

## BOOSTING AND NUDGING PEOPLE TO MAKE SMART BACK-COUNTRY DECISIONS: THE CASE OF WINTER NORWAY

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**ABSTRACT:** Each year, alongside Norwegians, a concerning number of visiting backcountry ski-tourists lose their lives to avalanches in Norway. How do you support people to make smart decisions in a high-risk environment where regulations are few and people are left more or less to their own devices in choosing how to manage their winter mountain activity? Norway's ethos of *friluftsliv* in a country with a well-established freedom to roam law, creates a thought-provoking context for studying this. How can we aid back-country winter recreationists in this quite free and competence-based context where it is expected people will make sound decisions on their own for an activity that is both fun and safe – for themselves and others. Boosting (through timely education and training) and nudging (through well-placed decision-making aids) are two complementary strategies that could be ideal for supporting skiers in this kind of context. We'll present the basic ideas of boosting and nudging, introduce current tools and practices used in Norway today that serve boosting and nudging functions (for example, The Mountain Code taught in schools, forecasting apps, department of transportation initiatives and a newly developed Norwegian planning and touring app). We'll share their current strengths and weaknesses in relation to how well they might ensure safe and gratifying skiing. We'll also consider this in light of their relevance for people who have learned to ski on Norway's terms, but also for the thousands of visitors who each year come to Norway's mountains from elsewhere, where the expectations, regulations and social contracts around back-country winter mountain activity may be notably different.

**KEYWORDS:** Boosting, Nudging, Back-Country Activity, Winter Mountains, Snow Sports

### HIGHLIGHTS

- ❖ Norway's mountains are free and open for use, though it is recreationists' responsibility to use them well.
- ❖ We can make smart regulatory choices to aid people when in the mountains.
- ❖ Boosting and nudging are soft regulatory practices that can be used to guide people to safer, smarter back-country winter mountain activity choices, and Norway has many.
- ❖ Boosting and nudging preserve people's autonomy to choose what they do in the mountains, though they are important guides for making better choices.
- ❖ Boosting and nudging practices have their advantages, costs and limits.

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## 1. INTRODUCTION

How can we (and policymakers) help ourselves or others to merge the theory of decision-making with the practice to do the best right thing in the moment when back-country skiing in avalanche terrain? We present two methods that allow people to preserve their autonomy to make their own decisions while also keeping themselves and others safe in snowy mountains. The methods involve boosting general competency and/or nudging people to do the right thing in relevant moments.

When are boosting and nudging policy interventions relevant, and how do they work? We will first briefly explain the terms, contextualize their need – particularly in places where skiers have considerable autonomy, provide some concrete examples and then discuss their implications for safe mountain travel.

### 1.1 *Boosting and nudging*

Boosts are based on the presumption that people are motivated and capable of learning, and that this is adaptable and can be developed (Hertwig, 2017). As a policy intervention, boosting therefore focuses on improving people's competence to make their own decisions and help them to exercise personal agency (Hertwig & Gruene-Yanoff, 2017). For example, a boost might be a lesson on how to do a companion rescue. A person might not need that skill just then, but they will know what to do should they find themselves in a situation later where a companion needs rescuing. For boosts to succeed, however, the booster must be trustworthy (e.g., a certified avalanche instructor who teaches methods for companion rescue that are tested and actually work), and the boost must be accessible to those it is intended for (anyone who might need to know how to do a companion rescue can easily find and attend such a lesson). Furthermore, since people vary in knowledge, skill and experience, boosts need to account for that in how they are delivered.

Nudging, on the other hand, is based on the presumption that people's decision-making skills are biased, flawed and error prone, and therefore benefit from external support in the moment when key decisions are to be made. Whereas boosting focuses on developing competence that people can use in multiple situations later, nudging focuses on employing strategies like defaults or social norms to steer people in a particular direction at key moments (Thaler & Sunstein, 2008). In that way, they aid people in finding the best solution for things they already have decided on. For example, a nudging strategy may be providing ample public parking close to a popular and safe skiing area. Though strongly suggestive, the nudge is flexible enough to allow for people's freedom of choice – in this case, in spite of the parking advantage, perhaps choosing to ski in a safe yet more remote area with fewer legal parking options.

In sum, both boosting and nudging, if done right, preserve people's choice autonomy, though differently. We can choose to seek out a boost (or not), and we can follow a nudge (or not) – assuming our awareness of the nudge in the moment.

### 1.2 *Freedom to roam and responsibility in Norwegian mountains*

In many countries, to keep skiers safe, winter and skiing professionals manage designated ski area conditions and access, while legal authorities regulate, monitor and enforce violations of safe mountain use.

In Norway, however, back-country skiing is relatively unregulated. Based on the culturally ingrained and legally secured principled Freedom to Roam in Norway (Outdoor Recreation Act 1957/2021), anyone can use Norway's mountains recreationally any time, with very few restrictions (Gelter, 2000). That puts primary responsibility for safe and respectful mountain use in the hands of each mountain user rather than in the hands of authorities.

Meanwhile, Norway's mountains are pristine and fun to play in, in part because of how varied and complex they are. At the same time, this wild and varied terrain with its changing snow and weather conditions makes some areas avalanche prone. The downside of this freedom is that as many as 20% of Norway's back-country skiers have experienced avalanches either directly or indirectly – sometimes with tragic outcomes (CARE Center for Avalanche Research and Education, 2022). Even in more regulated skiing terrains in North America and Europe, fatalities also occur (EAWS, 2024).

Three important aspects of avalanche risk are the hazard's likelihood, vulnerability in terms of consequences from different-sized avalanches, and exposure to places where avalanches may occur (Statham, 2008).

Given that not everyone who enjoys Norway's mountains for challenge and fun are mountain-, snow- or back-country experts in assessing this kind of complex risk, how can we better prepare people to safely take on their Freedom to Roam in Norway's beautiful winter mountains responsibly? How can soft regulations like boosting and nudging help them with that? What already exists of soft boosting and nudging regulations, how well do they work, and where is there room for growth?

## 2. EXAMPLES OF EXISTING BOOSTS AND NUDGES FOR BACKCOUNTRY RECREATIONISTS

Since boosts and nudges occur at different times in a mountain user's mountain use trajectory, it is important to consider not only what exists of boosts and nudges, but when they are relevant to enact.

When preparing this paper, the authors collected suggestions of existing soft regulations (boosts and nudges) in Norway. Those we selected for this paper are representative (though not exhaustive) of soft regulations that are well known, professionally serviced in some way, commonly used and complementary to each other.

As Figure 1 maps out, trips are embedded in broad contexts. Some preparations can happen any time before, during or after *any trip* (like learning new skills) and others before, during or after a *particular trip* (like which route to take given current mountain conditions).

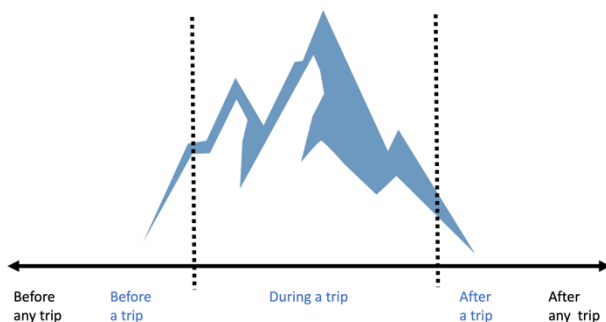


Figure 1. A timeline for boosting and nudging in the context of Norway's relatively unregulated winter mountain activity. Background image source: <https://www.vecteezy.com/vector-art/622948-mountain-logo-vector-illustration>.

In light of those parameters, what kinds of boosts and nudges exist already today in Norway?

### 2.1 Fjellvettregler / Norwegian Mountain Code

Created in 1952 and later revised in 2017, the current Norwegian Mountain Code consists of nine rules of thumb for responsible mountain use available at the website from The Norwegian trekking association (2017). This code is taught to children at school and in outdoor recreation clubs. They are also made available and promoted to all through the Norwegian Trekking Association (DNT). The code highlights doing trips like summer hikes or winter ski tours “according to one’s ability” (“*tur etter evne*”). This requires insight in terms of one’s own ability to handle changes in weather, altitude, fatigue and the like, but also in terms of when and where the trip will take place, and what the conditions will be like while there.

We regard the Mountain Code as a boost, though if called upon as a reminder during a trip, it can also serve as a nudge.

### 2.2 Digital Avalanche School (Snøskredskolen) created by NVE

Similar to offerings such as *Know before you go* and the *Ortovox Safety Academy*, the Digital Avalanche

School from Norway’s Water and Energy Resources Directorate (NVE) is a free online learning platform linked to its forecasting app *Varsom.no*. It offers interactive units for developing skills like how to plan a trip by assessing and avoiding avalanche danger (<https://www.varsom.no/snoskred/snoskredskolen/>).

We regard this offering as a boost.

### 2.3 Avalanche forecast and travel advice

NVE also supports a forecasting app ([www.Varsom.no](http://www.Varsom.no)). The information is based on the European Avalanche Warning Service standards (EAWS standards, n.d.; Mueller et al., 2024) and yields warnings on a scale from 1 to 5. Snow avalanche warnings are issued from approximately December 1<sup>st</sup> to May 1<sup>st</sup> -- though danger levels at 4 and 5 are reported whenever relevant. The app also contains steepness maps, including trigger and runout areas for avalanches, so users can identify avalanche terrain easily. It is intended to be informational, and it is up to users to know how to make sense of its content and use it wisely in trip planning and execution.

We regard this offering, overall, as a boost, though travel advice is included in the forecast, and when there is high avalanche probability, that is included in the main message early in the forecast. In that way, the app also provides nudges for when planning actual trips.

### 2.4 Avalanche courses (in situ)

Avalanche courses are available through a wide variety of certified and sometimes un-certified course providers. These courses are not required, but voluntary and highly recommended. The kinds of skills that are taught include terrain awareness, informational resources and how to use them in trip planning and decision-making, skill training with, for example, beacons and companion rescue methods. These tend to be offered seasonally, and not everywhere in Norway. Additionally, people typically pay to take these courses.

We regard these courses as a boost, though some rules of thumb are taught to be used (like nudges) when actually planning or on a trip.

### 2.5 Topptur.guide and related apps

[Topptur.guide](http://Topptur.guide) and related applications are digital tools that provide information about actual trip possibilities that are already rated in terms of the Avalanche Terrain Exposure scale version 2 (Statham and Campbell, 2023). *Topptur.guide* is inspired by the *skitourengru* website (Schmudlach, n.d.; Schmudlach & Kühler, 2016), though provides to date less sophisticated risk-related information. Such touring apps provide routes and options to people

planning a trip based on their skill, terrain preferences, and current mountain conditions. See <https://topptur.guide>.

We regard Topptur.guide and similar tools as nudges available to aid the planning of particular trips.

## 2.6 Road and parking access

People commonly drive to trailheads, parking in public, private or sometimes unofficial parking spaces. Though the tradition of placing public parking lots in places of convenience, the Norwegian Transportation Authority has begun to work more deliberately with placing public parking or doing snow removal at trailheads near simpler terrain rather than near more complex avalanche terrain.

We regard these access initiatives as a nudge since it is relevant for where to start a particular trip and may nudge users into safer terrain choices for the day.



Figure 2. A sample map from <https://Topptur.guide>. Green routes go through simple terrain (ATEs class 1) where it is easily possible to avoid avalanches. Blue routes are in challenging terrain (class 2) and red routes in complex terrain (class 3) where it becomes gradually more difficult to avoid avalanches. Black routes are in extreme terrain (class 4) with no options to reduce exposure where even small avalanches can be fatal.

## 2.7 Beacon check signs and checkpoints

Avalanche beacon (transceiver) check points are large signs, strategically posted at common ski trip trailheads – often in or right off parking lots in popular trip terrain (Toft et al., 2024). Adapted from BCA Back

Country Access, they are posting information in Norwegian and English (see Figure 3) that encourage people to check if their beacon is on and in transmitting/sending mode before embarking on their trip. By nearing the sign, audio-visual feedback is given when the beacon is working. Though a free service, these are not posted everywhere in Norway, nor are they used by everyone who pass them (Fjellaksel et al., 2024a).

We regard this offering as a nudge. As research has shown, its availability nevertheless does not guarantee its use – evidence of personal autonomy to not choose to use nudge when available (Fjellaksel et al., 2024a).



Figure 3. Beacon Check Checkpoint Sign as used in Toft et al. 2024

## 3. DISCUSSION

### 3.1 What we've learned about winter mountain boosts and nudges

Though alike as soft regulatory methods, boosting and nudging are different in their basis, execution and effect. Both, however, can be quite effective. As the examples we have included here indicate, there are more boosts available than nudges.

Boosts are voluntarily accessed, and some even cost money. Not all are universally available, though online tools like NVE's digital avalanche school and *Varsom.no* are important complements to the *in situ* tools like the Norwegian Mountain Code and avalanche courses. Their effect is limited, however, to people's awareness of them, their actual use, as



well as the quality of how successfully what is learned is truly practiced when in the mountains.

Nudges are placed where access should be relatively easy. However, nudges like Topptur.guide require internet access when planning (or adjusting plans), not to mention appropriate language skills to read the text and background knowledge to understand and appropriately analyze it. Beacon checks require access and active engagement where the signs are located (which are in a limited number of places). Likewise, parking options need to be planned, regulated and maintained.

Going back to Figure 1, if you add the boosts and nudges that we have illustrated here, it is evident that just knowing and accessing boosts is not enough. Timing matters. At the same time, there are limits to what kinds of nudges can be placed or accessed in natural environments where they will be most relevant.

But relevance doesn't mean that they actually work as planned, or that the investment in each of them is of equal value. There is a need to test how well each of these measures reach the intended users, how well they work in practice and to compare that with what they cost to implement, considering who carries that cost and what that means for access.

### 3.2 Implications

As Figure 4 illustrates, the examples in our paper are front-end heavy. Most of these boosts and nudges target the user before or at the start of a trip. It is more difficult to design nudges that reach the user once they leave the parking lot and head into the mountains. Perhaps that is sufficient, though that needs to be investigated. At the same time, mentoring is another form of soft regulation that could serve

both as a kind of boost prior to and after trips in general, and a nudge during the planning and execution of particular trips. However, there is no formalized process for mentoring for recreational backcountry users in Norway today, even though recreationists and winter snow professions expressed a desire and need for it. It can happen informally, but that requires knowing and having access to mentors. Another post-trip suggestion in Figure 4 is Trip reporting and reflecting – a kind of guided debriefing for both others' benefit and one's own. Learning from experience is, after all, a life-long process and something can be learned from every day on the mountain, also from others. We have developed the Reflectometer, a tool to help the reflection process, and are testing its effect on learning and practice (see Fjellaksel et al., 2024b; Landrø et al., In preparation).

Finally, another post-trip suggestion is continued avalanche education and training. After and before "any trip" cyclically overlap in this regard, but by adding it to the end, it reminds us to be more deliberate in addressing the woefully insufficient "one-and-done" approach to avalanche course participation.

What ideas might you have to add to this menu of options? Why those? When are they relevant? What might they cost?

Policymakers must have clear regulatory goals and an awareness of related costs. If we have limited resources, policymakers must choose how independent they truly want back-country mountain users to be. If they want to continue allowing skiing in Norwegian mountains in the spirit of the freedom to roam, which boosts and nudges are most effective, and what does it cost – both in money and human capital - to implement them (or to *not* implement them)? Who will be responsible for developing and implementing them? Who are natural partners in such work (such as the Norwegian Water and Energy Directorate we

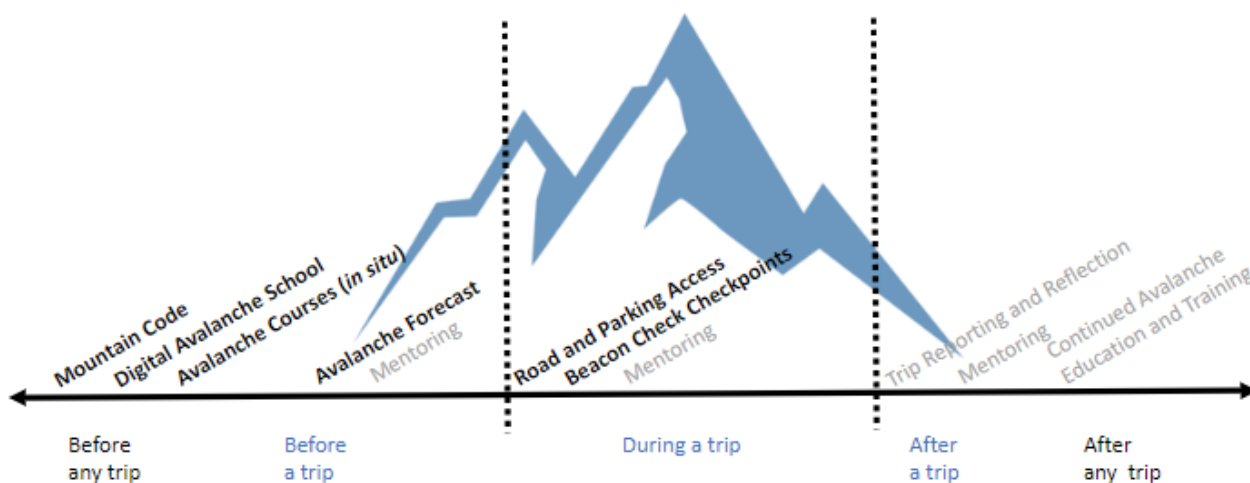


Figure 4. Placement of our illustrative boosts and nudges (in bold) with some suggestions for more (in gray). Background image source: <https://www.vecteezy.com/vector-art/622948-mountain-logo-vector-illustration>.

introduced here, as well as departments of transportation, winter recreation organizations, volunteers, or the like). These are questions we don't have answers for but have at least laid the groundwork for in this paper.

One reason for not being able to answer the cost / benefit question is that we do not know how many back-country recreationists use the mountains, nor how many avalanche-related incidents occur, thereby limiting our ability to calculate the fatality rate (see Toft et al., 2024 for more about this). Note, also, that bad decisions can still co-occur with good outcomes (no avalanche), challenging how to measure boosting and nudging effectiveness.

Lastly, when mountain conditions are at the highest danger levels, boosts and nudges are not sufficient. Authorities do then bypass soft regulation and go right to active regulating of mountain access with, for example, road closings and evacuations – thus moving away from the ethos of individual autonomy and self-regulation to the ethos of authority and collective regulation for the sake of health and safety.

### 3.3 Limitations

Though we have listed boosts and nudges independently, it may be that the effectiveness of some nudges is dependent upon prior boosts. For example, the ubiquitous Norwegian Mountain Code sets the stage for expecting people to assess their competence and capacity before embarking on a trip. How does having that in one's mind change later course participation or trip planning? And how is that different for mountain users who are not familiar with the mountain code expectations for how to be in the mountains?

We know we haven't covered all boosts and nudges that are out there, and there may well be important or frequently used boosts or nudges that should have been included. Recent research at CARE, for example, surveyed people on which resources they used for trip planning (Fjellaksel et al., 2024c). Socially available information and own judgement were mentioned as often or more as official information from the avalanche bulletin. Some also mentioned choosing safe trips outside of avalanche territory. Understanding which social information is used, and how, is important, as is the quality of people's own judgement.

We also have not reported the costs of each of the boosting and nudging measures, nor what we define as relevant costs for that equation, so that is yet another area for future work and research.

## 4. CONCLUSION

Boosts and nudges are effective means for helping backcountry travelers make smarter decisions in potentially hazardous terrain. Many types exist already,

and it is likely that a combination of the most effective boosts and nudges may promote the safest trip outcomes. The advantage of using them is that they support backcountry travelers in doing what they love and in exercising their autonomy as free and responsible movers in the mountains.

Future research should address and compare the costs and effectiveness of targeted boosts and nudges, the best and most trustworthy people or organizations to partner with to optimally deliver them, as well as the risks associated with them. How might they differ in effectiveness in relation to various user groups, for example, who might have different social and cultural backgrounds, different background knowledge and skills, and varying goals and motivations?

Also, there is a dire need to design boosts, or especially nudges, that can reach backcountry recreationists when out in the mountains, beyond the parking lot.

This work will require a concerted effort by the avalanche community, researchers, policy makers, private stakeholders and regulative authorities. Sharing experiences and learning from each other, along with the recreationists who use the mountains will be a good place to start as we determine when and how to best boost and nudge people to make smart backcountry decisions – with personal autonomy and competence while actively looking out for themselves and others. It's relevant for recreationists *from* Norway, for visiting recreationists *to* Norway and for the winter mountain communities beyond. After all, figuring out how to boost, nudge and, when necessary, regulate safe mountain fun is in the best interest of everyone.

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