

Communicating Minimum Impact Behavior With Trailside Bulletin Boards: Visitor Characteristics Associated With Effectiveness

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Abstract—Bulletin boards are a frequently used method of communicating minimum impact behaviors to wilderness visitors. But how effective are they? What types of visitors are most likely to pay attention to the messages posted there? This study used a field experiment to identify visitor characteristics associated with attention to minimum impact messages posted on a bulletin board located along a heavily used trail into the Selway-Bitterroot Wilderness. The results indicated that the bulletin board was most effective for hikers and overnight users. Personal utility of the messages posted on the bulletin board was one reason that such users, rather than horse riders or day users may attend to them.

With a generally accepted objective of minimizing human-induced recreational impacts on the biophysical and social character of wilderness environments, managers continue to rely on trailside bulletin boards to communicate important messages to visitors. Reduced budgets and a resulting smaller presence in the field mean that such bulletin board messages are increasingly significant in the repertoire of communication tools. Bulletin boards are relatively inexpensive to place and maintain, and are highly adaptable as locales for new messages and information. Since most visitors must pass by bulletin boards when placed at trailheads or along trails, the potential audience for the messages placed on them includes virtually all wilderness visitors.

Bulletin boards are enormously popular with wilderness managers. Douchette and Cole (1993) report that bulletin boards are used in at least 67% of wilderness areas. Bulletin boards are used to communicate information important to both visitors and managers, including rules and regulations regarding visitor use, warnings of fire and wildlife dangers, orientation to the area, descriptions of the areas through text, photographs and maps, and appropriate visitor behavior for reducing biophysical and social impacts. Managers often view bulletin boards as a cost-effective method of

transmitting a wide variety of necessary information, but the boards can easily become cluttered with visually conflicting messages.

A major purpose of bulletin boards is to communicate messages about minimum impact behaviors. Despite their frequent use by wilderness managers and their immense potential audience, little is known about the ability trailside bulletin boards to capture the attention of passing wilderness visitors, effectively communicate minimum impact messages, change behavior, and generally reduce biophysical and social impacts. Although attempts to educate visitors about minimum impact behavior have expanded and improved over the last two decades, knowledge about this topic remain relatively low. Cole and others (1997), for example, report that the average score on an eight-item minimum impact behavior quiz varied from 16% when there were no messages on a trailside bulletin board to 42% when eight messages were present.

Placing messages on trailside bulletin boards implicitly assumes that travelers passing by will stop, attend to, process and respond to the message. However, a variety of intervening variables and processes mitigate the assumed effectiveness of such messages. Given the system-wide investment in trailside bulletin boards and the implicit assumptions about their capabilities, understanding the factors that influence their effectiveness would seem critical to programs emphasizing visitor education.

Variables influencing effectiveness may be broadly characterized as message, visitor, and situational characteristics. Message characteristics include design parameters such as color, size, length, number and placement of the message. Other important message attributes involve message content, the nature of the persuasive argument used, and message source characteristics. Situational characteristics involve not only the specific site of the bulletin board, but the social and behavioral context that affects decisions to engage in minimum impact behaviors. Visitor characteristics that may be influential when trying to encourage minimum impact behaviors include attributes of the visit itself (length of stay, for example), social-demographic background of the visitor, previous experience and level of knowledge and a host of social-psychological variables, such as involvement, motivation and existing belief systems). Ideally, each of these attributes is considered in a systems context when developing appeals to a specific audience, thereby increasing the probability that the message will be received, considered, adopted and acted upon.

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While managers can control message attributes through appropriate design and production, they have little control over the visitor and situational characteristics that influence message effectiveness. Messages on bulletin boards are read at the whim of the potential audience. Messages wait passively for visitors to attend to them, often in settings with a variety of environmental attributes that compete for the visitor's attention. Understanding which visitor variables influence effectiveness in this environment can help managers develop and place messages that are more appealing and more compelling.

In this paper, we focus on visitor characteristics that are associated with attention to, comprehension of and knowledge gained from messages placed on trailside bulletin boards. We do so because understanding the characteristics of one's audience is perhaps the most critical component of developing effective persuasive appeals. In the research reported here, we examine four specific kinds of visitor characteristics: 1) those that characterize the wilderness visit itself (length of stay, travel method); 2) social-demographic characteristics (age, sex, educational level), 3) perceived knowledge of minimum impact behavior and frequency of seeing information about appropriate behavior; and 4) previous wilderness experience. We test relationships between these independent variables and the following dependent ones: exposure to the bulletin board, attention visitors pay to minimum impact persuasive messages, comprehension of message content and changes in minimum impact knowledge. Finally, we discuss the implications of our findings for future research and management.

Framework

Research in communication and attitude theory has identified numerous visitor variables such as affect, involvement, perceptions of source credibility, prior existing beliefs, perceived message saliency and others that mediate the communication process (Vander Stoep and Roggenbuck 1996). Each variable may play a significant role in determining the saliency of a specific persuasive message, the extent to which a visitor attends to the message, how it is interpreted and integrated into the visitor's belief system and, finally how a visitor acts on the message during a wilderness experience.

Messages placed on bulletin boards may be viewed as persuasive messages calculated to encourage visitors to adopt a group of behaviors designed to reduce the biophysical and social impacts of recreation. The effectiveness of these messages may be defined in a variety of ways including increase in awareness of biophysical and social impacts, change to a sanctioned behavior, and an enlarging knowledge base about the principles describing relationships between behavior and impact.

The effectiveness of persuasive messages in a variety of contexts has attracted a large number of researchers, who have conducted an enormous number of investigations into both personal and message characteristics that influence their efficacy. Many of the resulting models of persuasion and applications to wilderness and dispersed recreation management situations are summarized by Vander Stoep and Roggenbuck (1996). However, these models implicitly assume that message location and design are attractive

enough that audience members will attend to the message. In fact, many minimum impact messages are relatively passive in their placement—in brochures and on bulletin boards—calling into question this implicit assumption. McGuire's models of information processing suggest that message exposure through attention and processing of content is fundamental to achieving desired behavioral change (McGuire 1976;1985). His approach to information processing forms the basis of the research reported here (one version of his model is shown in figure 1). McGuire argues that persuasion begins with exposure to information—in this study, with the presentation of minimum impact messages on a bulletin board.

Exposure and attention to the message—viewing and reading the persuasive message—is essential to all further information-processing steps, including decisions to adopt the recommended minimum impact behaviors. The process of attending to messages placed on trailside bulletin boards consists of several sequential and distinctive decisions on the part of the visitor. Information-processing theory states that these decisions will be influenced by specific visitor characteristics. (Message characteristics are also influential, but this study examines only visitor characteristics.) Wilderness visitors who encounter a bulletin board along a trail make three decisions related to exposure and attention to these messages.

The first decision involves whether to stop at the bulletin board. If visitors pass the board without stopping, they will not be exposed to the persuasive appeals located there, and consequent behavior change will not occur. This means that the bulletin board must be located in a position where few

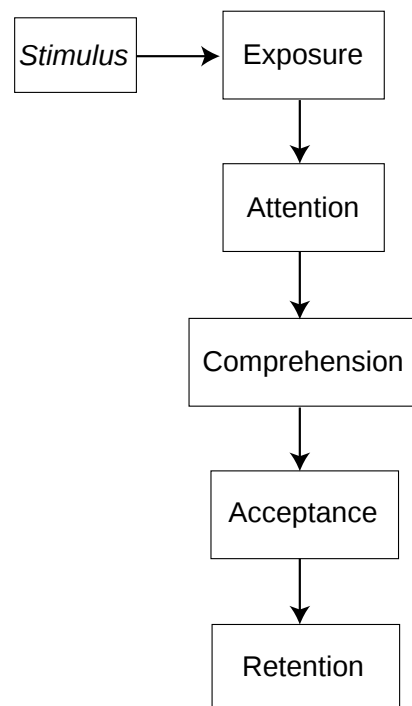


Figure 1—Representation of information processing for persuasive messages (adapted from McGuire 1976).

other attributes compete for the visitor's limited attention. Petersen (1985) found that a wilderness trail registration sign was most effective located some distance from the trailhead, apparently because there were few competing distractions. In addition, the bulletin board must contain obvious visual clues that messages located on it are salient to the visitor's needs or experience. Cole (1998), however, found that relatively elaborate such appeals (such as "avoid the need to restrict wilderness use") were less effective in getting visitors to stop than a simple request ("please take the time to read these messages"). Cole and others (1997) used a large-scale topographic map of the area placed on one of the bulletin board panels to increase the saliency of the messages.

The second decision concerns whether visitors who stop at a bulletin board will attend to the minimum impact messages placed there rather than other potentially competing messages. Bulletin boards are notorious for numerous messages carelessly clumped together, each of which compete for limited attention and provide a distraction from the others. Visitors must select from this aggregation a specific message or set of messages to read within a limited time period.

After deciding which messages to attend to, visitors decide how much time to spend on the messages. These decisions are probably made without much significant thought and are most likely affected by both message characteristics (such as clarity and simplicity) and visitor characteristics (Tykocinski and others 1994). The decision about how much attention to give to messages is important because minimum impact messages are not necessarily simple, and visitors may need to elaborate on them for understanding and later application (Petty and Cacioppo 1986).

Attention to message content should lead to better message comprehension—can the visitor recall the message?—and to higher levels of knowledge about minimum impact behavior, changes in knowledge levels and, ultimately, to behavioral changes.

Several studies have examined the role of personal relevancy or utility as a primary factor influencing attention to persuasive messages (Roser 1990; Tykocinski and others 1994; Pratkansis and Greenwald 1993). Minimum impact messages probably have more relevance for people on extended trips—such as overnight camping trips—because such messages deal with several of the behavioral aspects of the trip. Thus, we anticipate that overnight visitors would more be more likely to stop at the bulletin board than day trippers.

Lucas (1985) suggests that visitors with higher levels of education have more capacity to process and apply complex messages than visitors with lower levels. Therefore, visitors with higher levels of education should attend to persuasive messages on the bulletin board than other visitors. Sex and age of the visitor may also be associated with the decision to attend to messages, but we have no *a priori* reason to believe that one sex would be more likely to stop than the other or that younger visitors would be more or less likely to stop than older visitors.

Exposure to bulletin board messages occurs within the larger context of off-site wilderness related information (such as television and print media coverage). Wilderness visitors may be frequently exposed to minimum impact messages both off-site and on previous visits and thus have

become habituated to messages about reducing impacts. Habituation of message content may directly affect a visitor's propensity to attend to minimum impact messages on a trailside bulletin board (Cacippo and Petty 1979; Engel and others 1990). Thus, visitors who have been frequently exposed to such information should be less likely to stop at a trailside bulletin board and pay attention to its persuasive messages.

Previous wilderness experience is another variable that may influence attention to minimum impact messages. More experienced visitors tend to have different information needs than less experienced ones (Krumpe and Brown 1982; Roggenbuck and Berrier 1982; Williams and Huffman 1986). Experience may one method to measure involvement—which in this study could be defined as the intrinsic personal relevance of wilderness issues. Several researchers have noted that the motivation and capacity to process information increases with involvement (Celsi and Olson 1988). This would lead one to expect more experienced visitors to be more likely to attend to minimum impact messages. But more experienced visitors may also be more attuned and habituated to these messages and one could argue less likely to attend to them. Again, the personal utility of minimum impact messages may be less for more experienced visitors.

Age, sex and travel method should have little impact on decisions to read minimum impact messages (unless the messages deal with minimizing impacts of specific travel methods). While travel method has been found to be a variable associated with message attention in previous studies of wilderness visitors (Petersen 1985; Cole 1998; Cole and others 1997; Hammond 1994), we have no *a priori* conceptually based reason to anticipate that horse users or hikers would be more likely to stop at a bulletin board that displayed minimum impact behavior messages.

Attention to messages is critical to comprehending message content and improving knowledge about minimum impact behaviors. Comprehension should be correlated positively with time spent viewing messages, but would also be associated with motivation and capacity to process messages (that is, personal relevancy and prior knowledge). Age, sex or travel method should not be associated with comprehension. Educational attainment should be positively correlated with comprehension, because of increased capacity to understand messages. Frequency of exposure to information would be positively correlated with comprehension, because the messages displayed on the bulletin board would be easier to incorporate into a pre-existing belief system. Previous experience would positively affect comprehension. Overnight campers would report higher levels of comprehension due to the higher personal relevance of the messages.

Does exposure to minimum impact messages increase knowledge of those behaviors? Knowledge (or beliefs) appear to be an immediate antecedent for intended behavior (Fishbein and Manfredo 1992). Increasing knowledge which leads to changes in behavior seems to be an important goal of minimum impact persuasive messages. However, more knowledgeable visitors are likely to feel that they do not need any additional information, and thus we would expect that as knowledge levels increase, motivation to search for new information decreases. As knowledge increases, ability to process new information also increases (Petty and Cacioppo 1986). Thus, visitors with higher existing levels of knowledge

and greater previous exposure to minimum impact messages should have higher knowledge levels, even though they may spend less time attending to messages. We expect education to be positively correlated with knowledge because of higher capacity to process message content. Finally, we expect knowledge to be positively correlated with comprehension.

Methods

Visitors to portions of the Selway-Bitterroot Wilderness located in Montana participated in an experiment involving several bulletin board treatments in 1995. An experimental bulletin board was established approximately 1.5 miles up the trail from the trailhead. This location was chosen to minimize the number of potentially distracting environmental attributes, like those confronting bulletin boards located in parking lots. In addition, Petersen (1985) found that a trailside registration sign received the greatest attention and response when it was located along the trail a similar distance from the trailhead.

The bulletin board consisted of two four-by-four foot panels placed roughly parallel to the trail in a shallow "v-shape." The treatments included varying numbers of minimum impact messages (treatments consisted of 2, 4, 6 and 8 messages) and an attractor (a local topographic map displaying the watershed and trails), either with no messages or with four messages.

Visitors were observed with an infrared beam-activated film recorder as they approached the site of the bulletin board along the trail. When the beam was interrupted by the passage of a group, the camera recorded one frame every four seconds for four minutes; thus, the amount of time spent attending to the bulletin board could be estimated from the film. Recorded were each group attending to the bulletin board, the particular panel they attended to, and the length of time they spent examining the messages on it. Characteristics such as travel method, day or overnight visitor were noted at the time. After they completed their trip into the Wilderness, a subsample of visitors was asked to complete a

short questionnaire. Respondents were asked to note their age, sex, and level of educational attainment and then self-assessed their previous exposure to minimum impact messages and level of knowledge. The sampling process observed 453 people at the bulletin board; 202 of these completed these questionnaires. Comprehension was measured by asking respondents to recall what messages they had viewed during their visit. Respondents' score on an eight-item minimum impact quiz served as a measure of knowledge. Previous wilderness experience was measured by asking respondents about how many previous visits to Bitterroot canyons they had made, how many different wildernesses they had visited, their total number of visits to wildernesses, and about how many visits they make to wildernesses per year.

Results

The focus of this analysis is to associate specific visitor characteristics with each of the three decisions about bulletin board messages and the comprehension and knowledge outcomes.

The Decision to Stop at the Bulletin Board (Exposure)

Overall, about 64% of the visitors we observed stopped at the bulletin board (table 1). For only two visitor characteristics were differences statistically significant at $\alpha \leq .05$. Hikers were much more likely to stop at the bulletin board (85%) than horseback riders (30%), as suggested by previous empirical work. Visitors on overnight trips (73%) were more likely to stop than those on day trips (63%), supporting our expectation based on the assumption that the messages posted were more relevant to overnight visitors. Those who stopped were younger than those who didn't stop, but the difference was minimal ($\alpha = 0.1$). Sex and educational level attained were not associated with the decision to stop

Table 1—Percentage of visitors stopping at trailside bulletin board for two different measures of experience.

Travel method**	Hiker (n=254)	Horse rider (n=132)		
Percent	85	30		
Type of Use**	Overnight (n=133)	Day (n=253)		
Percent	73	63		
Self-assessed amount of experience*	Not at all (n=9)	A Little (n=30)	Somewhat (n=84)	Very (n=49)
Percent	67	74	76	74
Number of wilderness Visits/year*	Less than or equal to 1 (n=30)	2-5 (n=72)	6-10 (n=27)	>10 (n=43)
Percent	77	76	74	67

*Differences statistically significant at $\alpha = .10$, using a chi-square test.

**Differences statistically significant at $\alpha = .05$, using a chi-square test.

at the bulletin board. Self-reported wilderness experience and number of wilderness visits per year were associated with the decision to stop, but the findings are conflicting (table 1).

The Decision to Look at Minimum Impact Messages (Attention)

About 70% of those stopping at the bulletin board attended to the messages placed there, as opposed to looking only at the map. The only variables statistically associated ($\alpha \leq .05$) with this decision were previous experience, as measured by self-assessment and number of wilderness visits per year. At alphas between .05 and .10, the number of total visits to wilderness and number of wilderness areas visited (see table 2) were also significant. As expected, all four of these variables suggest that experienced visitors are more likely to attend to minimum impact behavior messages than inexperienced visitors.

Amount of Time Spent Attending to Minimum Impact Messages (Attention)

Visitors did not devote much time attending to the minimum impact messages. For the sample as a whole, visitors spent an average of about five seconds attending to each of the displayed messages. The experiment included treatments with different numbers of messages. Six variables were statistically associated with differences in per message attention, but none of these was in the direction expected. Hikers spent more time than horse riders attending to messages (table 3). Age was negatively correlated with per message attention, but the relationship is not straightforward. Respondents who felt they were very frequently exposed to minimum impact messages spent more time looking at the messages than those with less previous exposure, although the major difference is with the group

most highly exposed. Those with less prior experience both generally and in the Bitterroot canyons spent more time attending messages, perhaps because they found the messages more useful.

Message Comprehension

Respondent message comprehension scores were correlated with the messages posted during their visit. As expected, overnight visitors reported a higher comprehension ($\alpha = .06$) of message content than day users (table 4). The comprehension levels of hikers and horse riders differed significantly ($\alpha = .01$), with hikers comprehending more of the message content than horse riders. Males and younger visitors had higher comprehension scores than females and older visitors ($\alpha = .01$ for both). Visitors with less experience in Bitterroot canyons had higher comprehension scores than more experienced visitors, counter to expectations. We had expected that general wilderness experience, education and prior knowledge would be related to comprehension, but they were not.

Knowledge

Overall, knowledge about minimum impact behaviors was low: On average, respondents scored about 32% on the knowledge quiz. As expected, overnight visitors and those with higher self-reported wilderness experience and knowledge about minimum impact behavior had significantly higher ($\alpha \leq .05$) knowledge levels than day users and less experienced and knowledgeable visitors (table 5). We had expected that education, general wilderness experience and frequency of exposure to minimum impact behavior messages would be associated with knowledge. They were not. Moreover, prior experience in the Bitterroot canyons was negatively correlated with knowledge. Travel method (hike or horseback) and sex demonstrated significant

Table 2—Characteristics of visitors that stopped at the bulletin board choosing to attend to messages posted there.

Self-assessed experience				
With wilderness travel**	Not at All (n=5)	A Little (n=21)	Somewhat (n=58)	Very (n=34)
Percent	80	91	91	91
Wilderness visits per year**	Less than 1 (n=20)	2-5 (n=51)	6-10 (n=20)	More than 10 (n=26)
Percent	85	92	95	92
Average number of Wildernesses visited for those who*	Attended to Messages (n=103) 11	Did not Attend Messages (n=11) 4		
Average number of total Wilderness visits for those who*	Attended to Messages (n=103) 31	Did not Attend Messages (n=10) 16		

*Differences statistically significant at $\alpha = .10$.

**Differences statistically significant at $\alpha = .05$.

Table 3—Mean amount of time, in seconds, attending to minimum impact messages (on a per message basis) for variables with significant differences (includes only those visitors stopping at the bulletin board and attending messages).

Age category*	18-20 (n=22)	21-35 (n=33)	36-55 (n=38)	> 55 (n=11)
mean, s.e.	6.0 (0.7)	5.3 (0.8)	4.2 (0.5)	5.8 (1.3)
Frequency of Exposure To Minimum Impact Messages**	Never (n=7)	Not Frequently (48)	Frequently (n=44)	Very Frequently (n=6)
Mean, s.e.	4.8 (1.0)	4.7 (0.5)	4.8 (0.5)	9.7 (3.1)
Prior visits to Bitterroot canyons**	1 (n=34)	2-5 (n=17)	6-20 (n=24)	> 20 (n=32)
Mean, s.e.	5.4 (0.6)	7.3 (1.0)	4.1 (0.7)	4.2 (0.7)
Wilderness visits Per year**	<2 (n=17)	2-5 (n=47)	6-10 (n=19)	> 10 (n=24)
Mean, s.e.	4.6 (0.7)	6.1 (0.6)	3.1 (0.5)	5.0 (0.9)
Total Wilderness Visits**	<3 (n=10)	3-15 (n=43)	16-60 (n=32)	> 60 (n=18)
Mean, s.e.	6.2 (1.3)	5.7 (0.6)	4.0 (0.5)	4.6 (1.1)

Age, visits to Bitterroot canyons, and total wilderness visits were originally measured at the interval level, but data is shown in categories for ease of interpretation.

*Differences statistically significant at alpha = .10.

**Differences statistically significant at alpha = .05.

differences in knowledge—variables for which we had not expected differences.

Does exposure to more messages lead to gains in knowledge? To address this question, we examined interactions between the number of messages to which the visitors were exposed and each of the independent variables examined in this study. We found significant interaction with three visitor characteristics. To assess the magnitude of knowledge gained as exposure to number of messages increased, knowledge scores were regressed against the number of messages presented for each level of the independent

variables. Larger regression coefficients (regression line slopes) indicate a greater gain in knowledge with increasing numbers of messages. Steeper slopes represent greater capacity to process messages and integrate them into one's existing belief system. Day users, college graduates and those with many previous visits to the Bitterroot canyons show the highest regression coefficients, suggesting they learn more from exposure to increasing numbers of messages than overnight visitors, those with lower levels of educational attainment, and visitors with less previous experience in the Bitterroot canyons (table 6). Although day users and locally experienced visitors paid less attention to the messages, the data suggest they gained more knowledge when they did attend to the messages. Spearman's rho correlation coefficients show significant positive relationships between mean per message attention time and comprehension (.526) and between comprehension and knowledge (.480).

Table 4—Mean message comprehension for study respondents attending to messages posted on the bulletin board, in percent.

Travel method**	Hiker (n=92)	Horse rider (n=15)		
Mean, s.e.	56 (3)	15 (5)		
Type of Use*	Overnight (n=46)	Day (n=61)		
Mean, s.e.	56 (4)	47 (4)		
Sex*	Male (n=67)	Female (n=40)		
Mean, s.e.	55 (3)	44 (6)		
Age**	18-20 (n=22)	21-35 (n=33)	36-55 (n=38)	>55 (n=11)
Mean, s.e.	64 (5)	53 (5)	45 (5)	44 (11)
Prior visits to Bitterroot canyons**	1 (n=34)	2-5 (n=17)	6-20 (n=24)	>20 (n=32)
Mean, s.e.	54 (4)	64 (7)	51 (6)	39 (6)

*Differences statistically significant at alpha = .10.

**Differences statistically significant at alpha = .05.

Discussion

We have summarized the study results in table 7 by reporting the alpha values for the tests conducted in the analysis. One can use the table to determine what visitor characteristics are associated with specific decisions and outcomes. We feel these results are striking because the generally modest relationships are counter to many of our expectations.

The variable most closely associated with attention to the bulletin board messages was travel method. The use of a general factorial model incorporating travel method and other independent variables shows that travel method is usually the only statistically significant variable. Hikers were much more likely to stop at the bulletin board and attend to the messages than horseback riders. This result is

Table 5—Mean minimum impact behavior knowledge score, in percent.

Travel method**	Hiker (n=135)	Horse rider (n=51)		
Mean, s.e.	40 (2)	21 (2)		
Type of Use**	Overnight (n=78)	Day (n=108)		
Mean, s.e.	39 (2)	32 (2)		
Sex**	Male (n=112)	Female (n=74)		
Mean, s.e.	38 (2)	31 (2)		
Age**	18-20 (n=31)	21-35 (n=59)	36-55 (n=78)	>55 (n=15)
Mean, s.e.	45 (3)	36 (3)	32 (3)	31 (6)
Self-assessed Knowledge Of Minimum Impact** Behavior	Not Very (n=21)	Somewhat (n=66)	Very (n=66)	Extremely (n=31)
Mean, s.e.	28 (4)	30 (3)	38 (3)	44 (4)
Self-assessed Experience With Wilderness Travel**	Not at All (n=10)	A Little (n=32)	Somewhat (n=89)	Very (n=54)
Mean, s.e.	25 (6)	35 (4)	35 (2)	39 (3)
Prior visits to Bitterroot Canyons*	1 (n=59)	2-5 (n=42)	6-20 (n=30)	>20 (n=52)
Mean, s.e.	41 (3)	33 (3)	34 (3)	32 (3)

*Differences statistically significant at alpha = .10.

**Differences statistically significant at alpha =.05.

Table 6—Gains in knowledge with exposure to increasing numbers of messages. Figures shown are slopes in regression equations. Numbers of messages ranged from 2-8.

Type of Use**	Overnight (n=86)	Day (n=129)		
Regression slope, s.e.	.01 (.02)	.07 (.01)		
Educational Attainment**	High School Or Less (n=53)	Some College (n=59)	College Graduate (n=54)	Post Graduate (n=46)
Slope, s.e.	.05 (.02)	.00 (.02)	.12 (.03)	.07 (.03)
Prior visits to Bitterroot canyons**	1 (n=63)	2-5 (n=38)	6-20 (n=52)	>20 (n=57)
Slope, s.e.	.02 (.03)	.01 (.03)	.06 (.02)	.09 (.03)

**Differences statistically significant at alpha =.05.

similar to those found by Cole (1998) and Petersen (1985), but we wonder why. Certainly, stopping a horse (and a pack string) is difficult, and it may be this factor more than experience, interest or beliefs about minimum impact behavior that affects attention to bulletin boards. Once horseback riders did stop, they tended to look at the messages with a propensity similar to hikers. However, they spent less time attending to the messages than hikers. A fundamental question, for both managers and scientists, therefore deals with finding and evaluating mechanisms to effectively

communicate minimum impact behaviors to horse riders. Petersen (1985) showed that trailhead locations are not very good places for registration, perhaps because of the number of competing attributes or because of a desire to “get on the trail.” Presentations at group organization meetings, fairs and workshops may be more effective venues for horse riders than bulletin boards.

People who report they have been frequently exposed to messages spent more time viewing the messages we presented on the bulletin board, a somewhat surprising result in light

Table 7—Summary statistics for analysis. Data shows level of significance for each tested relationship.

Visit characteristics	Stopped at bulletin board	Looked at messages	Per message attention	Comprehension	Knowledge	Gain in knowledge with exposure
Travel Method	.000	.47	.09	.00	.00	.66
Type of Use	.04	.38	.16	.06	.02	.01
Social-demographics						
Age	.10	.11	.06	.01	.01	.26
Sex	.39	.25	.65	.10	.03	.98
Education	.21	.12	.47	.22	.49	.01
Prior Knowledge or Exposure						
Self-Reported Knowledge	.18	.11	.20	.98	.01	.26
Prior Exposure	.14	.12	.02	.61	.56	.73
Wilderness Experience						
Visits to Bitterroot canyons	.40	.17	.01	.03	.01	.01
Experience with Wilderness Travel	.09	.04	.20	.72	.05	.98
Wilderness Visits per Year	.07	.05	.03	.14	.46	.17
Total Wilderness Visits	.18	.08	.01	.30	.22	.86
Number of Wildernesses Visited	.25	.08	.28	.31	.64	.73

of previous research. Perhaps such individuals perceive the usefulness of the messages and are seeking confirmation of previous knowledge or dissonance reduction. The negative relationship between experience and attention was counter to our expectations. Experienced individuals may feel that minimum impact behavior messages are of little use to their wilderness visit. The negative relationship between age and attention may be superfluous: Horseback riders tended to be older than hikers.

Comprehension was primarily associated with travel method and type of use (overnight or day use), but relationships with age, sex and previous local experience were also found. With the exception of type of use, none of these findings was expected, and several of our expectations were not supported. While comprehension was associated with time spent attending to messages, travel method (although not type of use) was still statistically associated with comprehension. These findings bring up the question of what variables underlie the travel method distinction and how useful they are in explaining these differences. The practical difficulties of stopping horses to read messages may explain the different propensity of horse riders and hikers to stop at the bulletin board, but this would not be relevant to comprehension for those who paid attention to the message.

Knowledge levels were associated with a variety of variables. However, only the higher scores of overnight users, more knowledgeable visitors and those with greater general wilderness experience were expected. The negative relationships with local experience (in the Bitterroot canyons), and the lack of relationship between education and prior exposure to minimum impact messages were unexpected. What both findings suggest is that the process of communicating minimum impact persuasive messages is more complex than one might expect. Relying on passive communication media, such as signs and brochures may be simply not adequate. Comprehension was strongly related to knowledge levels, but travel method and type of use were also important. This suggests that if people stop and attend to the bulletin board and spend the time needed to read the messages, increases in knowledge will result.

We did find that education had an important effect once message attention occurred: Individuals with higher levels of education appear to have a greater capacity to assimilate message content as the number of messages increase. Thus, if visitors do stop, and they are highly educated, they can process a number of messages. Managers can feel confident then that they are communicating effectively.

The results suggest that bulletin boards, at least the kind studied here, are effective only for hikers. However, even this group attended to each message hardly long enough to deliberate on its contents, meaning and application. The fact that only 64% of passing visitors stopped at the bulletin board suggests that the messages may not have been perceived as being useful. This conclusion is confirmed by Cole's (1998) study in which he found that appeals to read the messages, other than a simple request, had little or even negative effects on the proportion of visitors stopping. This altruistic motivation may outweigh more instrumental or utilitarian pleadings.

Slater (1997) also argues that "people read, listen to, and view messages because they choose to in order to achieve some purpose or end..." Essentially, the decision to stop is influenced by the perceived utility of the message to the wilderness visit. It is quite likely that information about minimum impact behaviors is not viewed as useful by wilderness visitors. Brown and others (1992) reported that only one respondent of 93 contacted in the Pemigewasset Wilderness in New Hampshire felt that "low-impact camping techniques" were helpful to their trip. This was far less than the 25.8% who felt information on location of campsites was helpful. It is not clear from this study or others (e.g., Cole 1998) how bulletin boards could be designed to be more useful for horse users or be more effective in relating minimum impact messages.

Finally, there are theoretical questions that confront scientists. For example, past research in a number of settings has suggested that messages that stimulate elaboration or deliberation more effectively engendered the desired behavior. Our study did not examine this question, but it would seem appropriate to ask when such elaboration

occurs, if it does, and its effectiveness. Certainly, the data shown here suggests that elaboration does not occur during or immediately following viewing of messages. Perhaps it occurs on the trail or at the campsite. However, Roser (1990) concluded that it takes time to integrate persuasive messages, even if they are accepted, into one's personal values and then act on them. Elaboration of message content may be one process for integration, but there may be others as well.

The concept of involvement can have great utility in explaining message elaboration processes. Petty and Cacioppo (1986) and numerous followers hypothesize that involvement increases the likelihood that message receivers will process message content, elaborate on it and choose to behave accordingly. Celsi and Olson (1988) report that message attention is positively correlated with involvement. In this sense, those with higher levels of wilderness experience or those most aware of human impacts on wilderness conditions might be more involved individuals, and thus more likely to attend to and process minimum impact behavior. Our data showed (both here and in Cole and others) that message attention (measured in time) was positively correlated with knowledge of minimum impact behavior, reinforcing this hypothesis. While involvement as a scientific construct has many meanings (Slater 1997), it would be useful to explore what involvement means in this context and to develop measures that can be tested. Our shadow measure of involvement (previous wilderness experience) was modestly successful in explaining some of the results.

Better understanding the conditions under which visitors attend to and process messages will help identify more effective persuasive message strategies, a search that has not only scientific relevance but utility for those working in resource constrained agencies. Slater (1997) suggests that "Recipients are active in choosing to be exposed to various messages and are purposive or goal-directed in seeking various instrumental utilities and personal gratification from such message exposure." By investigating the social and situational factors affecting this choice process, as well as the personal and instrumental benefits from the choice, scientists may be able to provide principles for increasing attention to minimum impact messages posted at trailhead or trailside bulletin boards.

Our study leaves open the need to design more effective persuasive communication channels for wilderness managers. Certainly, the data suggest that a variety of media are needed to reach intended audiences, hardly a startling conclusion, but one that is important in an era of scarce communication resources. Understanding the audience, how it chooses to attend to various messages and at what stage to measure effectiveness remain important questions for both managers and scientists.

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