

REDUCING RISKY BEHAVIORS:
APPLYING THEORIES OF BEHAVIORAL CHANGE TO AVALANCHE EDUCATION

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ABSTRACT: Avalanche course curriculum tends to focus on three main areas: the technical and observable underpinnings of avalanche formation and release, decision-making, and rescue skills. The most difficult of these areas to quantify, decision-making, can be challenging precisely because individuals perceive risk differently. Avalanche education from the classroom level to wider public-service campaigns can benefit from knowledge of behavioral health theories as they relate to improving the comprehension of risk-taking behaviors. Drawing from the field of public health, behavioral change theories seek a process-oriented approach to understanding health behaviors as a basis for developing more effective ways to influence and change behavior. In relation to avalanche education, behavioral change theories can be applied to mitigation of risk-taking behaviors. By incorporating this approach, behavioral change theory can aid both educators and individuals by offering a framework for further understanding the basis of risk-taking behavior and providing additional tools to help influence behavioral choices and attitudes as they pertain to the decision-making process.

KEYWORDS: avalanche education, human factors, decision making, risk, behavior change

1. INTRODUCTION

The use of behavioral change theories can benefit avalanche education at both the classroom level as well as in broader public awareness campaigns. The purpose of this paper is to introduce the more formal application of behavioral change theory from a public health viewpoint and to explore how to incorporate these ideas into avalanche education. As human factors research and tools for hazard evaluation continue to develop, the challenge continues on increasing the emphasis for educators to encourage and lead students to the behaviors that utilize this information (McCammon 2000). The concepts of behavioral change theories are common in the health education field (Jackson 1997), yet there remains ample room to more directly incorporate the ideas of behavioral change theory into the unique field of avalanche education.

Public health officials frequently apply behavioral change theory to influence both long-term and daily behavioral decisions such as smoking

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cessation, diet and exercise, safe sex, etc.; similarly, we can also apply the concept of regular and consistent decision making principles to avalanche

education, e.g. "go or no-go", terrain selection, safe travel techniques, etc. A growing body of work on human factors and the dynamics of decision making, continues to help in identifying those factors that can bias the decision making process (Tremper 2008; Atkins 2000; McCammon 2002). The development of numerous guides such as the Avaluator (Haegeli et al. 2006), the AIARE Communication Checklist (AIARE 2016), and others aim to provide a data-based or objective approach to aid decision making; yet, the full value of these tools may be lost without also understanding and influencing the behaviors to encourage their use. Influencing behavioral norms during the educational process, both at an individual or course level as well as with broader public-education campaigns can increase the likelihood of effecting desired behavioral changes with regard to avalanche hazard evaluation and decision making in the field.

Many of the concepts outlined in the Fig. 1 below may seem intuitive and familiar, and aspects of each are likely found in most quality avalanche courses, if not explicitly identified as such. A more detailed understanding of the origins and influencing factors on behavioral change can aid in the understanding of how diverse situations and individuals may benefit from differing approaches. Introducing the ideas of behavioral change theories can therefore provide for better awareness and inclusion when designing and presenting avalanche education materials.

2. METHODS AND DISCUSSION

A distinction is made between the terms of behavioral health *model*, which is aimed at understanding a behavior, and behavioral change *theory*, which is aimed at changing or influencing a behavior. Examples of both are given in Fig. 1 below. Generally, different theories incorporate different models, i.e. changing behavior rests on an understanding of behavior, and there is some overlap where noted. This list is not intended to be exhaustive in its depth nor its inclusiveness; rather, the primary models and theories are outlined as an initial overview to understand how current concepts of behavioral change can be applied to avalanche education. Further, no one behavioral theory can be applied to every situation and their development continues to be an active area of public health research.

1.2 Classroom level approaches to influencing behavior

Skills taught at the classroom level have the benefit of tailoring the information to fit the needs of an individual or group. Using the social-cognitive model, we can evaluate the relationship between environment, behavior, and other personal factors (Fig. 2). In the context of an avalanche class, we can consider the following:

1. Personal factors: The self-efficacy of the individual to perform the required tasks.
2. Behavioral response: The positive or negative response received when performing a behavior.
3. Environment: The availability of tools and support for performing an action; understanding the environment in which behavioral decisions are likely to be made.

Theory/model	Overview	Key influencing factors
Self-efficacy model	The impression of one's own ability to perform a challenging or demanding task, e.g. testing slope stability or route selection	Prior success in the task or related task; Individual's psychological state; Outside sources of persuasion
Health belief model	For one to act, the perceived threat and its severity and benefits of action must outweigh barriers to action	Subjective assessment of susceptibility; Seriousness of risk; Perceived inconvenience; Perceived benefits
Social-cognitive theory	Behavior change is a result of the relationship between environment, personal factors, and the behavior itself.	Self-efficacy of behavioral change and the reciprocal relationship between the environment, behavior, and personal factors
Theory of reasoned action	Consequences are considered before performing an action; therefore, intentions are predictive of actual behavior	Intentions are shaped by: (1) One's attitudes toward the behavior (value of expectations); and (2) Beliefs about others' support of the behavior
Theory of planned behavior	An expansion of the Theory of Reasoned Behavior to include a consideration of one's perceived control of all factors affecting intention and the strength of one's intention	In addition to the above, intentions are influenced by one's perceived level of behavioral control

Fig. 1: Overview of primary models and theories of behavior and behavioral change (US Department of Health and Human Services 2002). Using specific examples to further illustrate some of the ideas presented in the table above, we can begin to see how to directly apply concepts of behavior change theory, including the self-efficacy (Bandura 1997) and health belief (Rosenstock 1974) models, social-cognitive theory (Bandura 2004) and theories of reasoned action and planned behavior (Ajzen 1991; Madden et al. 1992).

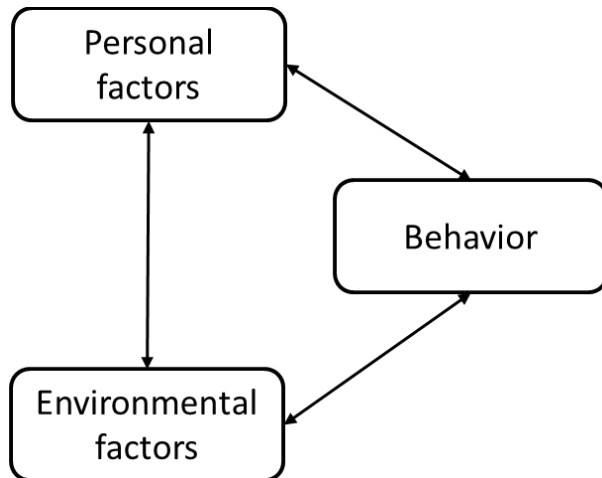


Fig. 2. The social-cognitive framework and relationship between personal factors, behavioral response, and the environment.

In the classroom setting, providing familiarity with available tools, e.g. weather and avalanche forecasting websites, discussions of key local terrain features, and conversations about various human factors (group think, expert halo, etc.) are all examples of the environmental context of behavioral decision making. Tying these topics back to the response received when performing an action can help influence behavior. For example, ask students to discuss recent weather and avalanche forecasts at the beginning of every class or field session, and then rewarding their insights and use of these tools. Encouraging students to be prepared with this knowledge for future planning sessions and excursions can have benefits throughout the class and beyond.

During field training components of avalanche courses, the self-efficacy model shows how the primary foundation for developing good decision making behavior is confidence in the related skills, e.g. slope stability testing, route selection, analysis of weather and avalanche forecasts, etc. Early success and confidence in such skills are key for influencing future behavior. A focus on skills practice can improve the confidence in individuals for performing said skills, and therefore increase the long-term behavioral choices in utilizing those skills outside of the classroom environment. Further, rewarding successful outcomes of target skills will enhance the likelihood of their replication.

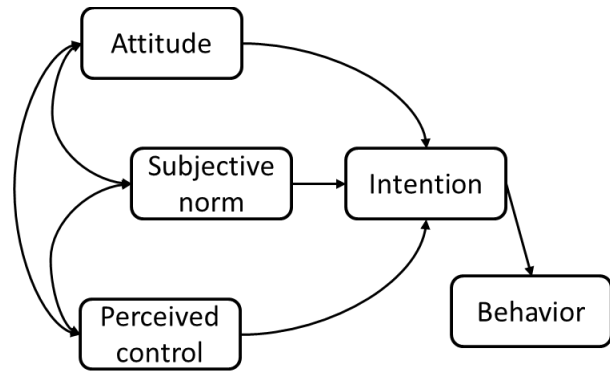


Fig. 3. The relationship between components of the theory of planned behavior, including the concept that one's perceived level of behavioral control will influence intention and that intention ultimately is the driver of behavior.

Applying the theory of planned behavior, we see that a combination of personal attitudes, perceived level of behavioral control, and subjective norms influence intention, which in turn guides behavior (Fig. 3). Consider this three-pronged approach in the context of teaching any particular skill, such as the techniques of a shovel shear test. Questions for the instructor to address should include: What is the value of this test (attitude)? What are the possible outcomes of this test and what behavioral choices are linked to those outcomes (attitude)? What is the social norm for who performs this test and when (subjective norm)? What factors can aid or hinder the performance of this test (perceived control)? Due to the complex nature of avalanches and the uncertainty of observable variables in the field, answers to these types of questions may rarely be straightforward; yet, the better that an instructor can address these ideas, the greater the influence on intention to perform a given task, and therefore behavior. Learning can still happen in the absence of providing wider context for the skill; however, effective *implementation* of the skill necessitates an understanding of the relevance, personal meaning, and accessibility for performing the behavior. At all stages of skills instruction, efforts to support desired behavioral outcomes can result in more effective retention and will improve the likelihood of future use those skills.

2.2 Influencing broad-based behavioral norms

In public service campaigns, prime targets for the application of behavioral theory include influencing both general expectations for standard behavioral models through reinforcement of desired social norms and the encouragement of individual self-

efficacy and behavioral control. A common approach for any type of advertisement is the use of relatable spokespersons with whom the target audience can identify. These individuals can then model the desired behaviors of good decision making and risk evaluation. Examples of celebrity representatives for a public service announcement about avalanche safety might include well-known skiers, climbers, or other outdoor adventurers. However, an additional approach is the use of an “everyman” or other non-expert to model desired behaviors as the normal routine rather than as expert-only skills. This tactic may be particularly useful in targeting user groups that may lack readily recognizable public figures, such as snowshoeing or snowmobiling. For example, a familiar local celebrity or professional athlete from outside the arena of winter recreation may be able to exert greater influence on a wider audience than testimony from experts in the field who may be obscure to the lay person. In this case, the goal may be less about instructing specific skills and more focused on modeling the behavioral expectations for performing certain tasks or directing the audience to resources where they can learn the requisite skills. Further, repetition of a consistent message across a range of presenters and platforms, including both experts and non-experts, has the additional benefits of establishing social norms and influencing the beliefs about other people’s support for the desired behavior.

Another ripe target for modeling desired behavioral norms is to target the winter recreation media industry for greater inclusion and emphasis on avalanche evaluation in backcountry or extreme skiing/snowboarding/snowmachine films, magazines, and other media. While less explicit than a direct messaging campaign about avalanche danger and awareness, regular inclusion of even short, straight spoken clips or discussions about the evaluation, consideration, and mitigation of avalanche hazards have the potential to yield a more lasting effect through repetition. Encouraging a standard of demonstrating some level of avalanche hazard evaluation, e.g. stability testing, terrain and weather evaluation, etc., as modeled by experts can provide a broad, top-down message of social expectations. A side-by-side inclusion of such messaging need not distract from otherwise glossy and impressive productions, nor should these productions be expected to teach all of the skills involved in the behaviors; even so, every opportunity for accurate modeling of the desired

behaviors can help to set and reinforce desired social norms.

3. SUMMARY AND FUTURE WORK

Continued research aimed at addressing the full range of human factors that contribute to avalanche accidents are vital, including endeavors aimed at improving judgement, skills, and knowledge. Decision-making tools ranging from checklists to data-based decision-making-matrices are one such approach, yet all have limitations, not the least of which is the promotion and consistent use of these tools and other methods aimed at “standardization” of the decision-making process. At all levels, the underlying concept of self-efficacy is the foundation for successful implementation and influence of desired behavior norms. Providing students and the public with greater confidence in performing the skills involved with risk assessment, hazard evaluation, and decision making will increase the success and consistency with which these skills are performed across all user groups and ability levels.

Further efforts towards encouraging behavioral expectations of the decision-making process (whether this is to utilize specific evaluation tools, other checklists, or some other desired standard) are also necessary in order to exact actual behavior change. In the examples above, we can begin to see how to apply behavioral change theory to avalanche education. Additional and more detailed application of the various theories can provide further insight into techniques for influencing specific behaviors (Ryan 2009) during the avalanche educational process. Analysis on the relationship between instruction of skills like stability testing, route selection, and other preventative techniques compared to the emphasis of rescue skills is another area for investigation in efforts at preventing avalanche accidents. The differing needs of varying skill levels are likewise important; while beginners may benefit from encouraging behaviors aimed at more specific evaluation methods and tools (e.g. the Avaluator), experts tend to rely more on intuition, and thus each group requires differing behavioral emphasis.

Evaluation and decision making with regard to travel in avalanche terrain is a complex process with many confounding factors. Efforts to influence the underlying behaviors necessary to act must accompany the knowledge of key decision points, heuristic traps, and other human factors. Such consideration of how to specifically influence

behavior during avalanche education will benefit future development and deployment of tools and techniques to improve avalanche safety and decision making in the field.

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