

The role of trust in residents' fire wise actions

James D. Absher^{A,C,*} and Jerry J. Vaske^{B,*}

^AUSDA Forest Service, Pacific Southwest Research Station, 4955 Canyon Crest Drive, Riverside, CA 92507, USA.

^BHuman Dimension of Natural Resources, Colorado State University, Fort Collins, CO 80523, USA. Email: jerryv@cnr.colostate.edu

^CCorresponding author. Email: jabshe@fs.fed.us

*Authors have contributed equally to this paper.

Abstract. Residents' trust in the managing agency has been heralded as a necessary precursor to success in preventing wildland fire losses in the wildland–urban interface. Trust, however, is a complex concept. Homeowners' specific fire wise actions may not be easily linked to general measures of trust. This article uses two distinct trust indices to predict residents' intention to do fire wise actions to their house and adjacent site. Results of structural equation models using a survey of Colorado Front Range residents ($n = 456$) revealed strong explanatory power: 85% (house behaviours) and 72% (site behaviours) of the variation in intentions were accounted for by trust, previous fire wise behaviours and the perceived effectiveness of the actions. The trust measures, however, were not major influences. 'Trust in agency competence' weakly predicted perceived effectiveness for site behaviours; 'trust in agency information' weakly predicted past house behaviours. Neither trust variable directly affected intentions to perform these actions. We conclude that trust is best viewed as a broad precursor whose influence on behavioural intentions is mediated by other constructs (e.g. past behaviour, perceived effectiveness). The implications for further work to understand the role of trust and the possible social mechanisms involved are discussed.

Additional keywords: fire wise behaviours, social trust, wildland fire, wildland–urban interface.

Introduction

To minimise the negative consequences of wildfires, natural resource agencies have shifted from a traditional emphasis on total fire suppression to policies designed to reduce the probability or severity of wildfires and to restore ecological conditions. Two major techniques used are prescribed burning 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. At the individual level, action programs for homeowners in areas that might be affected by wildland fires are now common (e.g. FireWise or FireSafe Councils). Defensible space activities involve actions such as plant spacing or the removal of trees near the home. Other actions target structures, such as cleaning gutters or using fire-resistant building materials.

For either agency or individual actions, public support is essential for a successful program. Recent social science efforts have sought to understand the amount of public support for agency policy and when homeowners will do the recommended fire wise actions (McCaffrey 2004; Fege and Absher 2007; Absher *et al.* 2009). Trust in the agency has been suggested as a key psychological predictor of support for agency actions and for individual behaviour (Winter *et al.* 2004; Carroll *et al.* 2007; Liljeblad *et al.* 2009). Our previous research has documented that trust does positively influence attitudes towards agency

actions such as prescribed burning and mechanical thinning (e.g. Absher and Vaske 2007; Vaske *et al.* 2007). Other work has shown that individual values and perceptions affect trust of the agencies involved and may affect judgments about their competence (Morehouse *et al.* 2010). Little attention has been focussed on the relationship between agency trust and individual homeowner attitudes and behaviour regarding fire wise actions.

This article fills that knowledge gap by empirically modelling the relationships between two measures of agency trust (perceived agency competence, trust in information provided) and homeowners': (1) perceived effectiveness of fire wise actions; (2) past fire wise behaviours; and (3) behavioural intentions to perform fire wise actions. Based on social psychology theory, we argue that contrary to the agency-level analyses where general measures of trust predict general attitudes towards agency actions, general measures of trust will not predict homeowners' specific attitudes and behaviours.

Theoretical framework

Social trust has been defined as 'the willingness to rely on those who have the responsibility for making decisions and taking actions' (Siegrist *et al.* 2000, p. 354). The adjective 'social' emphasises that the people being trusted are those with formal responsibilities within organisations that may not be personally known to the person making the trust attribution (Siegrist *et al.* 2000). Institutions and agencies that provide fire protection and

mitigation services in communities where wildland fires may be a problem are generally trusted as authoritative sources, but their decision models may be heavily focussed on biophysical information and lack crucial social information (Bradstock and Gill 2001; Morehouse *et al.* 2010).

People who perceive that they share similar views to the managing agency tend to trust the agency more than those who do not (e.g. Siegrist and Cvetkovich 2000; Cvetkovich and Winter 2003; Vaske *et al.* 2007). Some research has further differentiated types of trust (Poortinga and Pidgeon 2003) or its relationship to perceptions of risk (Walls *et al.* 2004) as important distinctions. Winter (2003), for example, found that trust ratings of the USDA Forest Service (USFS) fire management policies (1) varied significantly by state (i.e. in Arizona, California, Colorado, New Mexico); (2) were primarily influenced by shared values between the agency and the public; and (3) predicted respondents' approval of management actions. Winter *et al.* (2004) found significant relationships between social trust in USDA Forest Service fuel management strategies and perceived agency competence.

The role of trust is usually measured as a general belief or orientation. These broad, abstract thoughts should be distinguished, however, from more specific cognitions (Eagly and Chaiken 1993). Setting- or situation-specific thoughts are more likely to predict particular fire wise decisions than the broader orientations. For example, general trust orientations may influence support for agency actions but their effect is likely mediated by residents' other perceptions or preferences in a specific situation. When correspondence between variables is similar (in terms of target, action, context and time), correlations between variables are expected to be larger (Fishbein and Ajzen 1975; Manfredo *et al.* 2004). This suggests that trust should be measured with reference to the desired action in order to maximise the ability to predict individual fire wise behaviours.

Distinguishing the effects of trust in an agency in general and more specific fire wise action recommendations (e.g.

information for homeowner actions) is warranted. Some researchers (Poortinga and Pidgeon 2003; Liljeblad *et al.* 2009) have suggested that trust is composed of three elements: a series of shared norms and values, effectiveness expectations, and competence and consistency in behaviour. Similarly, Bright *et al.* (2002) postulated competence and effectiveness were essential to trust. Recent work has focussed on the relationships between agency trust and public acceptance of agency policies both before and after a wildland fire (e.g. Shindler and Toman 2003; Cvetkovich and Winter 2008; Olsen and Shindler 2010). Others have focussed strongly on the community and feelings of trust at that level (Carroll *et al.* 2000; Grayzeck-Souter *et al.* 2009; Winter *et al.* 2009). These results need to be extended to homeowners' preparedness actions and the role of trust on private lands. For fire wise actions, homeowners' perceptions that an agency will protect their home (i.e. it is competent at wildland firefighting and prevention) and that it will provide accurate advice and information (i.e. it will be effective at reducing the risk of wildfire losses) are important distinctions to make for understanding the role of trust.

Study objectives

The models analysed here used two trust indices (i.e. trust agency competence, trust agency information) to predict: (1) the perceived effectiveness of fire wise actions; (2) recent homeowner fire wise behaviours; and (3) intentions to perform future fire wise actions. Perceived effectiveness and recent behaviours were hypothesised to mediate the relationships between trust and behavioural intentions. The trust indices were based on previous literature and reflect two distinct general orientations towards the agency.

Perceived effectiveness, recent fire wise behaviours and behavioural intentions for future fire wise actions were specific to a set of possible behaviours: either house-specific actions (e.g. cleaning roofs, Fig. 1) or adjacent site landscaping actions (e.g. clearing shrubs, Fig. 2). Based on the specificity principle,

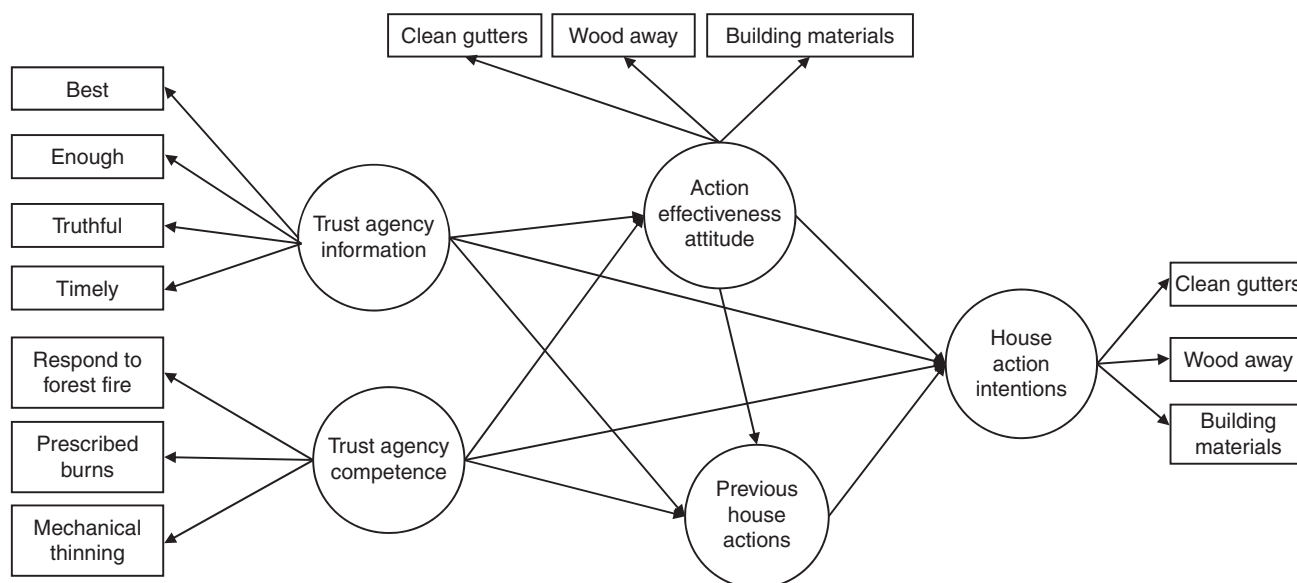


Fig. 1. Analytical model for fire wise house actions.

these effectiveness and recent-action variables are likely to have more predictive power for behavioural intentions than the more general trust variables, and in turn would be expected to rely on perceptions of trust to some extent.

Methods

The study population consisted of landowners over the age of 18 years who reside in the rural areas (based on US Census Bureau 2010 data) of six Colorado counties (Boulder, Clear Creek, Gilpin, Grand, Jackson and Larimer). Colorado has 22 million acres (8.9×10^6 ha) of forested landscape. A substantial portion of these lands is in the six counties in our study area. For example, over 50% of Larimer County is publicly owned, most of which is land within the Arapaho–Roosevelt National Forest. Although the six counties are broadly defined as part of Colorado’s wildland–urban interface, a mixture of rural and urban population centres is evident, and the sampling frame was constrained to landowners living in rural locations in each of the six counties. We used the Census Bureau’s 2000 definition of rural (i.e. population density <1000 people per square mile (384.8 people per square kilometre), US Census Bureau 2010) and operationalised ‘rural’ using local maps and zipcodes. A random sample of resident names and addresses was purchased from a commercial sampling firm. See Vaske *et al.* (2007) for more detail on sampling.

Mail survey administration

Four mailings were used to administer the survey beginning at the end of May 2004. Residents first received the 12-page questionnaire, a prepaid postage return envelope and a personalised 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 (questionnaire, prepaid-postage return envelope and cover letter) was sent to non-respondents 10 days after the postcard

reminder. To further increase the response rate, a third complete mailing was sent 1 month following the second complete mailing.

A total of 532 completed surveys were returned with an overall response rate of 47% (532 returned/1200 sent – 56 non-deliverables). After eliminating respondents who lived in apartment buildings and mobile homes, 456 respondents were included in the analysis.

As a check on potential non-response bias, a telephone survey was conducted of non-response residences ($n = 100$). Selected key issues (e.g. trust, perceived effectiveness, previous fire wise behaviours) were addressed in the telephone survey. Differences between respondents and non-respondents on these central topics were ‘minimal’ (Hedges’ g effect sizes <0.2) (Vaske 2008). Thus, non-response bias was not considered to be a problem, and the data were not weighted.

Social trust variables

Two distinct multiple-item indices of social trust served as independent variables in the models. The first index included three questions (i.e. trust agency competence). Respondents indicated their level of agreement with: ‘I trust the USDA Forest Service knows how to: (1) effectively plan prescribed burns; (2) use mechanical thinning effectively; and (3) respond to forest fires’. The second index of social trust was based on four questions concerned with USFS information (i.e. trust agency information). ‘With respect to forest fire management, I trust the USDA Forest Service to provide: (1) the best available information on forest fire issues; (2) me with enough information to decide what actions I should take regarding forest fire; (3) truthful information about safety issues related to forest fire; and (4) timely information regarding forest fire issues.’ Survey items in both the ‘trust agency competence’ and ‘trust agency information’ indices were measured on a seven-point scale from ‘strongly disagree’ (–3) to ‘strongly agree’ (3).

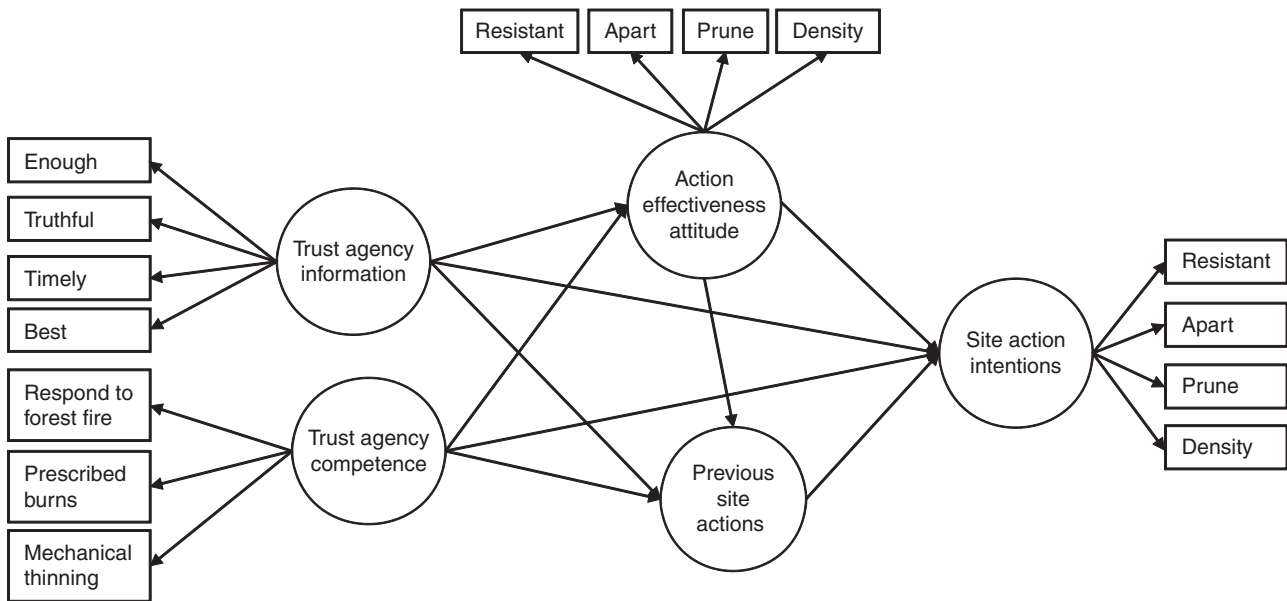


Fig. 2. Analytical model for fire wise site actions.

Fire wise action variables

Seven fire wise actions were measured in three ways: (1) perceived effectiveness of fire wise actions; (2) residents' previous fire wise actions; and (3) intentions do the actions in the future. The fire wise behaviours were separated into actions related to the site (i.e. the area near the house), and those that affected the house itself. The four actions affecting the site adjacent to the house included: (1) planting fire-resistant plants to protect the home; (2) planting plants 15 feet (4.57 m) apart to protect the home; (3) pruning branches within 85 feet (25.9 m) of the house to protect the home; and (4) reducing density of trees within 100 feet (30.5 m) of the house to protect it. Three fire wise actions related to the house and these were: (1) cleaning roof surfaces of vegetation to protect the home (eliminate an ignition source); (2) stacking lumber 30 feet (9.14 m) from the home (eliminate an ignition source); and (3) using fire-resistant building materials to protect the home (reduce ignition potential).

For each fire wise action, effectiveness was measured by asking: 'How effective is ___ in protecting one's property from forest fire?' Variables were coded on seven-point scales ranging from 'not at all effective' (1) to 'extremely effective' (7). The previous-behaviour questions asked: 'Do you currently do ___?' These variables were coded as 'yes' (1) or 'no' (0). Two summated indices were created. The index for site actions ranged from 0 (none) to 3 (all); the index for house actions ranged from 0 to 4 (all). The behavioural intentions items asked: 'How likely are you to do ___ in the future?' These variables were coded on seven-point scales ranging from 'not at all likely' (1) to 'extremely likely' (7).

Data analysis

A confirmatory factor analysis tested whether the trust dimensions, perceived effectiveness indicators and behavioural intention variables provided a good fit to the data. *LISREL 8.80* (Jöreskog and Sörbom 2007) was used for this analysis based on the maximum likelihood estimation procedure and the covariance matrix of the items measuring the concepts.

A structural equation path analysis was then used to test the predictive validity of the proposed house and site models. Because the two additive indices of past behaviour constituted single items of their respective constructs (i.e. house behaviours

and site behaviours), the error variance had to be assumed. A series of models were examined with varying levels of error variance (i.e. 0.1, 0.15, 0.2). Because the different models yielded substantively the same results, the error variance was set at 0.1.

The overall fit of the models was assessed using six indicators (χ^2 , $\chi^2/\text{d.f.}$, GFI, NFI, CFI, RMR; see Jöreskog and Sörbom 2008). Because large sample sizes tend to inflate the Chi-square statistic, Marsh and Hocevar (1985) suggest that the Chi-square should be evaluated in relation to the model's degrees of freedom. A $\chi^2/\text{d.f.}$ ratio of 2 : 1 to 5 : 1 indicates an acceptable fit. Acceptable fits for the GFI, NFI and CFI statistics are usually set at >0.90 and an acceptable fit for RMR is typically <0.05 (Kline 2005).

Results

A preliminary Principle Components Analysis factored the seven trust variables into the predicted two concepts (i.e. trust-competence, trust-information) and suggested that the constructs measure substantively different aspects of trust (Table 1). The percentage agreeing with each item ranged from 64 to 87%. There was generally stronger agreement for trust-information than for trust-competence. The standardised factor loadings for the items are reported separately for house and site measures and ranged from 0.63 to 0.93.

On average, respondents agreed that the actions were 'quite' effective in protecting one's property from forest fire (Table 2). The mean for the three house actions was 5.73; the mean for the four site actions was 5.21 (5 = quite effective). Factor loadings for the effectiveness measures were 0.60 to 0.79 for house actions and 0.61 to 0.85 for site actions. The summated scale for the 'currently do house actions' ranged from 0 to 3. The mean for this index was 1.93, implying that, on average, respondents were currently doing approximately two of the three actions. The index for 'site' ranged from 0 to 4; the average was 1.64. Overall, residents reported doing some of each type of fire wise actions. The intention measures had means of 5.40 (house) and 4.34 (site). For these seven-point scales, a value of 4 implies 'moderately' likely to do; a value of 5 indicates 'quite' likely to do. Standardised factor loadings ranged from 0.47 to 0.61 for house actions and 0.55 to 0.80 for site actions.

Table 1. Trust items and concepts

Item response scales: strongly disagree (−3) to strongly agree (+3). Percentage slightly agree (1) through strongly agree (3)

Concepts and variables	Percentage agreement	Standardised factor loading		Scale mean
		House	Site	
Trust – agency competence:				2.17
Agencies know how to do prescribed burns	64	0.80	0.79	
Agencies know how to do mechanical thinning	72	0.74	0.74	
Agencies know how to respond to forest fires	85	0.63	0.63	
Trust – agency information:				2.63
US Forest Service can be trusted to provide...				
The best information on forest fires	83	0.82	0.81	
Enough information on forest fires	86	0.87	0.86	
Truthful information about safety issues	87	0.92	0.93	
Timely information on forest fires	82	0.89	0.90	

Table 2. Perceived effectiveness, current actions, and intention to do fire wise actions
Item response scales are: Perceived effectiveness of fire wise action, not at all effective (1) to extremely effective (7); Currently do fire wise action, yes or no (0, 1) into additive index. Factor loadings with error variance set at 0.1 (multiple runs at 0.1, 0.15, 0.2 yielded the same results); and Intention to do fire wise action, not at all likely (1) to extremely likely (7)

Variables	Standardised factor loading		Mean	
	House	Site	House	Site
Perceived effectiveness of fire wise action			5.73	5.21
Clean roof and gutters	0.79			
Stack wood away from house	0.91			
Use fire-resistant building materials	0.60			
Use fire-resistant plantings		0.61		
Plant 15 feet (9.14 m) apart		0.74		
Prune out 85 feet (25.9 m)		0.85		
Reduce plant density within 100 feet (30.5 m)		0.74		
Currently do fire wise action	0.95	0.95	1.94	1.64
Intention to do fire wise action			5.40	4.34
Clean roof and gutters	0.47			
Stack wood away from house	0.57			
Use fire-resistant building materials	0.61			
Use fire-resistant plantings		0.55		
Plant 15 feet apart		0.69		
Prune out 85 feet		0.79		
Reduce plant density within 100 feet		0.80		

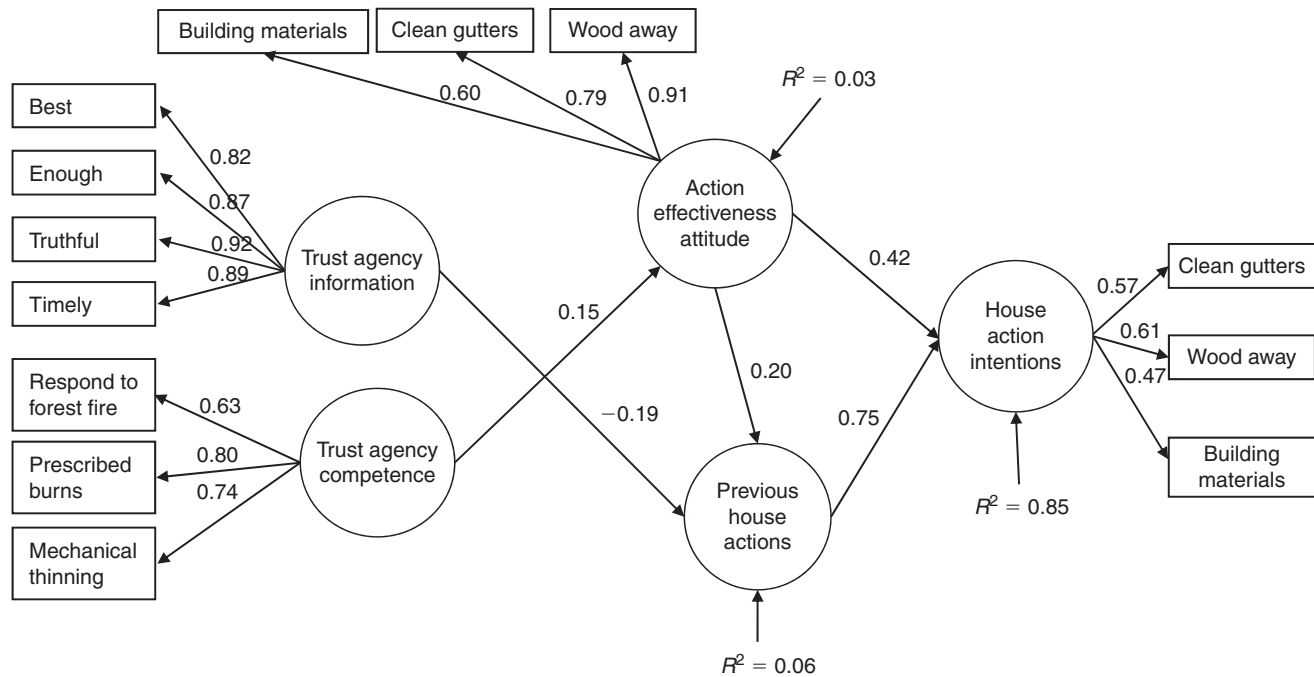


Fig. 3. Confirmatory factor analysis and structural equation model for fire wise house actions.

Model tests

Separate models were analysed for the house-specific data (Fig. 3) and site-specific data (Fig. 4). The two trust measures were the same for each model. The general pattern of findings was similar in both models. As anticipated, the best predictor of specific behavioural intentions was specific recent behaviours.

The structural equation path coefficients were 0.75 (house model) and 0.74 (site model) for this relationship. Perceived effectiveness was the second-best predictor of behavioural intentions (0.42 house model, 0.22 site model). The models explained 85 and 72% of the variance for house and site intentions respectively. Neither of the trust indices directly

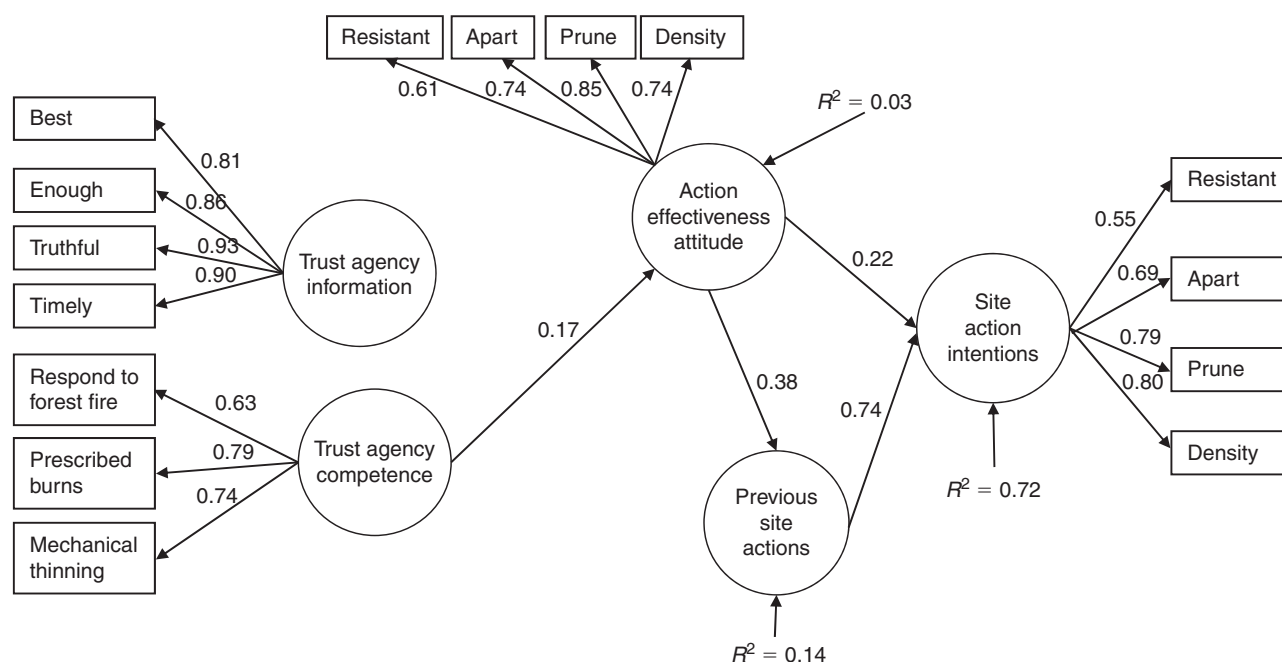


Fig. 4. Confirmatory factor analysis and structural equation model for fire wise site actions.

influenced intentions, although there were some weak to moderate indirect effects through effectiveness or previous actions.

In both models, the best predictor of specific recent behaviours was perceived effectiveness of the action (0.20 house model, 0.38 site model). The general trust in agency competence index did not influence past behaviours in either the site or house models. The relationship between trust in agency information and specific-behaviours index was not statistically significant in the site model. Although this trust variable was significant in the house model, the coefficient was negative. In other words, individuals who did the fire wise actions were less likely to trust the agency information. The models predicting past behaviour from effectiveness and trust explained less than 14% of the variance.

The models predicting perceived effectiveness using the two trust indices explained ~3% of the variation. The path from trust in agency competence to effectiveness was significant in both models (0.15 house, 0.17 site). The trust agency competence index influenced perceived effectiveness in the site model (0.17). The trust agency information index was not a discernible cause of effectiveness attitudes.

Discussion and implications

General trust in an agency can influence general support for agency policies (Vaske *et al.* 2007). As suggested by social psychological theory and the specificity hypothesis, however, the best predictor of specific behavioural fire wise intentions is specific past behaviour, followed by specific perceived effectiveness. In the models presented, we separated out two distinct types of general trust, competence and information. The agency trust measures did not have direct influence on specific homeowner fire wise behavioural intentions and the indirect effects were minimal. The influence of trust on past behaviours and

perceived effectiveness was weak. The data suggest that respondents did distinguish between trusting the agency to be competent in their land-management actions and trustworthiness of the information they provide. The analyses also show that discrete aspects of trust affect intermediary variables (effectiveness and past behaviours) differently.

These findings suggest three conclusions that hold true for both house and site models. First, even when given some specificity, agency-focussed trust measures (e.g. trust-competence, trust-information) are still relatively general. Consistently with theory, they have limited predictive power in accounting for variations in specific behavioural intentions. Second, the perceived effectiveness of fire wise actions explains a portion of variance in intentions to perform these actions and can thus play a substantive role in affecting fire wise behaviours. Third, the best predictor of future intentions is past behaviour. This suggests that efforts designed to encourage people to do something on the list of fire wise actions may facilitate other actions as well.

Additional implications can be drawn from the results to underscore the principle that effectiveness perceptions matter. The explanatory power in these models shows that for either house or site behaviours, convincing homeowners of the effectiveness may be important both directly and indirectly. This places emphasis on processes that can affect residents' opinions about effectiveness, especially through localised homeowner and community discourse about, and education efforts to attain, fire loss mitigation. Broad awareness campaigns, like generalised trust, may be only weakly effective in a direct way, and may need to be combined with local programs to be maximally useful.

Additional methodological, theoretical and practical explanations can be offered. First, previous work has argued for a strong relationship between a generalised concept of trust and general attitudes of support for agency actions such as

prescribed burning or mechanical thinning. Trust may be sufficiently multifaceted that it operates with different levels of action with given specific contexts. Given the moderately high mean scores for the variables in this analysis, other surveys may find settings where scores are lower and a threshold effect for trust is important, perhaps critical, to realising behaviour-change goals.

Second, social marketing and persuasive communications literature (Cialdini 2001; Kotler *et al.* 2002) suggests that people develop trust only after some experience with doing the behaviours or incorporating fire preparedness ideas into their lifestyle. The situationally different effects reported above suggest a recursive model of effects between trust and intentions may be useful (Lewicki *et al.* 2006). Homeowner's decisions to act develop in socially complex and dynamic ways. Fire wise knowledge, agency image and community norms all play a role over a period of time to reflect readiness to accept the need to act and to eventually accomplish the actions themselves. Agency personnel and community activists alike will want to be aware of the specifics of the sociocultural context for residents' actions in addition to the setting-specific biophysical risk factors.

Third, our respondents were residents of the Colorado Front Range and, as such, may reflect the culture and social dynamics of a particular group. Surveys of other groups that are geographically or culturally distinct may yield different results.

Fourth, the strength of our paths may also be related to measurement issues. Generalised measures of trust did not predict specific behavioural intentions, even after separating house and site concerns. Replication and extension of this model is needed. Of particular note is the weak reliability of the house action intention measure. Similar to previous research, we used standard measures of trust, but more focussed or reformulated measures of trust may be needed. Such expanded conceptualisations may yield richer, more complete explanations for the role of trust in management decision-making.

Finally, trust appears to operate in socially complex ways and measurement models need to reflect this complexity. The predictive power of the trust variables had a negative influence at one point (information trust affecting house actions). Perhaps trust is a stand-in for a generalised distrust of government. This might suggest that those who have done house-focussed fire wise actions may already have a negative view of agency communications, or have discounted it in such a way as to act independently. In either case, it seems that information trust acted like other generalised precursor variables in a cognitive hierarchy (e.g. beliefs affecting attitudes). Some subgroups may use mental standards to judge and inform action in seemingly contradictory ways. Direct study of these effects is warranted to better understand the role and significance of various types of trust in similar settings (Absher *et al.* 2009).

The results here should not be taken as a repudiation of trust in the process of affecting wildland fire preparedness by residents. Caution should be exercised when generalising these findings to other situations. Our results, however, do raise a 'red flag' regarding the role of trust in explaining homeowners' intention to do fire wise behaviours. Singular or generalised measures of trust may have a role in explaining public support for agency actions more broadly, but for residents affected by

wildland fire, we recommend further development of models and measures tied to the differences in homeowners' lifestyle or setting as they will likely be more robust.

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References

- Absher JD, Vaske JJ (2007) Modelling public support for wildland fire policy. In 'Sustainable Forestry in Theory and Practice'. (Eds KM Reynolds, AJ Thomson, M Kohl, MA Shannon, D Ray, K Rennolls) pp. 159–170. (CAB International Press: Wallingford, UK)
- Absher JD, Vaske JJ, Shelby LB (2009) Residents' responses to wildland fire programs: a review of cognitive and behavioral studies. USDA Forest Service, Pacific Southwest Research Station, General Technical Report PSW-GTR-223. (Albany, CA)
- Bradstock RA, Gill AM (2001) Living with fire and biodiversity at the urban edge: in search of a sustainable solution to the human protection problem in southern Australia. *Journal of Mediterranean Ecology* **2**, 179–195.
- Bright AD, Vaske JJ, Kneeshaw K, Absher JD (2002) Scale development of wildfire management basic beliefs. In 'Homeowner, Communities, and Wildfire: Science Findings from the National Fire Plan'. (Ed. PL Jakes) USDA Forest Service, North Central Research Station, General Technical Report GTR-NC-231. pp. 18–25. (Saint Paul, MN)
- Carroll MS, Findley AJ, Blatner KA, Mendes SR, Daniels SE, Walker GB (2000) Social assessment for the Wenatchee National Forest wildfires of 1994: targeted analysis for the Leavenworth, Entiat, and Chelan Ranger Districts. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-479. (Portland, OR)
- Carroll MS, Blatner KA, Cohn PJ, Morgan T (2007) Managing fire danger in the forests of the US inland Northwest: a classic 'wicked problem' in public land policy. *Journal of Forestry* **105**, 239–244.
- Cialdini RB (2001) 'Influence: Science and Practice.' 4th edn. (Allyn & Bacon: Boston, MA)
- Cvetkovich GT, Winter PL (2003) Trust and social representations of the management of threatened and endangered species. *Environment and Behavior* **35**, 286–307. doi:10.1177/0013916502250139
- Cvetkovich GT, Winter PL (2008) The experience of community residents in a fire-prone ecosystem: a case study of the San Bernardino National Forest. USDA Forest Service, Pacific Southwest Research Station, Research Paper PSW-RP-257. (Albany, CA)
- Eagly AH, Chaiken S (1993) 'The Psychology of Attitudes.' (Harcourt Brace Jovanovich: New York)
- Fege A, Absher JD (2007) Inviting other professions to help reduce wildfire property losses. *Fire Management Today* **67**(3), 19–23.
- Fishbein M, Ajzen I (1975) 'Belief, Attitude, Intention, and Behavior: an Introduction to Theory and Research.' (Addison-Wesley: Reading, MA)
- Grayzeck-Souter SA, Nelson KC, Brummel RF, Jakes P, Williams DR (2009) Interpreting federal policy at the local level: the wildland-urban interface concept in wildfire protection planning in the eastern United States. *International Journal of Wildland Fire* **18**, 278–289. doi:10.1071/WF08081
- Jöreskog K, Sörbom D (2008) 'LISREL 8.8 for Windows.' (Scientific Software International Inc.: Lincolnwood, IL)
- Kline RB (2005) 'Principles and Practice of Structural Equation Modelling.' 2nd edn. (Guilford Press: New York)
- Kotler P, Roberto N, Lee N (2002) 'Social Marketing: Improving the Quality of Life.' (Sage Publications: Thousand Oaks, CA)
- Lewicki RJ, Tomlinson EC, Gillespie N (2006) Models of interpersonal trust development: theoretical approaches, empirical evidence, and

- future directions. *Journal of Management* **32**, 991–1022. doi:10.1177/0149206306294405
- Liljeblad A, Borrie WT, Watson AE (2009) Determinants of trust for public lands: fire and fuels management on the Bitterroot National Forest. *Environmental Management* **43**(4), 571–584. doi:10.1007/S00267-008-9230-3
- Manfredo MJ, Teel TL, Bright AD (2004) Applications of the concept of values and attitudes in human dimensions of natural resources research. In 'Society and Natural Resources: a Summary of Knowledge'. (Eds MJ Manfredo, JJ Vaske, BL Bruyere, DR Field, PJ Brown) pp. 271–282. (Modern Litho: Jefferson, MO)
- Marsh HW, Hocevar D (1985) Application of confirmatory factor analysis to the study of self-concept: first- and higher-order factor models and their invariance across groups. *Psychological Bulletin* **97**, 562–582. doi:10.1037/0033-2909.97.3.562
- McCaffrey S (2004) Thinking of wildland fire as a natural hazard. *Society & Natural Resources* **17**, 509–516. doi:10.1080/08941920490452445
- Morehouse BJ, O'Brien S, Christopherson G (2010) Integrating values and risk perceptions into a decision support system. *International Journal of Wildland Fire* **19**, 123–136. doi:10.1071/WF08064
- Olsen CS, Shindler BA (2010) Trust, acceptance, and citizen–agency interactions after large fires: influences on planning processes. *International Journal of Wildland Fire* **19**, 137–147. doi:10.1071/WF08168
- Poortinga W, Pidgeon NF (2003) Exploring the dimensionality of trust in risk perception. *Risk Analysis* **23**(5), 961–972. doi:10.1111/1539-6924.00373
- Shindler BA, Toman E (2003) Fuel reduction strategies in forest communities: a longitudinal analysis of public support. *Journal of Forestry* **101**(6), 8–15.
- Siegrist M, Cvetkovich G (2000) Perception of hazards: the role of social trust and knowledge. *Risk Analysis* **20**(5), 713–720. doi:10.1111/0272-4332.205064
- Siegrist M, Cvetkovich G, Roth C (2000) Salient value similarity, social trust, and risk/benefit perception. *Risk Analysis* **20**(3), 353–362. doi:10.1111/0272-4332.203034
- US Census Bureau (2010) Census 2000 data for the state of Colorado. Available at <http://www.census.gov/census2000/states/co.html> [Verified 16 February 2011]
- Vaske JJ (2008) 'Survey Research and Analysis: Applications in Parks, Recreation and Human Dimensions.' (Venture Publishing: State College, PA)
- Vaske JJ, Absher JD, Bright AD (2007) Salient value similarity, social trust, and attitudes toward wildland fire management strategies. *Human Ecology Review* **14**(2), 223–232.
- Walls J, Pidgeon N, Weyman A, Horlick-Jones T (2004) Critical trust: understanding lay perceptions of health and safety risk regulation. *Health Risk & Society* **6**(2), 133–150. doi:10.1080/1369857042000219788
- Winter PL (2003) Californians' opinions on wildland and wilderness fire management. In 'Homeowner, Communities, and Wildfire: Science Findings from the National Fire Plan'. (Ed. PL Jakes) USDA Forest Service, North Central Research Station, General Technical Report NC-231, pp. 84–92. (Saint Paul, MN)
- Winter G, Vogt CA, McCaffrey S (2004) Examining social trust in fuels management strategies. *Journal of Forestry* **102**(6), 8–15.
- Winter G, McCaffrey S, Vogt CA (2009) The role of community policies in defensible space compliance. *Forest Policy and Economics* **11**, 570–578. doi:10.1016/J.FORPOL.2009.07.004

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