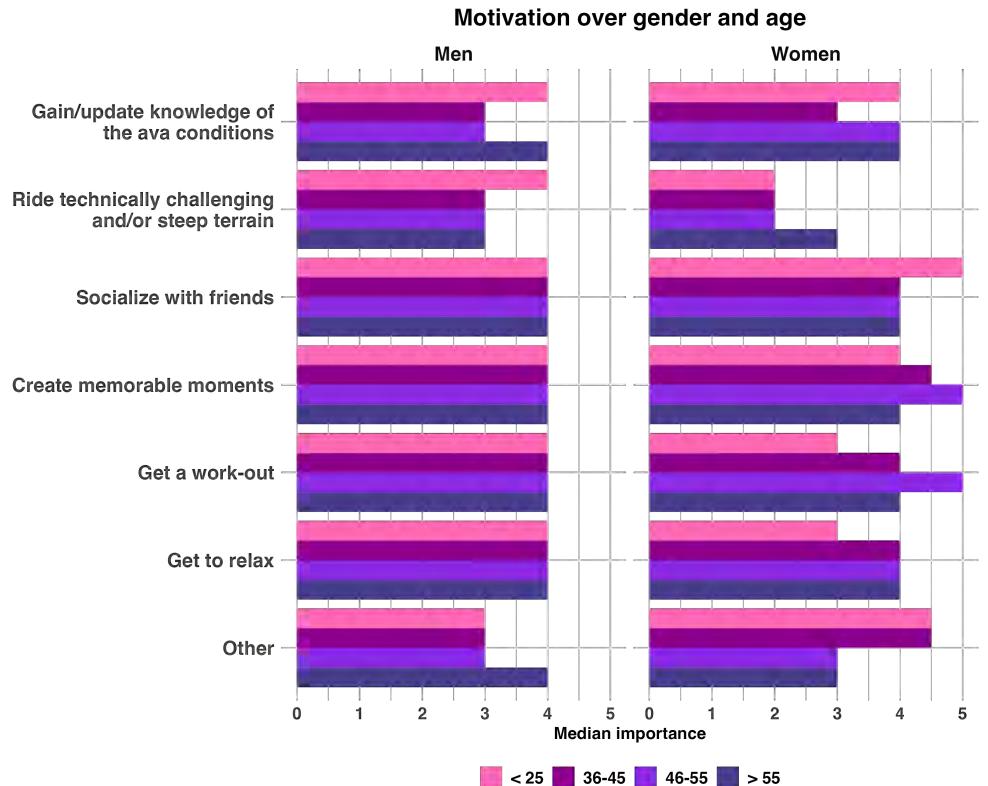
Why do we go riding?



Photo: Andrea Mannberg

We asked the panelist to rate how important a range of reasons are for them to go riding. The scale went from not important at all (0), to very important (6). The graph shows the median importance assigned for each reason by men and women in different age groups.

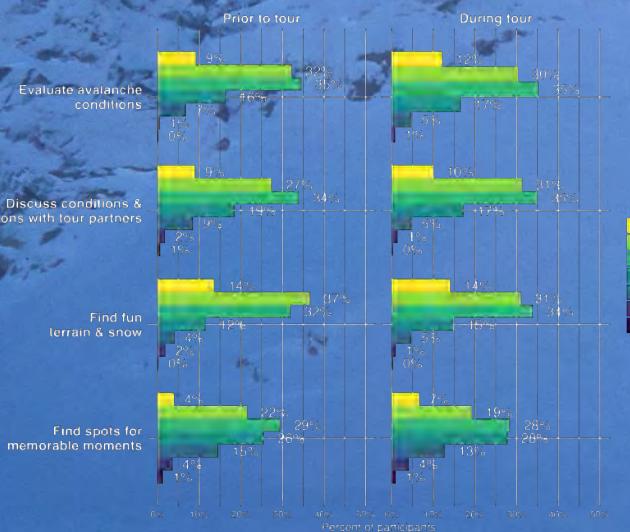
There is surprisingly little variation between the different motivating factors. But one thing is clear. CARE panelists do not mainly go out to ride "as steep as they dare". Our data suggests that other things are more important.



Men of all ages go out to socialise, create memorable moments, to exercise and to relax. It appears to be more important to ride steep terrain among young men as compared to older, and less important to update knowledge about avalanche conditions among middle-aged as compared to younger and older men.

Women show more variation depending on age. For young women, the most important factors are socialising with friends and factors not covered by our set of motivating factors. These women are less motivated by steep riding, exercising and getting to relax. Middle-aged women appear to be more motivated by creating memorable moments and getting a workout. Both men and women are least interested in updating their knowledge on avalanche conditions when they are in their mid 30s - 40s.

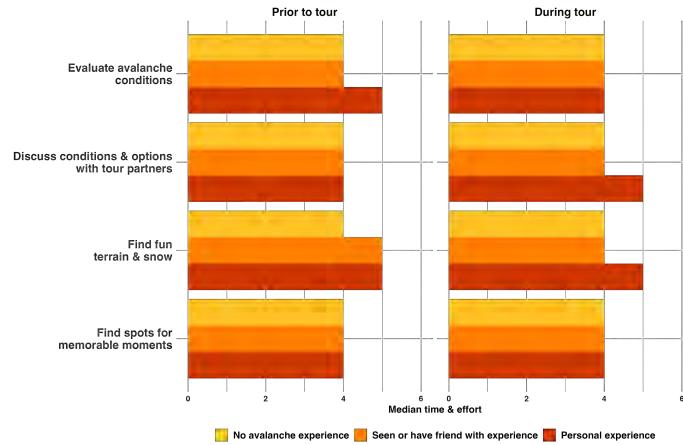
Information collection prior to & during a tour



We asked our participants about how much time and effort they typically use before and during a tour in the backcountry. The panelists answered on a scale from “No time and effort at all” (0) to “A large amount of time and effort” (6).

About 40% of panelists use a relatively large amount of time and effort to evaluate the avalanche conditions on their own both prior to venturing out into the backcountry, and during a tour. About the same number use a large time and effort to discuss avalanche conditions with their touring partners. Extremely few say that they do not evaluate avalanche conditions at all.

About 45-50% say that they use a relatively large amount of time and effort to find fun terrain and snow to ride in.



People, who have experienced an avalanche on a tour, appear to spend slightly more time to evaluate avalanche conditions prior to a tour, and more time and effort to discuss conditions and find good snow during a tour.

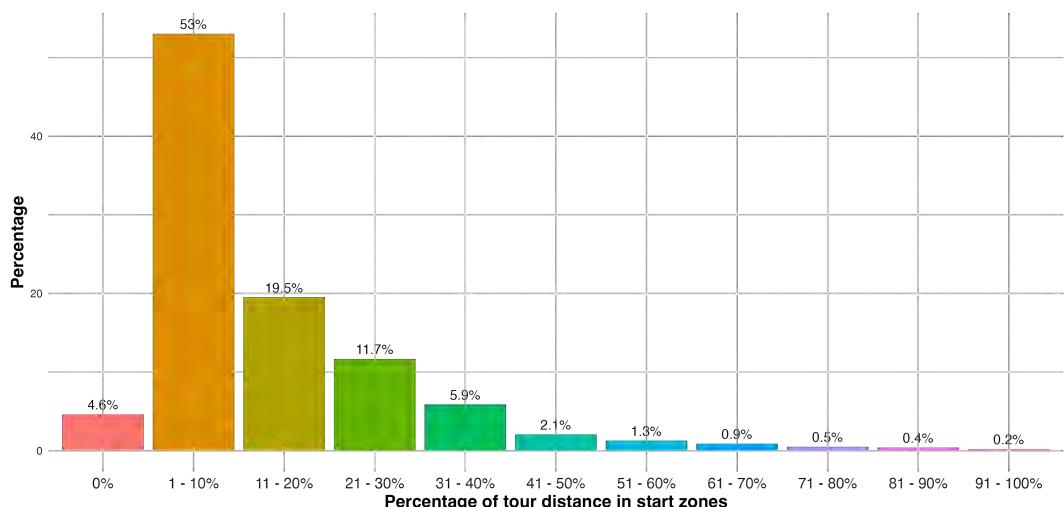
It is important to note that, to understand if an avalanche experience affects behaviour, we need to compare the behaviour before and after the experience. We do not have enough data yet to do this kind of comparison. Instead, we compare individuals with and without avalanche experiences. This does not tell us anything about cause and effect, but it does tell us if there are differences between the two populations.

CARE GPS study

Photo: Andrea Mannberg

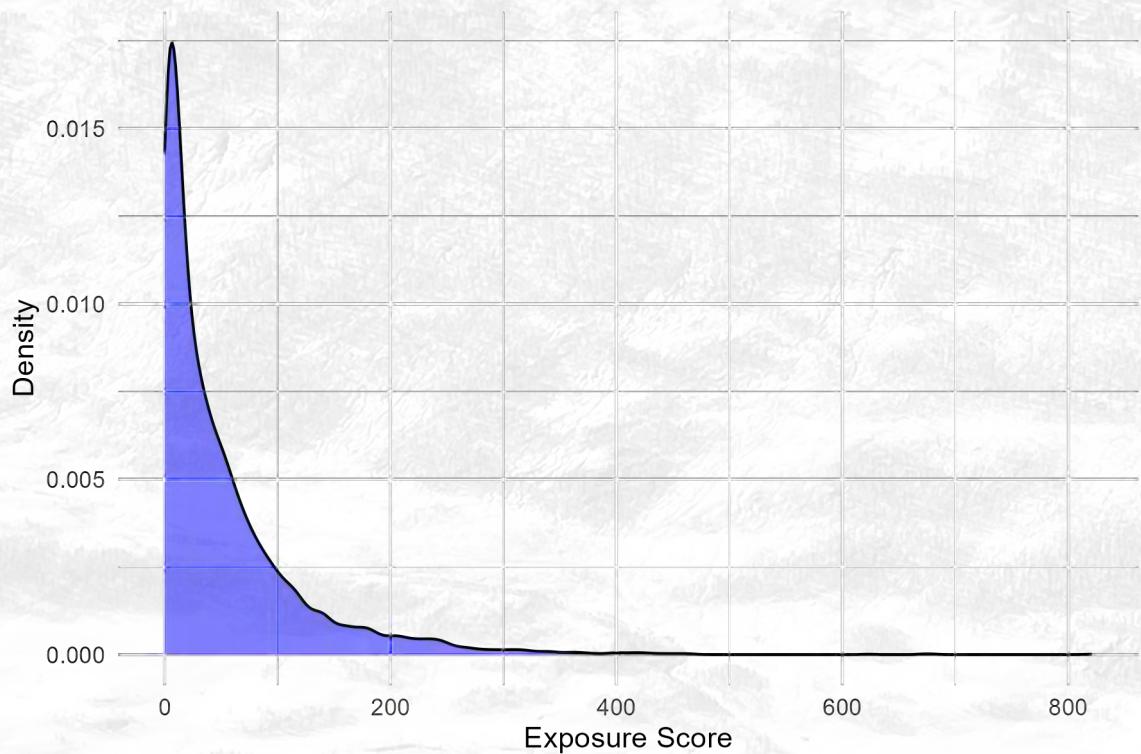
CARE has been collecting GPS tracks and survey answers since the season 2020/21. In 2022/23, we developed an app that made it possible to automatically share GPS tracks via Strava. This increased the number of responses substantially. While relatively few CARE panelists (N = 276) participate in the GPS study, we now have over 2000 responses to our GPS survey, and over 12,000 gps tracks.

82% of the GPS participants are male. Average age is 37.5 years (median is 35). Almost all tours were made on skis (95.5%). 76% of the tours went at least to some degree avalanche terrain. About 50% travelled 10% or less of the tour in start zones.

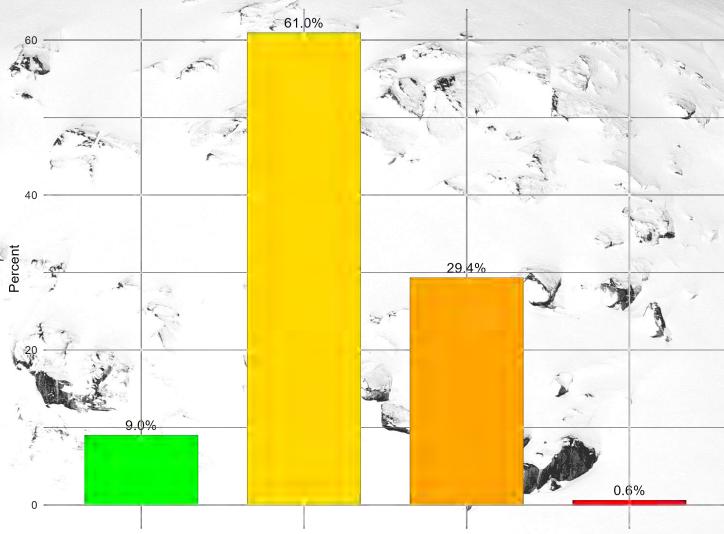


GPS tracks

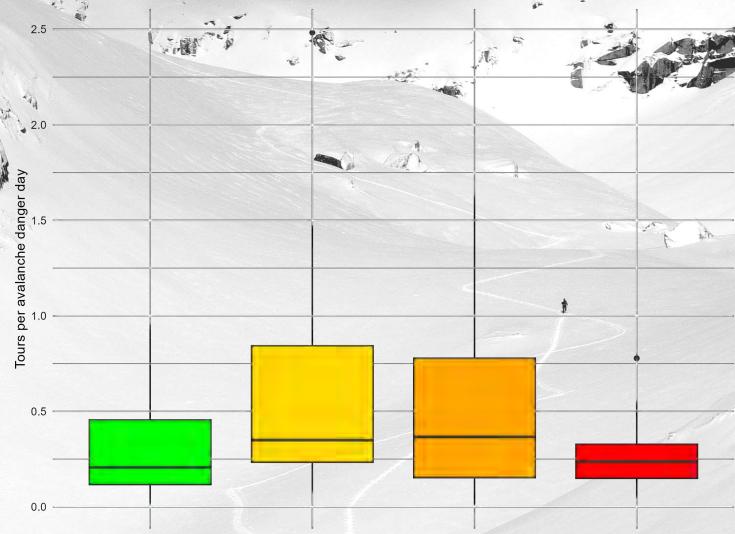
One of the aims of the GPS study is to analyse how much danger backcountry riders expose themselves to, and which factors that affect terrain choices. To be able to do this, we need a measure of exposure. Since we want to be able to evaluate how e.g., the avalanche forecast affect terrain choices (and since the avalanche forecast is on a regional scale), we only focus on exposure to avalanche *terrain*. We have developed a continuous exposure score (CES) that measures the exposure to avalanche terrain during a tour. You can read more about how we developed the CES [here](#). The CES increases with the number of meters in exposed terrain. Although the CES cannot be directly translated to the Avalanche Terrain Exposure Scale (ATES), a CES of 0 - 2 typically represent a tour in train with low exposure (simple terrain), scores around 10 are typically tours in “challenging” terrain, and scores above 20 typically indicate “complex” terrain. The below graph shows the distribution of the CES for the tours that we have analysed so far (N 12,823).



When do people go out?



Share of tours over forecasted avalanche danger level



Number of tours per day with a certain avalanche danger level, adjusted for number of days a danger level was forecasted

If we simply calculate the share of tracks over forecasted danger level, we find that most people go out riding on days when the regional forecasted danger level is moderate (61%). Very few go out on days with high avalanche danger (0.6%).

However, this does not tell us that people 'seek out' moderate danger level, and 'choose to stay home' during high avalanche danger. The reason is that moderate avalanche danger is forecasted relatively often, while high avalanche danger is rare. In other words, there are less opportunities to go out during high (and low) avalanche danger.

When we adjust for the number of days available with a certain danger level, we find that the median number of tours per day with a given danger level is about 0.75 for moderate and considerable avalanche danger, and slightly below 0.25 for low and high avalanche danger. However, when we perform statistical tests (Wilcoxon signed rank test) and correct for multiple testing, we do not find any significant differences in the number of tours per danger level day.

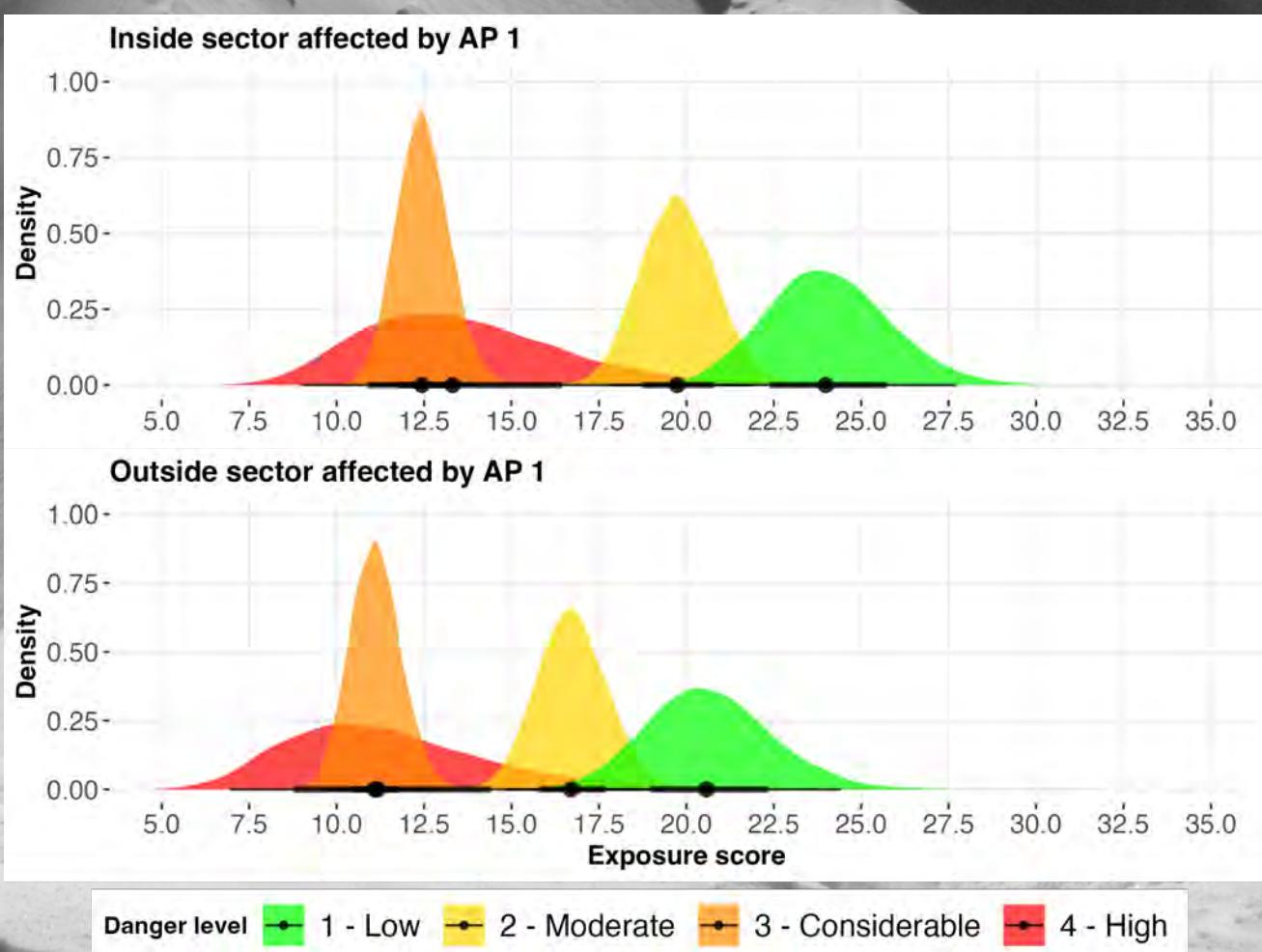
Where do people go?

We have analysed the GPS tracks using a method called Bayesian analysis. You can read more about what this means [here](#). In short, the analysis allows us to evaluate how exposure vary over e.g., forecasted danger level, while taking into account that other things (like avalanche problems, time of the season etc.) may co-vary with the danger level. We can further remove effects that are caused by personality differences between different CARE panelists.

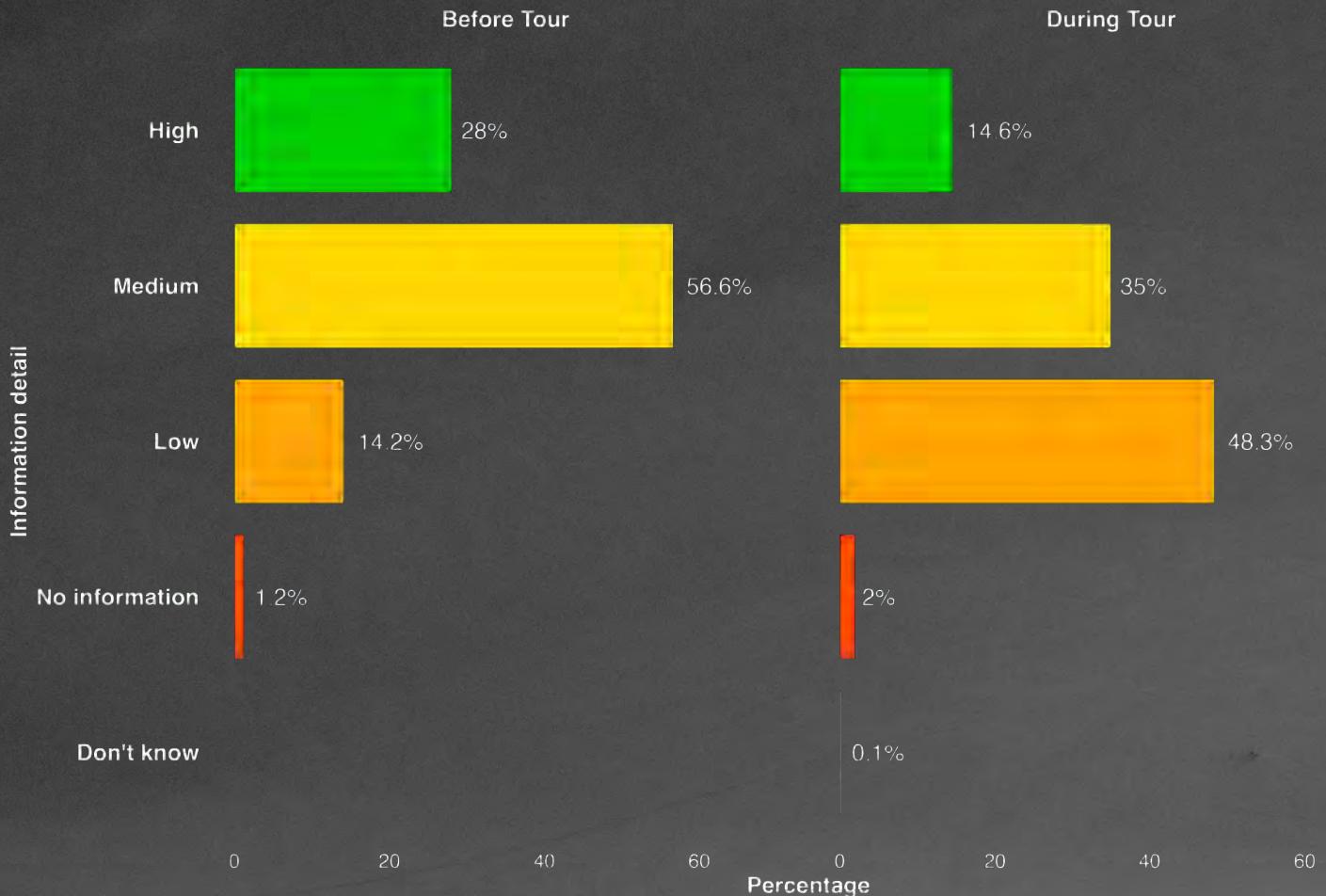
To start with, we wanted to understand if people react to the forecasted danger level by choosing simpler terrain, especially in areas where the avalanche problem (AP) is forecasted to be present. To keep things simple, we focused on the main AP forecasted.

The below graph shows the distribution of CES over forecasted danger level inside and outside the sector where the main AP (AP1) was forecasted. The wide distribution for high avalanche danger is a result of that high danger is rarely forecasted.

The results indicate that our participants choose to ride safer terrain during heightened avalanche danger, and that they 'react' more when the avalanche danger increased from moderate to considerable than from low to moderate. However, most tours still have relatively high terrain exposure (challenging terrain). We also note that there is no indication that people seek out relatively safer terrain in areas where AP1 is forecasted in comparison to areas where it is not.



Information collection



We asked the GPS loggers in what level of detail they collected information about snow and avalanche conditions before going out on a tour, and during the tour.

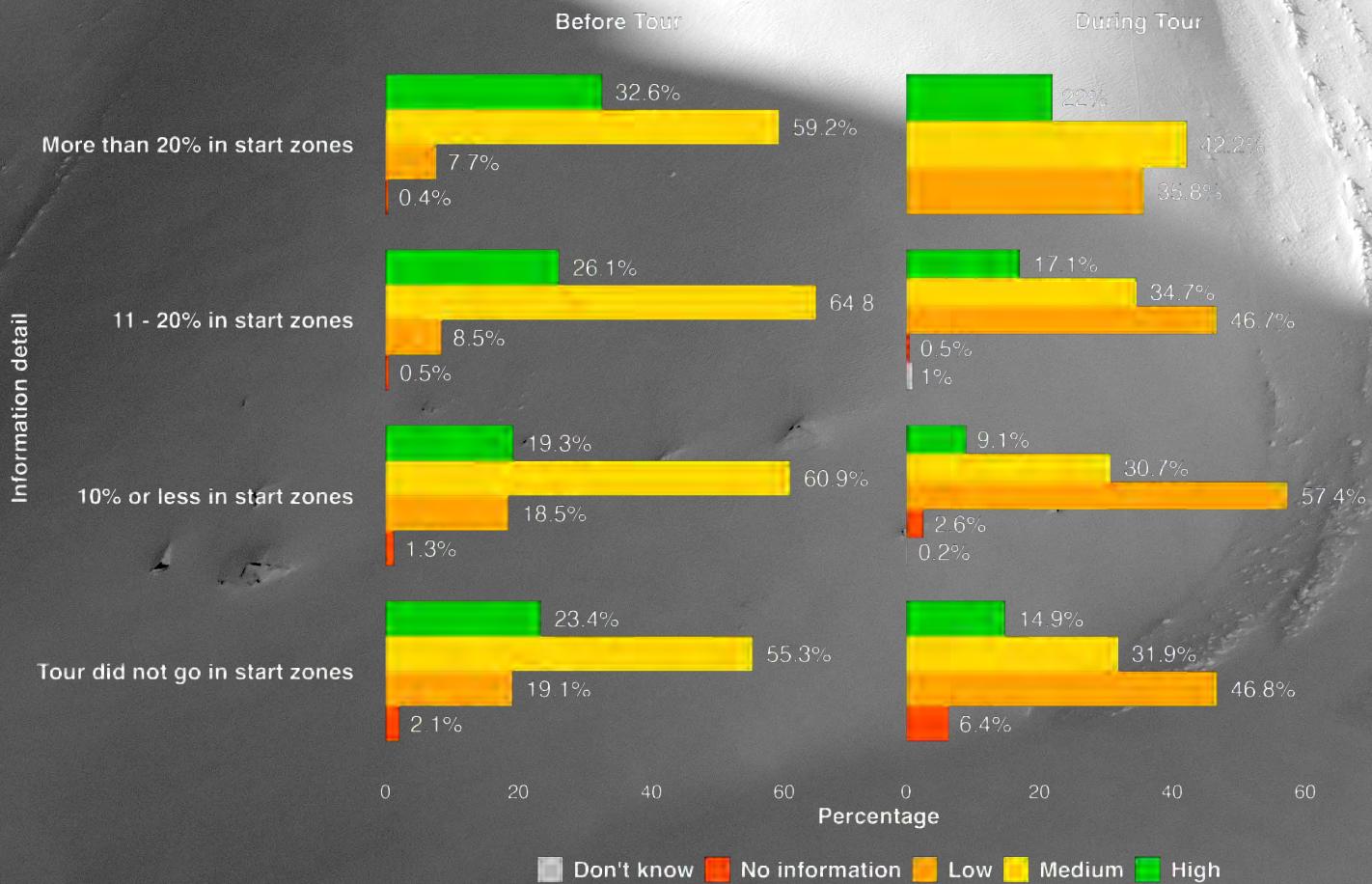
A 'high level of detail' means that the GPS logger did extensive snow and avalanche analysis. A 'medium level of detail' means that the participant collected some information about the distribution of the avalanche problem prior to the tour, and did some stability tests (e.g., hand shear) during the tour. A 'low level of detail' means that the individual were aware of the forecasted danger level prior to the tour, and paid attention to warning signs during the tour.

Most GPS loggers (85%) collect information about the distribution of the avalanche problem prior to their tours, and 28% make an extensive analysis of conditions. During a tour, it is more common to pay attention to warning signs (48%). Almost no one in our sample make tours without any information.



If a tour doesn't go in avalanche terrain, it is of less importance to have information about the avalanche conditions. We therefore divide the tours into four groups based on the share of the tour that went in start zones for avalanches.

For each 'tour type' (based on the share of the tour that went in start zones), the 'information detail groups' sum to 100%. In other words, we ask: Of those who did e.g., more than 20% of the tour in start zones, how many collected information in high detail?

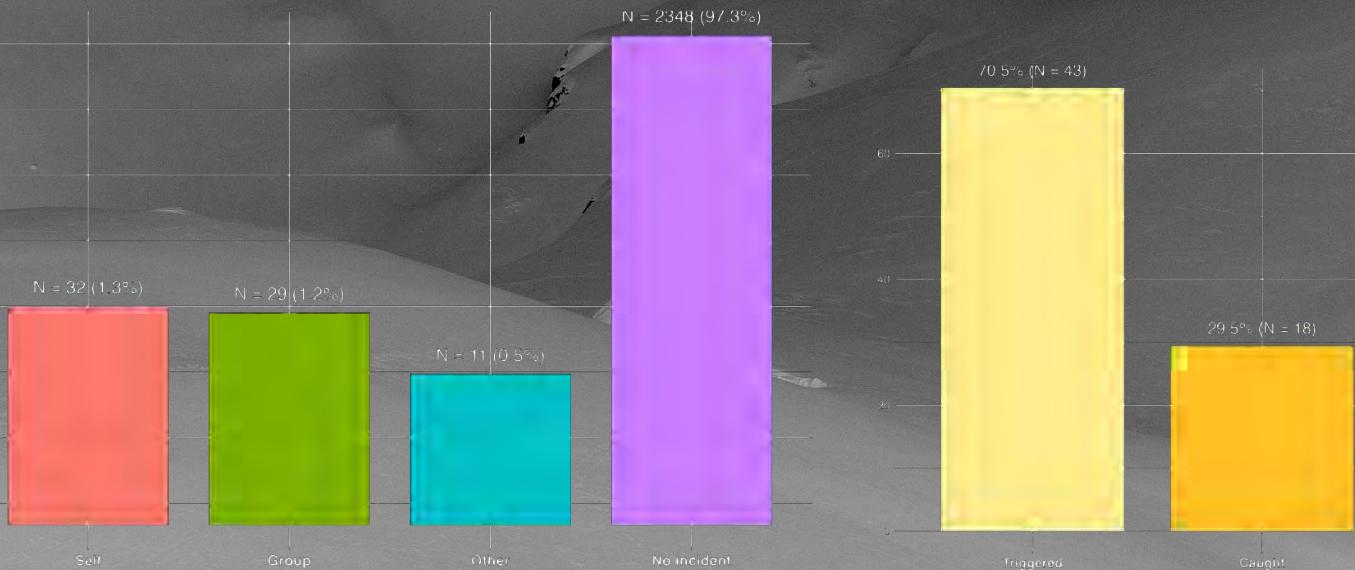


Our participants appear to collect relatively detailed information about avalanche conditions both prior to and during tours *outside* of avalanche terrain. This may appear surprising, but may be explained by that people use these tours as 'data collection' tours, or that people chose these tours on days with highly unstable conditions which required extensive analysis of the conditions.

Disregarding tours that did not go in avalanche terrain at all, there is a clear trend towards more detailed information collection both prior to and during a tour. However, on 36% of the tours that participants say went in start zones for at least 1/5 of the tour, the tourer only paid attention to danger signs.

Avalanche incidents

We are very glad to see that no avalanche incidents occurred on 97.3% of the tours in our sample. However, some did experience avalanches on their tours. Although the percentage shares are low, there were avalanche incidents on 72 tours in our sample. On 61 of these, someone in the group triggered (43) or where caught (18) in an avalanche. We have no observations of serious accidents (injuries or death).



Avalanche likelihood

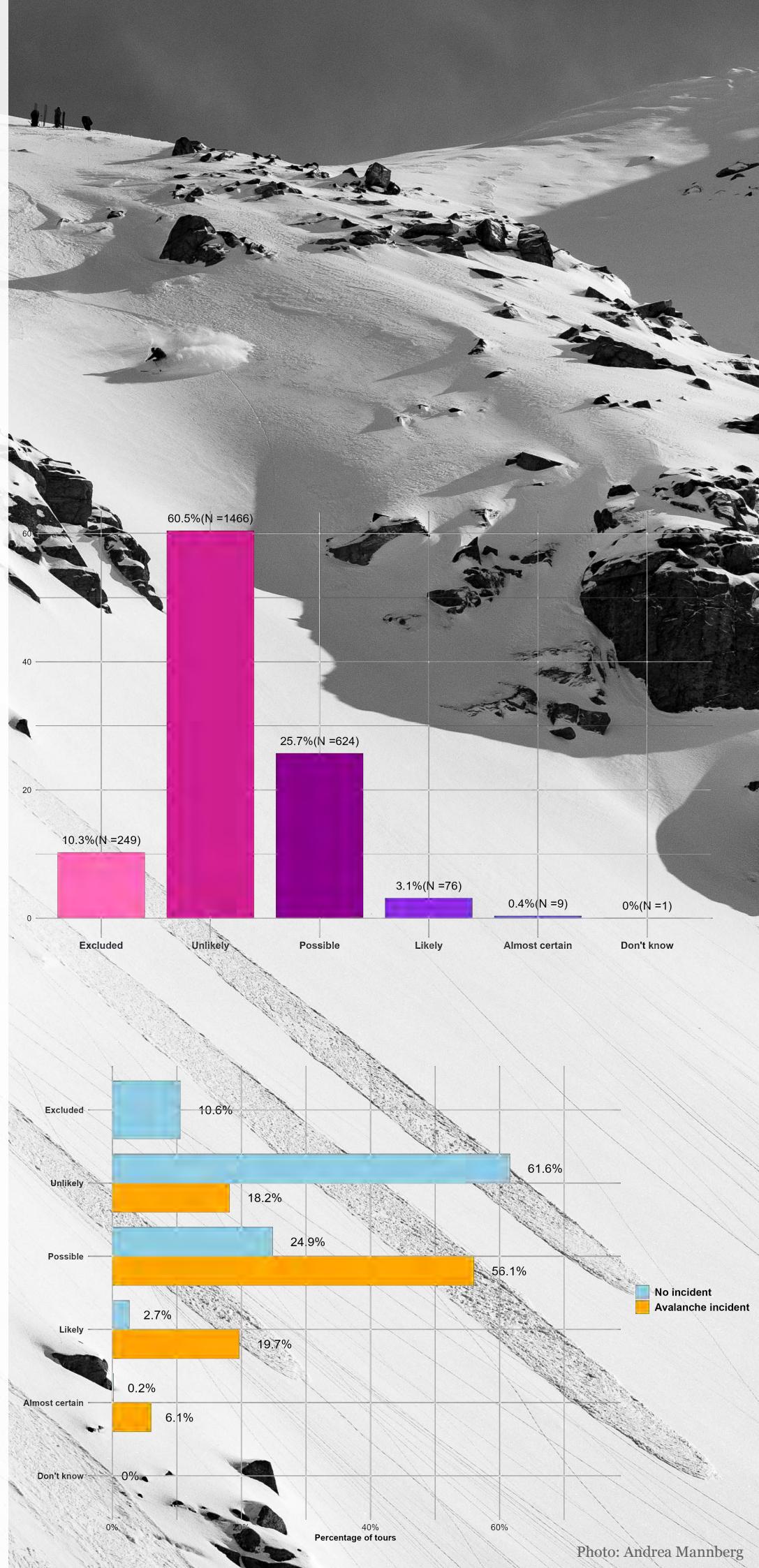
Even if no avalanche occurs during a tour, there is still a chance that the slopes could have avalanched.

We asked the GPS loggers to guesstimate the avalanche likelihood on the slopes that they travelled on. We used a similar scale as avalanche forecasters use to assess avalanche likelihood for specific avalanche paths: excluded, unlikely, possible, likely, and almost certain. We also allowed the tourers to state that they did not know.

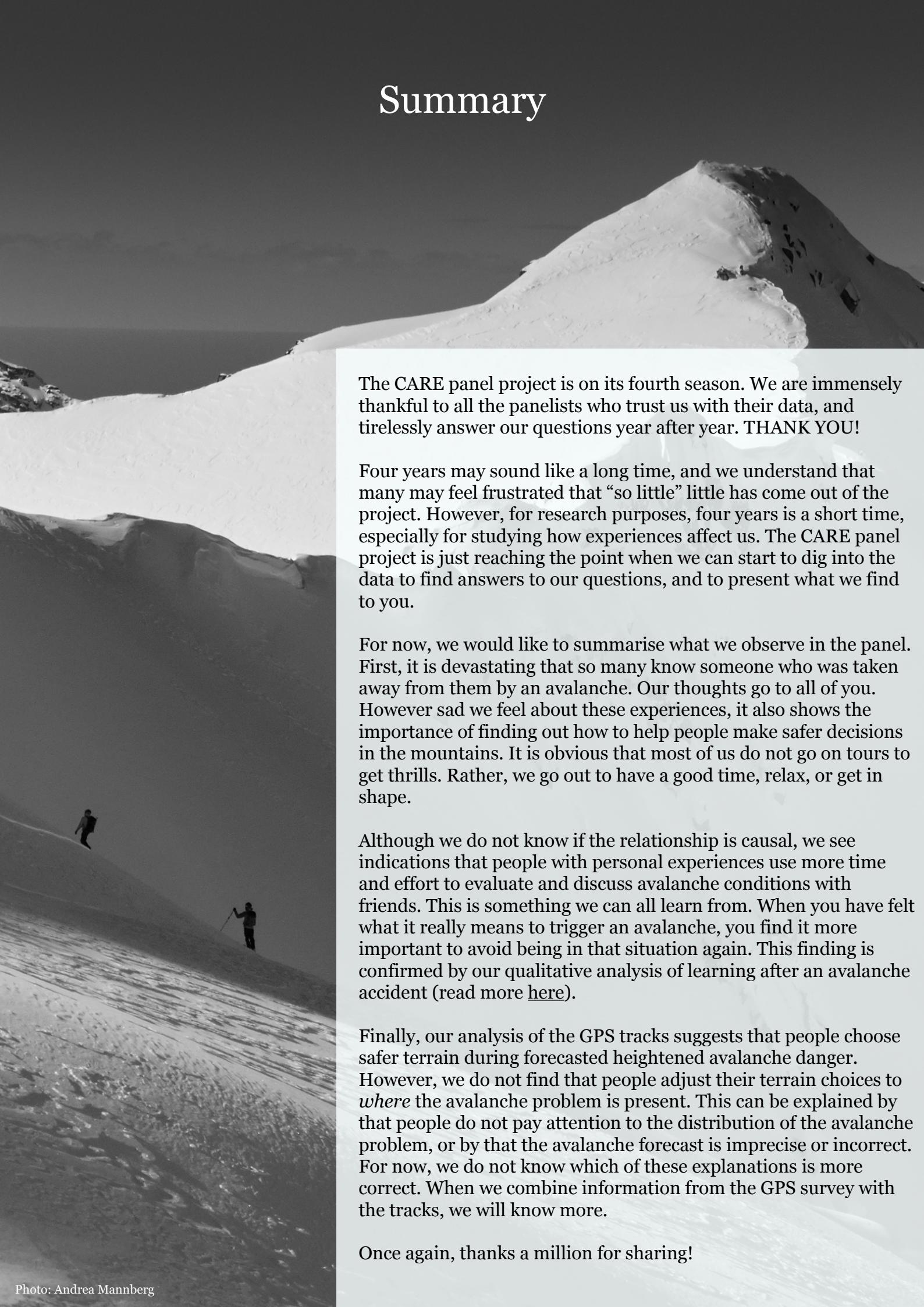
The vast majority of the tours went on slopes where the participants thought that avalanches were either excluded (10%) or unlikely (61%). About a quarter of the tours went on slopes where the tourer estimated that avalanches were possible (26%). 85 tours (3.5%) went in terrain where the avalanches were judged as likely or almost certain.

On some of the tours, avalanches did occur. We therefore split our sample into two: tours without avalanche incidents, and tours with avalanche incidents.

On tours where the group experienced triggering an avalanche, avalanches were considered almost certain in 6% of the cases, likely on 20%, possible on 56%, and unlikely on 18% of the tours. By contrast, the participants judged avalanches to be mostly unlikely or excluded on tours where no avalanches occurred. Only 3% perceived that avalanches were likely or almost certain on these tours.



Summary



The CARE panel project is on its fourth season. We are immensely thankful to all the panelists who trust us with their data, and tirelessly answer our questions year after year. **THANK YOU!**

Four years may sound like a long time, and we understand that many may feel frustrated that “so little” little has come out of the project. However, for research purposes, four years is a short time, especially for studying how experiences affect us. The CARE panel project is just reaching the point when we can start to dig into the data to find answers to our questions, and to present what we find to you.

For now, we would like to summarise what we observe in the panel. First, it is devastating that so many know someone who was taken away from them by an avalanche. Our thoughts go to all of you. However sad we feel about these experiences, it also shows the importance of finding out how to help people make safer decisions in the mountains. It is obvious that most of us do not go on tours to get thrills. Rather, we go out to have a good time, relax, or get in shape.

Although we do not know if the relationship is causal, we see indications that people with personal experiences use more time and effort to evaluate and discuss avalanche conditions with friends. This is something we can all learn from. When you have felt what it really means to trigger an avalanche, you find it more important to avoid being in that situation again. This finding is confirmed by our qualitative analysis of learning after an avalanche accident ([read more here](#)).

Finally, our analysis of the GPS tracks suggests that people choose safer terrain during forecasted heightened avalanche danger. However, we do not find that people adjust their terrain choices to *where* the avalanche problem is present. This can be explained by that people do not pay attention to the distribution of the avalanche problem, or by that the avalanche forecast is imprecise or incorrect. For now, we do not know which of these explanations is more correct. When we combine information from the GPS survey with the tracks, we will know more.

Once again, thanks a million for sharing!