SALIENT VALUE SIMILARITY, SOCIAL TRUST, AND ATTITUDES TOWARD WILDLAND FIRE MANAGEMENT STRATEGIES

Jerry J. Vaske
Human Dimensions in Natural Resources Unit
Colorado State University
Fort Collins, CO 80523

James D. Absher
U.S. Forest Service, Pacific Southwest Research Station

Alan D. Bright
Colorado State University

Abstract.—Using the salient value similarity (SVS) model, we predicted that social trust mediated the relationship between SVS and attitudes toward prescribed burns and mechanical thinning. Data were obtained from a mail survey (n = 532) of Colorado residents living in the wildland-urban interface. Results indicated that respondents shared the same values as U.S. Forest Service managers, and trusted the agency to plan prescribed burns and use mechanical thinning effectively. As hypothesized, social trust fully mediated the relationship between SVS and attitudes toward prescribed burns and mechanical thinning. As SVS increased, social trust in the agency increased. As social trust increased, approval of prescribed burns and mechanical thinning increased. These findings reinforce the role of social trust in gaining public support for wildfire management and support prior SVS research suggesting that trust mediates the relationship between value similarity and attitudes.

1.0 INTRODUCTION

Recent severe wildland fires in the western United States have heightened awareness of the potential risks associated with wildfires (Miller et al. 2000). To minimize the negative consequences of wildfires, the U.S. Forest Service has shifted from a traditional emphasis on total fire suppression to policies designed to reduce the probability/severity of wildfires and to restore ecological conditions. Two major techniques used are prescribed burns and mechanical thinning. Prescribed burning involves the controlled use of fire to burn off excess vegetation in the forest. Mechanical thinning reduces the amount of vegetation in the forest by physically removing some trees and shrubs. With either prescribed burns or mechanical thinning, management objectives are to: (a) decrease the likelihood of large, potentially uncontrollable fires; (b) reduce the severity of a fire; and (c) improve the ability to control a wildfire.

Although this policy change has ecological advantages, a successful fire mitigation program requires public support (Kneeshaw et al. 2004a, 2004b; Manfredo et al.1990; Vogt et al. 2005). Attitudes, value orientations toward wildland fires, and trust in the management agency have all been shown to influence support for management policies (Absher et al. 2006, Vogt et al. 2005). Using salient value similarity (SVS) measures, Winter and associates (Winter & Cvetkovich 2004, Winter et al. 2004) examined the direct link between shared values and social trust in the management agency. In this paper, we build on this work by exploring the relationships among shared values, social trust, and attitudes toward prescribed burns and mechanical thinning.

1.1 Conceptual Model

The SVS model examines the relationship between salient values and perceptions of trust in a managing agency (Siegrist & Cvetkovich 2000, Siegrist et al. 2000). *Salient values* include individuals' beliefs regarding important goals and processes that people and agencies should follow in specific situations. *Value similarity* reflects the extent to which a person's values are similar to those of the managing agency. Siegrist et al. (2000), for example, showed that people who perceived themselves as having similar values as managers of nuclear power plants had a high degree of trust in the managers and perceived less risks associated with nuclear power compared to those who expressed dissimilar values and distrusted the managers. These findings have been replicated in the contexts of artificial sweeteners, hormones in milk, cancer treatment, chemical plant hazards, hydroelectric power, commercial aviation, hazardous waste disposal sites, and chronic wasting disease (Needham & Vaske, in press).

Social trust is an integral component of SVS related models (Cvetkovich & Löfstedt 1999, Slovic 1993). Social trust is "the willingness to rely on those who have the responsibility for making decisions and taking

actions related to the management of technology, the environment, medicine, or other realms of public health and safety" (Siegrist et al. 2000, p. 354). The adjective "social" emphasizes that the people being trusted are those with formal responsibilities within organizations that may not be personally known to the person making the trust attribution (Siegrist et al. 2000).

Research has shown that social trust in a managing agency influences risk perceptions (e.g., Siegrist et al. 2000). People who trust the managing agency tend to perceive less risk compared to those who do not trust the agency (e.g., Hallman & Wandersman 1995, Siegrist & Cvetkovich 2000). A related variable, agency performance in handling risk situations, has been suggested to correlate with trust in the agency. Siegrist et al. (2003), for example, showed that confidence in the managing agency and evaluations of agency performance were related to perceived risk associated with electromagnetic fields.

1.2 Wildfire Management Research

Research has explored a range of cognitive variables related to wildland fire and its management (Knotek 2006). One line of inquiry, for example, has considered the influence of basic beliefs (Absher et al. 2003, Bright et al. 2005) and norms (Kneeshaw et al. 2004a, 2004b) on respondents' support or opposition to wildland fire policy (Absher et al. 2006, Absher & Vaske, in press). Bright et al. (in review), for example, found that the basic beliefs about wildland fire management influenced the relative effects of current conditions, wildfire history, and forest location on attitudes toward prescribed burns and mechanical thinning. Winter and Cvetkovich (2004) showed that for wildland fire opinions, trust resulted when values were shared and agency actions were viewed as consistent with those values. In a survey of homeowners in three different ecosystems that differed in fuel management strategies, Winter et al. (2004) found that trust in the agency influenced perceived risks/benefits and perceived agency competence.

1.3 Hypotheses

Consistent with prior SVS related models (e.g., Siegrist et al. 2000, Winter & Cvetkovich 2004, Winter et al. 2004), trust is predicted to mediate the relationship between SVS and attitudes toward prescribed burns and mechanical thinning. Stated more formally, we hypothesize:

H_1 Social trust will fully mediate the relationship between SVS and attitudes toward prescribed burns and mechanical thinning.

H_2 As SVS increases, social trust in the agency will increase.

H_3 As social trust increases, approval of prescribed burns will increase.

H_4 As social trust increases, approval of mechanical thinning will increase.

2.0 METHODS

Data for this study were obtained from a mail survey of Colorado residents living in the wildland-urban interface (WUI). The study population consisted of individuals over the age of 18 who reside in Boulder, Larimer, Gilpen, Grand, Jackson, and Clear Creek counties. A random sample of residents was purchased from a commercial sampling firm. Four mailings were used to administer the survey. Residents first received the 12-page questionnaire, a pre-paid postage return envelope and a personalized cover letter explaining the study and requesting their participation. Ten days after the initial mailing a reminder postcard was sent to participants. A second complete mailing was sent to non-respondents 10 days after the postcard reminder. To further increase response rate, a third complete mailing was sent one month following the second complete mailing. A total of 532 completed surveys were returned with an overall response rate of 47 percent (532 returned/1,200 sent - 56 non-deliverables).

As a check on potential non-response bias, a telephone survey was conducted of non-response residences (n = 100). Perceived effectiveness, approval, and aesthetic impacts of prescribed burns and mechanical thinning variables were included in the telephone survey. For all of the variables compared, differences between respondents and non-respondents were "minimal" (Vaske et al. 2002). Thus, non-response bias was not considered to be a problem, and the data were not weighted.

2.1 Variables in Model

Predictor – SVS. Following Siegrist et al. (2000), SVS was measured with five survey items. Respondents were asked: With respect to forest fire management, I feel the U.S. Forest Service: (a) shares similar values as me, (b) shares similar opinions as me, (c) thinks in a similar way as me, (d) takes similar actions as I would, and (e) shares similar goals as me. Variables were coded on a 7-point scale ranging from "strongly disagree" (1) to "strongly agree" (7).

Mediator – Social Trust. A multiple-item index of social trust served as the mediator. One variable consisted of a three-item trust in management index. Respondents were asked: I trust the U.S. Forest Service knows how to: (a) effectively plan prescribed burns, (b) use mechanical thinning effectively, and (c) respond to forest fires. A second indicator of social trust was based on four-item index concerned with trust in U.S. Forest Service information. With respect to forest fire management, I trust the U.S. Forest Service to provide: (a) the best available information on forest fire issues, (b) enough information to decide what actions I should take regarding forest fire, (c) truthful information about safety issues related to forest fire, and (d) timely information regarding forest fire issues. Survey items in both the "trust management" and "trust information" indices were measured on a 7-point scale from "strongly disagree" (1) to "strongly agree" (7). The third social trust variable, agency performance, was a single-item indicator. Respondents were asked to assign a letter grade to the U.S. Forest Service based on their opinion of the job that the agency has done managing wildland fires. Response categories were based on an "A" (4) to "F" (0) scale that included intermediate grades (e.g., A- = 3.75, B+ = 3.50).

Criterion variables. Attitudes toward prescribed burns and mechanical thinning were each measured with three survey items. Respondents were asked: (a) "How effective are prescribed burns (and mechanical thinning) in preventing subsequent fires from getting out of control?" [measured on a 9-point scale ranging from "not at all effective" (1) to "extremely effective" (9)]; (b) "Do you approve or disapprove of the use of prescribed burns (and mechanical thinning) in forests" [measured on a 9-point scale ranging from "strongly disapprove" (1) to "strongly approve" (9)]; and (c) "Do prescribed burns (and mechanical thinning) make the forest look better or worse" [measured on a 9-point scale ranging from "extremely worse" (1) to "extremely better" (9)].

2.3 Analysis Strategy

The internal consistency of the SVS, social trust, and attitude latent concepts were examined using Cronbach's alpha and confirmatory factor analysis. A structural equation path analysis was used to assess the mediation role of social trust. Two separate models were fitted in AMOS 5 using the variance and covariance matrices. In the partial mediation model, the predictor (SVS) influenced the criterion constructs (attitudes toward prescribed burns and mechanical thinning) directly and indirectly through its effect on the mediator (social trust). In the full mediation model, the predictor (SVS) influenced the criterion constructs (attitudes) only indirectly through its effect on the mediator (social trust).

3.0 RESULTS

With respect to forest fire management, the residents believed that they shared the same values (M = 4.86, SD = 1.53), opinions (M = 4.64, SD = 1.54), thoughts (M = 4.51, SD = 1.57), and goals (M = 4.70, SD = 1.57) as U.S. Forest Service managers (Table 1). Respondents also believed that they would act (M = 4.48, SD = 1.62) in a similar way to the Forest Service managers. The reliability coefficient for these five survey items was .96. Deleting any of the items did not improve the scale's overall reliability.

Social trust was measured using three sets of variables (i.e., a trust in management index, a trust in information index, a single-item indicator of the agency's performance grade). In general, respondents trusted Forest Service management to effectively plan prescribed burns (M = 4.80, SD = 1.71), use mechanical thinning effectively (M = 5.17, SD = 1.60), and respond to forest fires appropriately (M = 5.68, SD = 1.36). The reliability coefficient for these three items was .77. The mean for the index was 5.22 with a standard deviation of 1.28. Similar evaluations were given for the trust-in-Forest Service-information variables (e.g., provide the best available information on forest fire issues). The means for the four trust-in-information items ranged from 5.52

Table 1.—Reliability analyses of salient value similarity (SVS), social trust and attitudes toward wildland fire management strategies

	Mean	Standard Deviation	Cronbach Alpha if Item Deleted	Cronbach Alpha
SVS				
With respect to forest fire management, I feel that the US Forest Service [1]				.96
Shares similar values as me.	4.86	1.53	.94	
Shares similar opinions as me.	4.64	1.54	.94	
Thinks in a similar way as me.	4.51	1.57	.94	
Takes similar actions as I would.	4.48	1.62	.95	
Shares similar goals as me.	4.70	1.57	.95	
Social trust				
Trust in U.S. Forest Service management [1]				.77
I trust that the U.S. Forest Service knows how to:				
effectively plan prescribed burns	4.80	1.71	.63	
use mechanical thinning effectively	5.17	1.60	.62	
respond to forest fires	5.68	1.36	.74	
Trust Management index	5.22	1.28		
Trust in U.S. Forest Service information [1]				
With respect to forest fire management, I trust the U.S. Forest Service to provide:				.93
the best available information on forest fire issues	5.59	1.40	.92	
me with enough information to decide what actions I should take regarding forest fire	5.69	1.33	.91	
truthful information about safety issues related to fire	5.77	1.31	.91	
timely information regarding forest fire issues	5.52	1.50	.92	
Trust Information index	5.64	1.27		
Agency Performance Grade [2]				
Taking everything into consideration, how would you grade the U.S. Forest Service for handling forest fire in Colorado?	3.23	0.79		
Overall Social Trust [3]	4.69	0.92		.77
Attitude toward:				
Prescribed burns				.83
How effective are prescribed burns in preventing subsequent fires from getting out of control [4]	6.74	1.44	.77	
Do you approve or disapprove of the use of prescribed burns in forests [5]	6.85	1.87	.65	
Do prescribed burns make the forest look better or worse [6]	5.65	2.04	.81	
Mechanical thinning				.81
How effective is mechanical thinning in preventing subsequent fires from getting out of control [4]	6.84	1.56	.81	
Do you approve or disapprove of the use of mechanical thinning in forests [5]	7.04	1.89	.64	
Does mechanical thinning make the forest look better or worse [6]	6.31	1.98	.72	

[1] Variables coded on 7-point scale: (1) Strongly disagree, (2) Moderately disagree, (3) Slightly disagree (4) Neutral, (5) Slightly agree, (6) Moderately agree, (7) Strongly agree.
[2] Variable coded on a 10-point scale: (4.00) A, (3.75) A-, (3.50) B+, (3.00) B, (2.75) B-, (2.50) C+, (2.00) C, (1.75) C-, (1.00) D, (0.00) F.
[3] The "overall social trust" variable includes "trust management index", "trust information index" and "agency performance grade."
[4] Variable coded on 9-point scale: (1 and 2) Not at all effective, (3 and 4) Slightly effective, (5, 6, and 7) Moderately effective, (8 and 9) Extremely effective.
[5] Variable coded on 9-point scale: (1 and 2) Strongly disapprove, (3 and 4) Slightly disapprove, (5) Neutral, (6, and 7) Slightly approve, (8 and 9) Strongly approve.
[6] Variable coded on 9-point scale: (1 and 2) Extremely worse, (3 and 4) Slightly worse, (5) Neither, (6, and 7) Slightly better, (8 and 9) Extremely better.

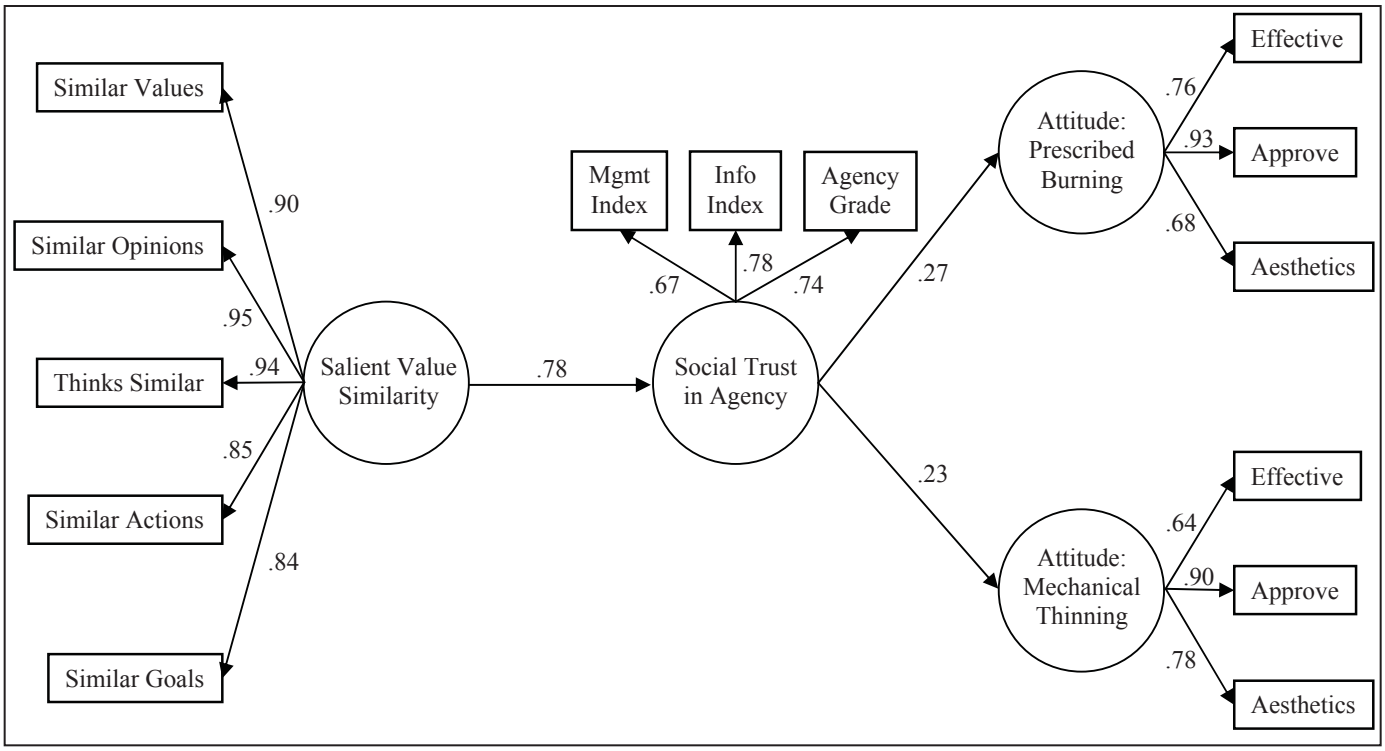

Figure 1.—Confirmatory factor analyses and full mediation structural equation model. Path coefficients are standardized regression coefficients. All coefficients are statistically significant ($p < .001$)

(provide timely information) to 5.77 (provide truthful information about safety issues related to forest fire) and the overall Cronbach's alpha was .93. The final variable representing the social trust concept, overall agency performance grade with respect to handling forest fires in Colorado, had an average score of 3.23 (a letter grade of B) and a standard deviation of 0.79. Taken together, the trust in management index, trust in information index, and overall agency grade had a reliability coefficient of 0.77.

Attitude toward prescribed burns was measured using three survey items that addressed effectiveness (M = 6.74, SD = 1.44), approval (M = 6.85, SD = 1.87), and aesthetic impact (M = 5.65, SD = 2.04). The overall Cronbach's alpha for these three items was .83 (Table 1). Attitude toward mechanical thinning was measured using an identical set of three variables. Results were similar to attitude toward prescribed burns. The means for mechanical thinning items ranged from 6.31 (aesthetic impact) to 7.04 (approval), with a reliability coefficient of .81.

3.1 Mediation Models

Having demonstrated the reliability of the constructs separately, confirmatory factor analysis was used to examine the relationship between each of the observed variables and the four latent constructs (Figure 1). The standardized factor loadings were consistently greater than .64 ($p < .001$). Modification indices indicated that the model fit could not be improved by allowing any of the observed variables to load on a different latent construct.

Hypothesis 1 was tested using two structural equation models. Consistent with prior SVS literature (Siegrist et al. 2000), social trust was predicted to fully mediate the relationship between SVS and attitudes toward prescribed burns and mechanical thinning. Support for this hypothesis was evident by comparing the full and partial mediation models. The partial mediation model (χ^2 = 438.19, df = 72, p < .001) was statistically equivalent to the full mediation model (χ^2 = 440.94, df = 74, p < .001); and the change in chi-square statistic was not significant ($\Delta\chi^2$ = 2.75, df = 2, n.s.). The χ^2 /

df (5.96), NFI (.917), CFI (.930), and RMSEA (.097) were acceptable for the full mediation model. The full mediation model was used to describe the data.

As predicted by hypothesis 2, as SVS increased, social trust in the agency increased ($\beta = .78$, $p < .001$, Figure 2). Similarly, as social trust increased, approval of prescribed burns ($\beta = .27$, $p < .001$) and mechanical thinning ($\beta = .23$, $p < .001$) increased. These findings support hypotheses 3 and 4.

4.0 DISCUSSION

This paper used a salient value similarity model to explain the relationships among: (a) SVS, (b) social trust in the U.S. Forest Service, and (c) attitudes toward wildland fire management strategies. The findings highlighted both applied and theoretical implications for understanding attitudes toward wildland fire management strategies.

4.1 Management Implications

From an applied perspective, results showed relatively weak but statistically significant relationships between social trust in the agency and attitudes toward prescribed burns and mechanical thinning. Studies of other issues such as nuclear power have shown a much stronger relationship between trust and related attitudinal constructs such as perceived risk (Siegrist et al. 2000). Nuclear power, however, is a technology created and controlled by humans, whereas wildfires can occur naturally and are perhaps viewed as a force of nature. Homeowners may trust the managing agency, but feel that wildfires, even prescribed burns, are beyond agency control. Agencies may need to do more to inform and educate individuals about agency strategies for managing wildfires and their expectations, capabilities, or objectives in fighting them.

Findings also revealed that, on average, homeowners agreed that they shared similar views as the Forest Service and trusted the agency to manage wildfires appropriately. This result is important for several reasons. First, SVS and trust can influence support of agency goals, objectives, and management (Earle 2004). For example, individuals in our study who shared similar values as the Forest Service reported more trust in the agency; those that trusted the agency were more likely to support prescribed burns and mechanical thinning. Second, persuasion models (e.g., elaboration likelihood, heuristic systematic) suggest that similarity and trust are important determinants of effective communication and persuasion (Petty & Cacioppo 1986). The full mediation model found here suggests that individuals who trust an agency may be more motivated to attend information campaigns. Third, agencies should strive to understand constituents' opinions, values, and goals. To preserve trust and a strong constituent base, management should be tailored to reflect local views whenever feasible. If constituents' views are not reflected in management, reasons for inconsistencies should be shared so they can be weighed in relation to considerations of trust (Cvetkovich & Winter 2003).

4.2 Theoretical Implications

Finding a strong positive relationship between SVS and trust is consistent with past research (Siegrist et al. 2000, Winter et al. 2004). Researchers should continue to examine measures of perceived similarity, as they seem to be important determinants of social trust. Given the factor loadings and reliabilities, variables used here and in other studies appear to be appropriate for measuring SVS. The association between social trust and attitude is less clear. Some studies have reported strong relationships between related concepts (e.g., trust and perceived risk) (Siegrist et al. 2000). Findings here, however, were consistent with research reporting relatively weak relationships (e.g., Sjöberg 2000b, 2001; Needham & Vaske, in press). Given that most of the variance in these concepts remains unexplained by trust, it is possible that other attributes such as knowledge, control, and newness may also contribute to respondents' perceptions (e.g., Fischhoff et al. 1978, Sjöberg 2000a).

There is inconsistency in the conceptualization and measurement of trust. Some researchers contend that trust is multidimensional and consists of dimensions such as caring, responsibility, competence, fairness, and confidence (Poortinga & Pidgeon 2003). Factor loadings and reliabilities reported here, however, support the unidimensional interpretation of social trust (Winter, Palucki et al. 1999, Siegrist et al. 2001).

4.3 Future Research

To increase the generalizability of these findings, the following research considerations are offered. First, this article examined homeowners' attitudes toward prescribed burns; it did not examine the potential risks associated with prescribed burns that may influence individuals' views. People tend to believe that they are at less risk than others (i.e., risk denial) (Sjöberg 2000a). Research is needed to assess how individuals assign judgments of risk.

Second, this article investigated WUI residents' perceptions of similarity, trust, and attitude. Research has shown that experts, constituent/interest groups, and the public can differ in their perceptions. Experts, for example, tend to judge risks differently and as less severe compared to others (Sjöberg 1999). Researchers should be sensitive to, and explore possible differences in, risk judgments among stakeholder groups.

Third, most studies investigating relationships among SVS and social trust have focused on the limited number of agencies that are usually responsible for managing a natural resource. This scope, however, may be too narrow. Perceptions may be influenced by additional sources such as interest groups, media, friends, and family, as well as the specific management agency (i.e., federal, state, local) (Don Carlos et al. 2006). This may partially explain the mixed results in studies examining relationships between trust and attitudinal concepts such as benefits and risks (e.g., Walls et al. 2004). Effects of other diverse information sources on judgments of risk related to other natural resource issues warrant research consideration.

Fourth, Colorado residents' attitudes were only partially influenced by trust in the agency. Researchers have identified other determinants of attitudes and perceived risk including dread, knowledge, control, and newness (e.g., Fischhoff et al. 1978, Sjöberg 2002, Slovic 1987). Research is required to explore the dimensionality and impact of perceived attitudes and risk. Understanding wildland fires within the context of a psychometric model may facilitate risk analysis and policy development.

Fifth, our operationalization of SVS in this paper was identical to prior theorizing and empirical work based on the SVS model (e.g., Siegrist et al. 2000). We have, however, also developed scales for measuring value orientations (i.e., patterns of basic beliefs) about wildfire management (e.g., Absher et al. 2003, Bright et al. 2005) based on the theoretical work of Rokeach (1973). These basic beliefs include dimensions such as biocentrism, anthropocentrism, responsibility, and freedom. Identification of these value orientations / basic beliefs has proven useful for predicting attitudes toward fire policies, norms for agency reactions to wildfire, and fire-related homeowner behaviors such as creating defensible space (Absher & Vaske, in press). Research that directly compares SVS measures of value similarity against the Rokeach-based value orientations may further facilitate understanding the foundations of individuals' attitudes, norms, and behaviors associated with wildland fire management.

Sixth, identical to most previous research on SVS and social trust, this article is quantitative and cross-sectional in nature. It is likely, however, that these concepts are dynamic, not static. Longitudinal or panel design studies are needed to obtain time-series data. Studies have found utility in applying qualitative methods to examine these concepts (e.g., Cvetkovich & Winter 2003, Earle 2004, Winter et al. 1999). These approaches may be useful for providing depth and detail necessary for delineating underlying influences and dimensions of perceived similarity and trust.

Finally, the concepts of SVS and social trust have generated considerable interest in the risk literature, but have received little attention in natural resource fields. Given the controversial nature of many natural resource issues, drawing on the risk literature may facilitate a better understanding of stakeholders and, consequently, the challenges faced by resource managers. This study should be viewed as a starting point in that direction. Researchers are encouraged to address research needs identified here to further understand the human dimensions of wildfire management.

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