POWDER, PERCEPTION, & THE PATRIARCHY: A GENDERED LOOK AT BACKCOUNTRY BEHAVIOR

Sarah Petelinsek[1,2*], Kailey Mahoney[4], Nikki Champion[3], Rowan Kelner[2,5], Olivia Pearson[5], Boomer Olsen[6], Peilu Zhang[1], and Patrick G. Hughes[2,5]

1 Department of Population Health Sciences, University of Utah, Salt Lake City, Utah, USA
2 Spencer Fox Eccles School of Medicine, University of Utah, Salt Lake City, Utah, USA
3 Utah Avalanche Center, Salt Lake City, Utah, USA
4 Division of Public Health, University of Utah, Salt Lake City, Utah, USA
5 Department of Emergency Medicine, University of Utah, Salt Lake City, Utah, USA
6 Department of Internal Medicine, University of Utah, Salt Lake City, Utah, USA

ABSTRACT: Gender may influence risk perception, decision-making, and participation in high-risk outdoor environments, yet gender differences among backcountry recreationists in the United States remain poorly characterized. We examined whether gender was associated with backcountry participation, avalanche education, and risk-taking behavior among Utah backcountry users. We performed a cross-sectional analysis of an anonymous online survey administered through the Utah Avalanche Center from January through February 2025. Participants completed demographic questions and validated measures of risk-taking, including the Risk Taking Inventory for High-Risk Sports (RTI), Domain-Specific Risk-Taking Scale (DOSPERT), and Gambler's Choice. Among 354 participants with complete demographic data, 263 (74%) identified as men and 91 (26%) identified as women. Women were significantly younger than men ($p < 0.001$). Women had lower mean RTI scores than men (1.46 ± 0.46 vs. 1.58 ± 0.52; $p = 0.002$) and lower DOSPERT scores (3.26 ± 0.58 vs. 3.52 ± 0.63; $p < 0.001$), while Gambler's Choice scores did not differ significantly ($p = 0.16$). Educational participation also differed: women reported higher Avalanche Level 1 completion than men (91.9% vs. 83.8%), although this difference was not statistically significant ($p = 0.071$), whereas men were more likely to report Backcountry 101 participation (34.8% vs. 12.5%; $p = 0.041$). Despite these differences, women and men reported similar levels of backcountry participation, including days per season, user type, and primary method of travel. These findings suggest that gender may be associated with differences in reported risk-taking and educational experiences without corresponding differences in overall backcountry engagement. Understanding these differences may help avalanche educators consider how users with different experiences and relationships with risk engage with backcountry education.

KEYWORDS: Gender; Backcountry recreation; Avalanche education; Risk-taking behavior; Risk perception; Decision-making

1. INTRODUCTION

Backcountry recreation requires individuals to make decisions under uncertainty, often with incomplete information and potentially serious consequences. Understanding how people perceive and respond to risk is therefore central to avalanche safety. Although gender differences in risk-taking have been studied across a range of settings, relatively little is known about how gender relates to risk-taking, education, and participation among backcountry users in the United States.

* Corresponding author address:
Sarah Petelinse
Department of Population Health Sciences
University of Utah, Salt Lake City, UT, USA
email: sarah.petelinsek@hsc.utah.edu

Gender is a social and structural variable that can influence behavior, opportunities, social expectations, and decision-making (Barr et al., 2024; Kågesten et al., 2016). Across multiple domains, women have often demonstrated lower risk preferences than men, although these differences vary by context and measurement approach (Croson and Gneezy, 2009; Filippin and Crosetto, 2016). Risk-taking may also change when decisions involve responsibility for others or occur within groups (Ertac and Gurdal, 2012; Pahlke et al., 2015).

Outdoor recreation provides a particularly relevant setting in which to examine these relationships. Previous research has identified gender differences in outdoor experiences, injury and illness reporting, and perceptions of risk (Twombly and Schussman, 1995; Mannberg et

al., 2018). Women have also been described as taking fewer risks in some outdoor settings, although findings have not been consistent. Among professional mountain guides, for example, no gender differences were identified in decision-making or risk tolerance despite perceptions that women took less risk (Walker and Latosuo, 2016).

Backcountry recreation and skiing have historically been characterized as masculinized spaces. Previous research has described barriers to women's participation, including gender discrimination, pressure to perform, and limited mentorship (Malterud et al., 2023; Rogers and Rose, 2019; Stoddart, 2010). At the same time, women's participation in outdoor recreation has increased, potentially changing who participates in and contributes to traditionally masculine outdoor spaces (Jacobs, 2020).

Avalanche education represents another potentially important component of backcountry participation and decision-making. Education may influence risk perception, confidence, and decision-making among backcountry skiers (Greene et al., 2025). However, whether women and men access avalanche education similarly remains poorly characterized, particularly within the United States.

We therefore examined gender differences in backcountry participation, avalanche education, and risk-taking behavior among a cohort of Utah backcountry recreationists. We sought to characterize whether differences in reported risk and educational participation were accompanied by differences in overall engagement with backcountry recreation.

2. METHODS

2.1 Study design and setting

We performed a cross-sectional secondary analysis of data collected in partnership with the Utah Avalanche Center (UAC). An anonymous online survey was administered from January through February 2025 to individuals participating in winter backcountry recreation in Utah. The study was reviewed and approved by the University of Utah Institutional Review Board.

2.2 Participants

Participants were adults aged 18 years or older who reported prior experience with winter backcountry recreation and had access to UAC resources. Participants provided informed consent and completed the survey in English. Respondents with incomplete data were excluded from analyses requiring complete demographic information.

The survey was hosted on Qualtrics and distributed through a pre-existing UAC email listserv using a digital QR code linking to the online questionnaire.

2.3 Measures

The survey was part of a larger study investigating risk preference and risk-taking behavior among backcountry users. For this analysis, we examined demographic characteristics, backcountry and avalanche education, risk preference and risk-taking behavior, and backcountry participation.

Risk-taking was assessed using three measures. The Risk Taking Inventory for High-Risk Sports (RTI) is a validated measure of risk-taking in high-risk sporting contexts (Woodman et al., 2013). The Domain-Specific Risk-Taking Scale (DOSPERT) assesses risk-taking across domains (Blais and Weber, 2006). Gambler's Choice is a single-item measure of risk preference based on choices involving actual or hypothetical gambles (Eckel and Grossman, 2008).

Education variables included participation in Backcountry 101, Avalanche Level 1, Avalanche Level 2, professional avalanche training, and wilderness medicine courses. Participation variables included recreational versus professional user type, number of backcountry days per season, and primary method of travel.

2.4 Data analysis

Data were exported from Qualtrics and analyzed using R version 4.5.1 (R Foundation for Statistical Computing, Vienna, Austria) within RStudio version 2026.01.0 (Posit Software, PBC, Boston, MA). Data cleaning and transformation were conducted using the tidyverse package, and descriptive and scale-based summaries were generated using the psych package.

Categorical variables were summarized using counts and proportions, while continuous variables were summarized using means and standard deviations. Chi-square tests were used for categorical comparisons when expected cell counts were adequate, and Fisher's exact tests

were used for sparse tables. Independent-sample t-tests with Welch's correction were used to compare continuous variables. Effect sizes for categorical comparisons were assessed using Cramér's V. All statistical tests were two-sided, with statistical significance defined as $p < 0.05$.

3. RESULTS

3.1 Participant characteristics

Of 457 total respondents, 354 (77%) provided complete demographic data and were included in the primary analysis. Of these, 263 (74%) identified as men and 91 (26%) identified as women. Respondents who selected non-binary, preferred not to say, or another gender identity were excluded from gender-stratified analyses because of small cell sizes.

The study population was predominantly White (94%) and not Hispanic or Latinx (96%). The modal age group was 26–35 years (40%), followed by 36–45 years (25%). Most participants identified alpine or telemark skiing as their primary method of travel (79%), followed by snowboarding (16%). Participants reported an average of 32 ± 33 days of backcountry recreation per season.

Women and men differed significantly in age distribution ($\chi^2(4) = 23.7$, $p < 0.001$; Cramér's V = 0.26). The most common age group among women was 26–35 years (61.5%), compared with 33.1% of men. No significant gender differences were observed in income, race, or ethnicity.

3.2 Avalanche and backcountry education

Educational participation varied across gender groups (Table 1). Women reported higher Avalanche Level 1 completion than men (91.9% vs. 83.8%), although this difference did not reach statistical significance ($p = 0.071$).

In contrast, men were significantly more likely to report completion of Backcountry 101 than women (34.8% vs. 12.5%; $p = 0.041$).

No statistically significant gender differences were observed in Avalanche Level 2, professional avalanche training, or wilderness medicine course participation.

Table 1: Backcountry and avalanche education by gender.

Training type	*Women, n (%)*	*Men, n (%)*	*p-value*
Backcountry 101	11 (12.5)	92 (34.8)	0.041
Avalanche Level 1	84 (91.9)	220 (83.8)	0.071
Avalanche Level 2	15 (16.3)	65 (24.7)	0.131
Professional avalanche course	8 (9.3)	39 (14.9)	0.266
Any wilderness medicine course	38 (41.7)	103 (39.1)	1.000

3.3 Risk-taking behavior

Significant gender differences were observed on two validated measures of risk.

Men demonstrated higher mean RTI scores than women (1.58 ± 0.52 vs. 1.46 ± 0.46; $t(201) = -3.10$, $p = 0.002$). Men also demonstrated higher mean DOSPERT scores (3.52 ± 0.63 vs. 3.26 ± 0.58; $t(197) = -3.82$, $p < 0.001$).

Gambler's Choice scores did not differ significantly between men and women (4.56 ± 1.61 vs. 4.30 ± 1.50; $t(143) = -1.42$, $p = 0.16$).

Thus, gender differences were observed on the two multi-item risk measures but not on the single-item Gambler's Choice measure.

Table 2: Risk preference scores by gender.

Measure	*Women*	*Men*	*t (df)*	*p-value*
RTI mean score	1.46 ± 0.46	1.58 ± 0.52	−3.10 (201)	0.002
DOSPERT total	3.26 ± 0.58	3.52 ± 0.63	−3.82 (197)	<0.001
Gambler's Choice	4.30 ± 1.50	4.56 ± 1.61	−1.42 (143)	0.16

3.4 Backcountry participation

Despite differences in risk measures and some educational measures, we did not observe statistically significant gender differences in overall backcountry participation.

The majority of participants identified as recreational users, including 91.2% of women and 89.3% of men ($p = 0.61$). Women reported 28.0 ± 24.8 backcountry days per season compared with 32.0 ± 32.6 days among men ($p = 0.23$).

Primary method of travel also did not differ significantly between genders ($p = 0.17$). Alpine or telemark skiing was the most common activity

among both women and men, representing 81.3% and 78.3% of participants, respectively. Snowboarding represented 11.0% of women and 17.5% of men.

4. DISCUSSION

This study identified gender differences in reported risk-taking and in some aspects of avalanche and backcountry education, but did not identify significant differences in overall backcountry participation. Women reported lower risk-taking on two validated measures. Women also reported higher Avalanche Level 1 completion, although this difference was not statistically significant, while men were more likely to report Backcountry 101 participation. Despite these differences, women and men reported similar levels of backcountry engagement.

4.1 Gender and risk in the backcountry

The finding that men reported higher risk-taking than women on both RTI and DOSPERT is consistent with previous research describing gender differences in risk preferences (Croson and Gneezy, 2009; Harris et al., 2006). However, the absence of a significant difference in Gambler's Choice demonstrates that the relationship between gender and risk may depend on how risk is measured.

RTI and DOSPERT are multi-item measures that assess risk across multiple situations, whereas Gambler's Choice is a single-item measure. The difference between these measures could reflect differences in their sensitivity within a backcountry population. It may also reflect the distinction between reported risk preference and behavioral risk.

These findings should not be interpreted as demonstrating that women are inherently safer backcountry users or that men are inherently unsafe. Rather, they indicate that gender was associated with differences in reported risk-taking on two validated measures within this cohort.

4.2 Gender and education

The educational findings suggest that women and men may have different experiences with backcountry and avalanche education. Women reported higher Avalanche Level 1 completion, although the difference was not statistically significant, whereas men were more likely to report participation in Backcountry 101.

Several factors could contribute to these differences. Women in this cohort were significantly younger than men, and differences in educational participation may therefore reflect differences in when participants entered backcountry recreation or progressed through available courses.

Social factors may also influence educational opportunities. Previous research has described skiing and other outdoor environments as historically masculinized spaces and has identified barriers including discrimination, pressure to perform, and limited mentorship (Malterud et al., 2023; Rogers and Rose, 2019; Stoddart, 2010).

The present data cannot determine why educational participation differed. However, the findings highlight the importance of considering how users enter and progress through avalanche education rather than assuming that all backcountry participants follow the same educational pathway.

4.3 Participation despite differences in risk

One of the most notable findings was that differences in reported risk-taking were not accompanied by differences in measured backcountry participation.

Women and men reported similar numbers of backcountry days per season, similar proportions of recreational and professional users, and similar primary methods of travel. Thus, lower reported risk-taking among women did not correspond to lower reported engagement with backcountry recreation in this cohort.

This finding may be useful when considering how risk and participation are discussed in avalanche education. Frequency of participation does not necessarily indicate an individual's tolerance for risk. Backcountry users may differ in how they manage risk while participating at similar levels.

4.4 Implications for avalanche education

These findings suggest that avalanche educators should consider variation in users' experiences with risk and education when developing outreach and educational programs.

The data do not support creating separate educational approaches for men and women. Rather, they suggest value in understanding the different pathways through which users enter

backcountry recreation and progress through education.

Representation may also matter. Previous literature has identified mentorship and belonging as important factors in women's experiences in outdoor environments. Increasing visibility of women among instructors, educators, guides, and other leaders may provide additional opportunities for mentorship and continued participation.

At the same time, interventions should avoid reinforcing assumptions that women are inherently risk-averse or that men are inherently risk-seeking. The goal should be to expand access to education and expertise while recognizing that individual risk preferences vary substantially within every gender group.

5. LIMITATIONS

This study has several limitations. First, the sample was predominantly male, White, and not Hispanic or Latinx. The small number of participants identifying with other gender identities prevented meaningful gender-stratified analyses of those groups.

Second, participants were recruited through the Utah Avalanche Center, limiting generalizability to backcountry users who do not interact with UAC resources. The findings therefore represent a specific Utah-based cohort rather than all backcountry users.

Third, many outcomes were self-reported and may be affected by recall or social desirability bias. Risk measures may reflect perceived rather than observed behavior.

Finally, the cross-sectional design prevents causal inference. The observed associations between gender, education, and risk-taking cannot establish whether gender itself produces differences in behavior or whether other demographic, social, or experiential factors contribute to the observed relationships.

6. FUTURE DIRECTIONS

Future research should examine how gender and other characteristics interact with avalanche education, mentorship, risk perception, and field behavior.

Longitudinal studies could determine whether differences in educational participation persist as users gain experience. Field-based research could also help determine whether differences in reported risk preferences correspond to differences in terrain selection, group decision-making, or other observable behaviors.

Further research should examine why some users progress from foundational to advanced avalanche education while others do not. Potential contributors include mentorship, social networks, cost, access, professional opportunities, confidence, and perceived belonging.

Finally, future studies should include more diverse populations and examine gender beyond a binary framework. Better understanding the experiences of women and other underrepresented groups may help the avalanche community build educational environments that support participation, expertise, and safety across a broader range of backcountry users.

7. CONCLUSIONS

In this Utah cohort, gender was associated with differences in reported risk-taking and some aspects of backcountry and avalanche education, but not with overall backcountry participation. Women reported lower risk-taking than men on two validated measures, while Gambler’s Choice scores did not differ. Women reported higher Avalanche Level 1 completion, although this difference was not statistically significant, whereas men were more likely to report Backcountry 101 participation. Despite these differences, women and men reported similar levels of backcountry engagement.

Together, these findings suggest that gender may shape how backcountry users perceive and engage with risk and education without necessarily determining how frequently they participate. Continued research into educational pathways, mentorship, and the experiences of underrepresented backcountry users may help inform more inclusive avalanche education.

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