



Integrating multi-level values and pro-environmental behavior in a U.S. protected area

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Abstract

Human behavior is influenced by an array of psychological processes such as environmental values. Despite the importance of understanding the reasons why people engage in activities that minimize environmental degradation, empirical research rarely integrates different types of values simultaneously to provide more complete and multi-faceted insights on how values contribute to environmental sustainability. Drawing from on-site survey data collected in Denali National Park and Preserve, Alaska ($n=641$), we used two-step structural equation modeling to test how variation in behavioral patterns was explained by the cultural, individual, and social values of visitors to a national park. We fused various disciplinary perspectives on the value concept to demonstrate how individual- and group-level dynamics were integral for predicting behavior and better understanding aggregated preferences for environmental conditions in the context of a U.S. protected area.

Keywords Pro-environmental behavior · Values · Eudaimonia · Hedonia · Sustainability · Protected areas

Introduction

The study of pro-environmental behavior provides a fundamental basis for understanding individual decisions that influence environmental sustainability. Particularly over the past four decades, conceptual and empirical evidence of the processes shaping pro-environmental behavior have

appeared in the literature (Steg and Vlek 2009; Stern et al. 1999; Gifford and Nilsson 2014; Ajzen and Fishbein 1977). Although still in its infancy, this body of work has converged on the importance of considering multiple dimensions of behavior (Larson et al. 2015; Landon et al. 2018), and indicated that multiple values are instrumental in shaping decisions (Manfredo et al. 2016; van Riper 2018). Here, we focus on “cultural” values (i.e., ideologies that characterize the structure of roles and responsibilities in a society) (Wildavsky and Dake 1990), “individual” values (i.e., guiding principles in life) (Schwartz 1994), and “social” values (i.e., place-based preferences for nature aggregated at the group-level) (Brown 1984; Raymond et al. 2014). Previous research has conceptualized the interrelationships between these values during well-being intervention programs (Raymond and Raymond 2019), and considered subsets of these concepts across levels including individuals, groups, communities, societies, and cultures (Kenter et al. 2016). However, none to date have provided empirical evidence of how these multiple levels influence one another and, in turn, shape pro-environmental behavior.

There is a strong need to better understand the complexity of values (Kenter et al. 2019) and their influence on behavior (Steg and Vlek 2009), which stems from three

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related considerations. First, the study of human values has a long-standing history in different fields of study such as anthropology, psychology, and economics. Although disciplinary distinctions indicate importance bestowed on these lines of research, there are differences that warrant attention because theoretical advancements in one area of study benefit research being conducted in another (Kurland et al. 2010). For example, psychometrics have advanced the study of individual values but are rarely applied to hone measurement of social values despite the benefits that would emerge. Second, refining the conceptual and empirical foundations of factors that compel individual behavior will increase the predictive capacity of models, which in turn, closes the so-called ‘value-action gap’ (Kollmuss and Agyeman 2002). The antecedent processes of behavioral formation are crucial for understanding how multi-dimensional interpretations of values and behavior complicate generalization. Finally, more stable psychological processes, if shifted, could alter the future of environmental sustainability. Given that previous research has predominantly focused on attitudinal processes that are more direct predictors of behavior (Heberlein 2012), there is a strong need to direct attention to how cultural and individual values influence and are influenced by the meaning and content of social values (Kenter et al. 2015; Chan et al. 2012). Therefore, the purpose of this investigation was to examine the relationships among multiple levels of values in the context of a U.S. protected area, and integrate methods to understand behavior change for achieving long-term sustainability objectives.

Conceptual orientation for the study of value–behavior relationships

Several theoretical orientations have been applied to understand the drivers of pro-environmental behavior, and indicate that intent-oriented actions are influenced by a hierarchical structure of beliefs and moral normative concerns (Stern 2000; Ajzen 1985). The key frameworks that have guided past research converge on the assumption that human behavior is a function of internal and external forces (van Riper et al. 2017; Kollmuss and Agyeman 2002), along with how values influence people’s engagement with their environments (Kenter et al. 2015; Ives and Kendal 2014; Braito et al. 2017). However, recent research has underlined the importance of considering how multiple levels of values influence behavior (Manfredo et al. 2014) and the dynamics of relationships between individuals and collectives that share environments. Specifically, van Riper et al. (2018) asserted that explicit recognition of heterogeneous, multi-level values would offer a more complete understanding of group decisions. These authors argued that the more diverse the values of stakeholders engaged in collective action, the

greater the transaction costs and investments in communication required to negotiate and minimize inter-group conflicts (Enengel et al. 2014). These theoretical propositions have yet to be tested. Deeper consideration of the empirical properties of value-behavior linkages in sustainability science will refine knowledge of how human and non-human activities create new dynamics and form complex, adaptive networks over time (Kendal and Raymond 2019; Kenter et al. 2019).

Another research gap addressed in the present study is related to the multi-dimensional structure of pro-environmental behavior (Larson et al. 2015). Different actions require different levels of motivation and ability (Kaiser 1998) and have varying influences on goals and behavioral outcomes (Steg et al. 2011). As such, the psychometric properties of scales should be carefully considered. As a corollary, previous research has converged on the following conceptualization of behaviors that benefit the environment: (1) environmental citizenship (e.g., voting and political consciousness); (2) social environmentalism (e.g., talking to people about environmental issues; and (3) conservation lifestyle (e.g., waste and water reduction) (Ebreo and Vining 2001; Landon et al. 2018). Research exploring these multiple dimensions of behavior has potential to unveil the complex interplay of how human values inform individual and group decisions that support environmental sustainability.

Cultural values

There are multiple tiers of values that influence how individuals and groups make decisions. Cultural values (also referred to as ‘cultural worldviews’) are the most fundamental guiding principles and ‘ways of life’ that define a society (Inglehart et al. 1998). Because cultural values evolve from a broader collective and are reinforced among individuals therein, they are relatively stable and difficult to change. Multiple cultural values can exist in one place, given that the relationship between an individual’s psyche and culture is defined by patterns of social relationships (Markus and Kitayama 1998). Elaborating on this idea, Kitayama et al. (1997) asserted that “...people in a given cultural context gradually develop through socialization a set of cognitive, emotional, and motivational processes that enable them to function well” (pp. 1245). Culture, in this view, reflects a set of institutional dynamics that integrate social structures and agents (Kitayama and Cohen 2010), and explains individual-level processes. With these assumptions in mind, a “cultural theory” was proposed by Douglas (1970) to guide research on phenomena such as the social construction of risk perceptions (Dake 1991), responses to climate change policies (Price et al. 2014), cultural differences in environmental attitudes (Steg and Sievers 2000), and intentions to engage in conservation behaviors (Yazdanpanah et al. 2014).

Measurement and operationalization of cultural theory has taken on a variety of forms. A particularly seminal body of work led by Douglas (1970) and Wildavsky (1987) identified four dimensions of cultural values, including hierarchism, individualism, fatalism, and egalitarianism. Several of these dimensions were empirically tested by Dake (1990) to provide insight on the heterogeneity of behavioral patterns within and between groups. Kahan and Braman (2003) subsequently argued that cultural cognition should be measured using two rather than four scales. First, a hierarchical-egalitarian scale was developed to reflect the extent to which an individual would prefer social roles and authoritative leadership, in contrast to equality among all members of society. Second, an individualism-communitarianism scale reflected the degree to which an individual was embedded within a group and would be supportive of group activities at the expense of individual freedom. The measurement properties of these two scales have been repeatedly tested in previous research (e.g., Kahan et al. 2011), and have accounted for variation in pro-environmental behavior (Steg and Sievers 2000).

Individual values

Individual values (referred to as transcendental values in this special feature) are fundamental, guiding principles (Allport 1960) that define moral codes of conduct (Rokeach 1973). Individual values transcend context and are more specifically defined as “an enduring belief that a particular mode of conduct or that a particular end-state of existence is personally and socially preferable to alternative modes of conduct or end-states of existence” (Rokeach 1973, pp. 550). Building on this work, Schwartz (1994) developed a set of 56 universal value types that comprised ten basic human values such as “Universalism” (i.e., understanding, appreciation, and social welfare) and “Achievement” (i.e., personal success and competence according to social standards). Schwartz situated these values on a circular diagram to illustrate the reciprocal relationships of values that are motivationally distinct and linked to affect, indicating people are compelled to engage in situations that yield positive emotional results (Lawler 1973). Similar value structures have emerged in approximately 70 different samples across the globe and are recognized in all societies because they tap the universal needs of people as agents of change, social interaction requirements, and human welfare that supports the survival of groups (Schwartz et al. 2012).

A long-standing body of research has considered individual values to be cognitive structures that energize behaviors benefiting the environment (Howell 2013; Dietz et al. 2005). Although less psychologically stable than cultural values, individual values have been used as a basis for explaining nature-based experiences by drawing on the

ideas of altruism (Heberlein 1977) and environmental ethics more broadly (Callicott 1984). Schwartz’s value theory was adapted by Stern et al. (1999) to formulate the Value-Belief Norm theory of environmentalism, which posits that individuals act in environmentally responsible ways when favorable values, beliefs, and moral norms are activated. According to this framework, individuals are guided by biospheric (i.e., environmentalism), egoistic (i.e., self-interest), and altruistic (i.e., humanism) value orientations. Research on individual values has provided insight on topics such as human-wildlife interactions (Vaske and Donnelly 1999), biodiversity conservation (Manfredo et al. 2016), park and protected area management (van Riper and Kyle 2014), adoption of low-emission alternatives (Perlaviciute and Steg 2015), and the evolutionary origins of predispositions toward nature (Kellert 1996).

Recent research has proposed two new self-enhancing value orientations—hedonic and eudaimonic (Steg et al. 2014; van den Born et al. 2018). Hedonic values compel individuals to pursue subjective short-term pleasure, comfort, and enjoyment while seeking to reduce negative affect. The hedonic values scale proposed and tested by Steg et al. (2014) was grounded in goal-framing theory and indicated that multiple motivations influenced the decisions of individuals. Subsequent research has verified this proposition and provided empirical support for hypothesizing a negative relationship between hedonic values and environmentally relevant attitudes, preferences, and behaviors (van Riper et al. 2019). Similar to hedonic goals, hedonic values are strong antecedents of behavior because individuals tend to prioritize personal comfort and short-term pleasure over long-term gain. The inclusion of hedonic values in behavioral models is, therefore, instrumental in explaining the hierarchical organization of value structures.

More recently, eudaimonic values were proposed as a missing pillar in the environmental values literature by van den Born et al. (2018), and have been grounded in self-determination theory (Deci and Ryan 2008; Grønhøj and Thøgersen 2017), indicating that the core human psychological need of autonomy requires both self-determination and self-regulation (Raymond and Raymond 2019). Although the integration of eudaimonic values into the sustainability science literature is relatively new, several authors have engaged with the concept of eudaimonia in reference to relational values (Chan et al. 2018; van Riper 2018; Pascual et al. 2017), yet none have provided a concrete definition or attempted to address its psychometric properties. Most recently, Winkler-Schor et al. (2018) found that eudaimonic values were empirically distinguishable from other self-enhancing values and provided a foundation for understanding long-term decision-making related to the environment. Building on this body of past work, we define eudaimonic value as a core belief that motivates individuals to prioritize

behaviors that further their autonomy, self-actualization, and excellence (Huta 2016; Huta and Waterman 2014).

Social values

Social values are related to cultural and individual values, but embody important conceptual and empirical distinctions. These types of values are place-based preferences for what people experience, and are least psychologically stable because they can be altered when minor disruptions (e.g., policy change, new knowledge) are introduced into a system (Dietz 2015). In other words, cultural and individual values transcend contexts, are formed through acculturation, and remain relatively consistent throughout a person's life (Raymond and Kenter 2016; Schwartz and Bardi 2001), whereas social values are more malleable and shaped by policies adopted by communities and governing authorities. Brown (1984) further defined social values as perceived qualities or benefits associated with a specific landscape or its function. Social values provide insight into why individuals and groups make decisions and have been guided by the ecosystem services framework (MEA 2005) to indicate the worth and importance of protected areas (van Riper et al. 2012) as well as the transactional relationships between ecosystems and human communities (Pascual et al. 2017; Chan et al. 2016).

One way to measure social values is to empirically assess the relative importance of perceived qualities across a landscape through public participation GIS (PPGIS). This technique empirically evaluates social values to spatially understand how people relate to landscape conditions (Bagstad 2016). Integrating Zube's (1987) transactional model and Gibson's (1979) ecological perception model focused on affordances of latent possibilities, applications of PPGIS have employed social value mapping tools to spatially understand place-based values and preferences of an array of different stakeholder groups (Raymond et al. 2017; Pietrzyk-Kaszyńska et al. 2017; Ives and Kendal 2014). Value mapping has been applied to enhance ecosystem management by determining which social values exist and can be integrated with biophysical data to minimize conflict around different land uses (Whitehead et al. 2014; van Riper et al. 2017).

Understanding the relationships among cultural, individual, and social values

The multiple value concepts reviewed above are expressed and transferred across conceptual levels. Feedback loops and bi-directional relationships connect these levels over time, as indicated by previous research that has argued values "scale up" and "scale down" (Kendal and Raymond 2019). However, we contend that values expressed by groups can

be an aggregate of individual values but also entirely new, emergent phenomena. That is, individual values emerge from broader collective units, but also develop through interpersonal interaction and in response to social context (van Riper et al. 2018). Specifically, through the process of "internalization," individual and social values can be translated to cultural values over long time periods. Conversely, through the process of "externalization," cultural values are moved to the level of individuals (Kenter et al. 2019). Although these explanations give credence to the complexities of value change over time, empirical tools can also be applied to cross-sectional data and determine correlations among cultural, individual, and social values as predictors of pro-environmental behavior. However, this contribution remains absent from the literature. There is a strong need for future research to not only theorize about human-environment interactions but also refine the measurement properties of psychological and cultural mechanisms that yield changes at different levels of social organization and improve individual capacity for self-realization.

Building on the literature reviewed above, we tested a series of hypotheses about how multiple levels of values influenced the intended behaviors of visitors to Denali National Park and Preserve in Alaska, U.S. We believed individualist and hierarchical cultural values would positively and negatively correlate with five dimensions of individual values, respectively. We also hypothesized that biospheric and altruistic values would positively predict three dimensions of pro-environmental behavior, whereas the self-enhancing values of egoistic, hedonic, and eudaimonic would negatively predict pro-environmental behavior. Finally, we anticipated that biospheric and altruistic values would positively whereas the other three individual value constructs would negatively predict the social value of perceived ecological integrity.

Methods

Context of research in a U.S. protected area

This research was conducted in Denali National Park and Preserve which is a six million acre protected area located in the Alaskan Interior (see Fig. 1). The park was established in 1917 and is renowned for North America's tallest peak, Denali (6190 m). As a designated biosphere reserve, the protected area includes a core portion of Wilderness that has the highest level of resource protection in the U.S., as well as surrounding fringe areas with fewer restrictions to accommodate subsistence use. The area boasts an intact ecosystem for animals such as Dall sheep (*Ovis dalli*), Moose (*Alces alces*), Caribou (*Rangifer tarandus*), Grizzly bears (*Ursus arctos*), and Gray wolves (*Canis lupus*). Indeed, the

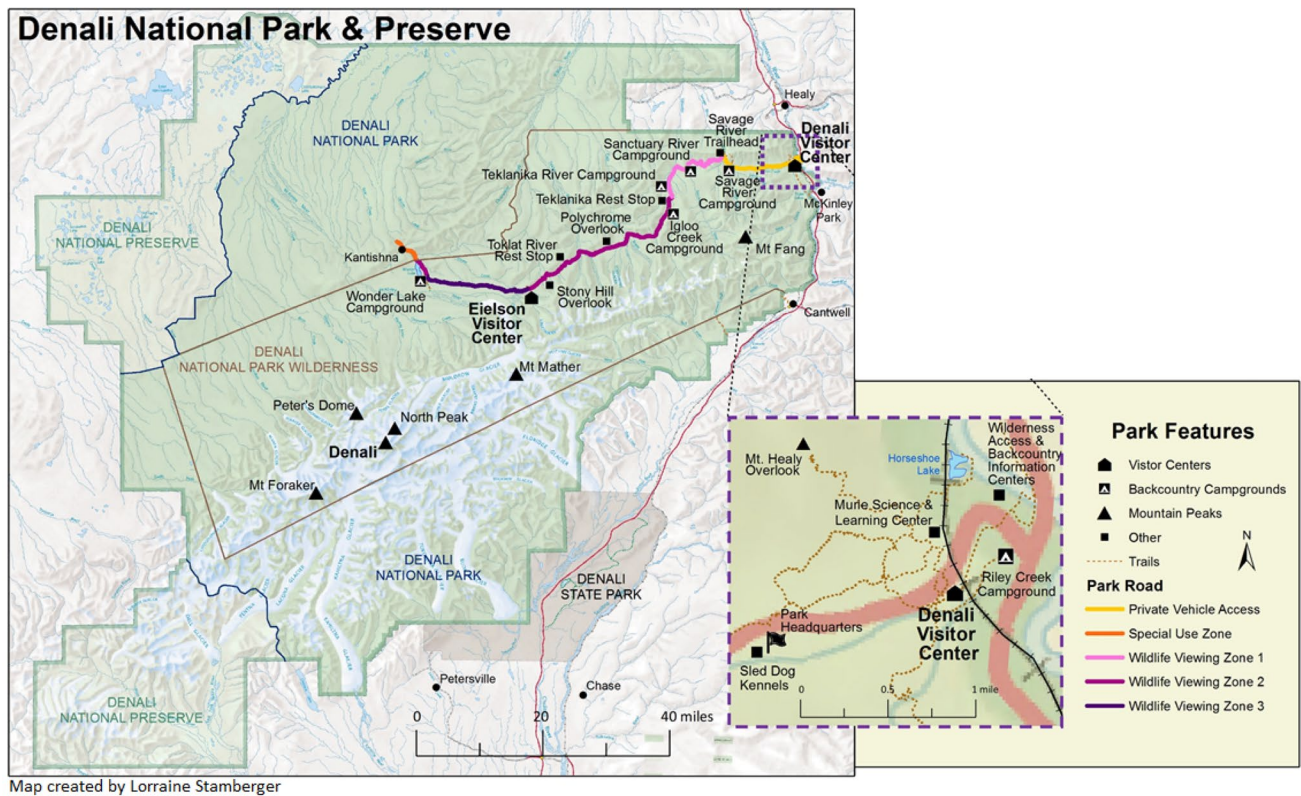


Fig. 1 Map of the study area

notion of “ecological integrity” is a key value communicated to visitors and embraced by management agencies in the U.S. Department of Interior that oversees the protected area. Visitors most often experience the park by taking a bus trip along the 92-mile park road that hugs the north side of the Alaskan Range (Yost and Wright 2001). There were 600,000 recorded visits in 2016 (National Park Service 2018), and the activities pursued by these individuals spanned wildlife viewing/photography, camping, mountaineering, cycling, packrafting, scenic air tours, and front and backcountry hiking (Stamberger et al. 2018).

Collection of survey data and sampling design

On-site self-administered surveys were distributed during the 2016 peak season (June–August). Data collection and the sampling design were guided by preliminary site visits in May and June 2016, and in consultation with the National Park Service. In response to discussions with the staff about their knowledge of visitor experiences, we tailored the definitions of social values to the study context and added the value of ecological integrity to our typology due to its centrality to the park’s mission and identity. Visitors over the age of 18 were approached by trained survey administrators and asked for their voluntary participation in the

study. A representative sample was obtained using systematic stratification. Specifically, the data collection schedule was stratified by day of the week and time of day; data were collected in the mornings and afternoons of 28 weekdays and 14 weekend days. For groups of visitors, the member with the most recent birthday was asked to complete the survey to minimize potential group leader bias (Battaglia et al. 2008). Contact logs were used to monitor response rates and calculate potential non-response bias on gender ($\chi^2 = 0.759$) and group size ($t = 1.967$, $df = 710$). This process resulted in 641 collected surveys (90.6% response rate). Bias in group size was detected but the data were not modified due to the small differences between people who refused to participate and those who agreed.

Measurement

Survey scales were adapted from past research to measure cultural, individual, and social values as well as intended pro-environmental behavior. Twelve survey items measured the “group-grid” scheme of cultural values drawn from Kahan (2012), including six items measuring individualism–communitarianism and six items measuring the hierarchy-egalitarianism grid scheme (see Table 1) We also measured three survey items for five individual values

including egoistic, altruistic, biospheric (Stern et al. 1999), hedonic (Steg et al. 2014), and eudaimonic (Winkler-Schor et al. 2018) (see Table 2). As one of the first studies to empirically test eudaimonia, we adapted the HEMA-R scale (Bujacz et al. 2014; Huta 2016). Respondents were asked to indicate the extent to which statements were considered guiding principles in life on a nine-point scale that ranged from “opposed to my values (− 1)” to “of supreme importance (7)” (De Groot and Steg 2009). One item was dropped from the eudaimonic scale, “gratification for oneself,” due to high cross-loading with hedonic values.

Social values were evaluated during a two-step mapping exercise completed by respondents. The definitions of value categories were informed by past research (e.g., Brown and Reed 2000) and modified in response to discussions with National Park Service staff during visits to the park. During the mapping exercise, respondents were asked to distribute 100 hypothetical preference points across 13 social value categories to reflect the reasons why Denali was considered important. Respondents were then asked to spatially locate these social values. A total of 505 out of 667 respondents assigned a value above 0 to ecological integrity which was the one social value category selected for further analysis in this paper. Finally, three dimensions of intended pro-environmental behavior—conservation lifestyles, social stewardship, and environmental citizenship—were measured using nine survey items (three per construct) that were adapted from past research (Larson et al. 2015) and later tested by Landon et al. (2018). The development of these items took

into consideration key principles outlined by Gifford and Nilsson (2014). Respondents were asked to rate how often they intended to engage in pro-environmental behaviors upon returning home from Denali using a five-point Likert scale ranging from “Never (1)” to “Very Often (5)” (see Table 3).

Analysis procedures

A two-step approach was taken to assess and modify our theoretical model, including the estimation of a confirmatory measurement model and then structural model to test whether our data fit the study hypotheses (Anderson and Gerbing 1988). We used a maximum likelihood estimation procedure and accounted for missing data using the full information maximum likelihood method (Muthén and Muthén 2010). Following Kline (2011), model fit was assessed using a suite of indices. Root Mean Square Error of Approximation (RMSEA) values less than 0.06 (Steiger 2007), Comparative Fit Index (CFI) values greater than 0.90 (Bentler 1990), and Standardized Root Mean Square Residual (SRMR) values less than 0.07 (Hu and Bentler 1999) were considered acceptable. Given that the factors within our structural equation model were correlated and, therefore, oblique (i.e., not orthogonal), the Factor loading scores were not constrained to a range between − 1 and + 1 (Jöreskog 1999), and were interpreted as regression coefficients rather than correlation coefficients. All non-significant paths ($\alpha \geq 0.05$) and survey items with standardized factor

Table 1 Agreement or disagreement with survey items measuring cultural values

Cultural Worldviews ^a	λ	Mean (SD)
Individualist ($\alpha=0.820$)		3.09 (0.88)
The government interferes far too much in our everyday lives	0.78	3.29 (1.21)
Sometimes government needs to make laws that keep people from Hurting themselves ^b	0.50	2.38 (1.14)
It's not the governments business to try to protect people from themselves	0.66	2.92 (1.21)
The government should stop telling people how to live their lives	0.77	3.31 (1.21)
The government should do more to advance society's goals, even if That means limiting the freedom and choices of individuals ^b	0.55	3.23 (1.25)
Government should put limits on the choices individuals can make so they don't get in the way of what's good for society ^b	0.53	3.41 (1.22)
Hierarchical ($\alpha=0.875$)		2.33 (1.05)
We have gone too far in pushing equal rights in this country	0.78	2.30 (1.32)
Our society would be better off if the distribution of wealth was more equal ^b	0.65	2.58 (1.39)
We need to dramatically reduce inequalities between the rich and the poor, whites and people of color, and men and women ^b	0.71	2.29 (1.32)
Discrimination against minorities is still a very serious problem in our society ^b	0.71	2.08 (1.17)
It seems like blacks, women, homosexuals and other groups don't want equal rights, they want special rights just for them	0.70	2.33 (1.39)
Society as a whole has become too soft and feminine	0.74	2.39 (1.40)

Bold values indicate the mean value scores for each construct

α Cronbach's alpha, λ factor loading score

^aMeasured along a Likert scale where 1 = “Strongly Disagree” and 5 = “Strongly Agree”

^bReverse coded survey items; average scores presented were recoded to reflect the opposite sign

Table 2 Average individual values scores reported by survey respondents

Held values ^a	λ	Mean (SD)
Altruistic values ($\alpha=0.88$; $\rho=0.89$; AVE=0.72)		7.55 (1.51)
A world at peace: free of war and conflict	0.80	7.40 (1.71)
Equality: equal opportunity for all	0.88	7.76 (1.62)
Social justice: correcting injustice, care for others	0.86	7.51 (1.73)
Biospheric values ($\alpha=0.88$; $\rho=0.89$; AVE=0.73)		7.44 (1.42)
Unity with nature: fitting into nature	0.88	7.25 (1.68)
Protecting the environment: preserving nature	0.90	7.65 (1.48)
A world of beauty: beauty of nature and the arts	0.77	7.43 (1.59)
Egoistic values ($\alpha=0.68$; $\rho=0.69$; AVE=0.43)		4.86 (1.41)
Authority: the right to lead or command	0.80	5.14 (1.90)
Social power: control over others, dominance	0.64	3.61 (1.85)
Influential: having an impact on people and events	0.50	5.84 (1.67)
Hedonic values ($\alpha=0.82$; $\rho=0.83$; AVE=0.62)		6.47 (1.46)
Pleasure: gratification of desires	0.71	5.84 (1.79)
Enjoying life: enjoying food, sex, leisure. etc.	0.84	6.98 (1.62)
Seeking fun: lighthearted pleasure and amusement	0.79	6.68 (1.69)
Eudaimonic values ($\alpha=0.86$; $\rho=0.86$; AVE=0.67)		7.35 (1.29)
Personal development: develop a skill, learn, and gain insight into something	0.78	7.06 (1.56)
Excellence: pursuit of excellence of personal ideal	0.81	7.59 (1.42)
Personal best: seeking to use the best in yourself	0.86	7.40 (1.71)

Bold values indicate the mean value scores for each construct

α Cronbach's alpha, ρ composite reliability, AVE average variance extracted, λ factor loading score

^aMeasured on a Likert scale where -1 = "Opposed to my values" and 7 = "Of supreme importance" and recoded on a scale from 1 to 9

Table 3 Environmental behaviors intended after returning home from the protected area

Intended behavior	λ	Mean (SD)
Conservation lifestyle ($\alpha=0.805$; $\rho=0.814$; AVE=0.594)	-	4.39 (0.71)
Recycle paper, plastic or metal	0.70	4.60 (0.77)
Conserve water or energy	0.80	4.45 (0.76)
Buy environmentally friendly and/or energy efficient products	0.81	4.11 (0.98)
Social environmentalism ($\alpha=0.867$; $\rho=0.891$; AVE=0.733)	-	2.74 (1.27)
Participate as an active member of a discussion about the environment	0.84	2.85 (1.31)
Volunteer for environmental causes (e.g., restore native or remove exotic species)	0.76	2.55 (1.22)
Work with other people to address an environmental problem	0.90	2.84 (1.31)
Environmental citizenship ($\alpha=0.782$; $\rho=0.742$; AVE=0.491)	-	2.46 (1.25)
Participate in a scientific research related to the environment	0.76	2.32 (1.31)
Donate money to support environmental protection	0.68	2.77 (1.21)
Write a letter or leave a comment about an environmental issue	0.78	2.29 (1.25)

Bold values indicate the mean value scores for each construct

Measured on a Likert scale where 1 = "Never" and 5 = "Very Often"

α Cronbach's alpha, ρ composite reliability, AVE average variance extracted, λ factor loading score

loading scores below 0.40 were dropped from the final structural equation model (Hair et al. 1998). We used Mplus version 7.2 for the analysis. Additionally, to reduce skewness in the data, the item measuring ecological integrity was log transformed prior to analysis.

Results

Socio-demographics, trip characteristics, and descriptive statistics

We found a nearly equal divide in the gender of survey respondents (male = 50.6%; female = 49.4%). Though the average age was 44.2 years (SD = 17.4; mode = 28), age displayed a bi-modal distribution with a peak for respondents in their late 20 s and another for those in their 60 s. The sample was well-educated and economically well-off with over 80.0% having at least a two-year college degree and 67.1% earning an annual household income over \$50,000. The majority of respondents racially identified as being White (88.6%), followed by Asian (6.3%). Respondents came from 26 countries with the majority reporting primary residency in 42 states across the US (85.6%). Most respondents traveled in groups of two or more (90.1%) and with family (54.0%). The average group size was 3.2 (SD = 3.6), ranging from one to 46 people per group. Respondents spent an average of 3.2 nights in the park (SD = 5.2) and 9.5% reported visiting as part of a cruise. While in the protected area, the most common activity reported by 73.0% of respondents was taking photographs, followed by viewing wildlife (69.4%), hiking (65.5%), and taking bus tours into the park (63.0%).

A descriptive assessment of our value and behavior constructs indicated differences in the types of

pro-environmental behaviors intended by visitors after returning home from Denali. Survey respondents were nearly twice as likely to engage in conservation lifestyle behaviors ($M=4.39$) as compared to social environmentalism ($M=2.74$) or environmental citizenship ($M=2.46$). Our analysis of cultural values suggested the predominant worldview of Denali visitors was individualist ($M=3.09$) rather than communitarian, indicating a tendency to be opposed to government intervention. We also observed that respondents were more likely to identify as egalitarian ($M=2.33$) rather than hierarchical, indicating a preference for maintaining equality in social roles. Additionally, results indicated altruistic ($M=7.55$), biospheric ($M=7.44$), and eudaimonic ($M=7.35$) values were more important guiding principles than hedonic ($M=6.47$) and egoistic values ($M=4.86$). The social value of ecological integrity was assessed in its original form ($M=12.63$) and a log transformed version was entered into the model ($M=0.85$).

A model of the relationships between multi-level values and behavior

Modeling results indicated that both the measurement model ($\chi^2 = 1605.724$, $df = 581$; RMSEA = 0.052; CFI = 0.917; SRMR = 0.061) and structural model ($\chi^2 = 1844.596$, $df = 598$; RMSEA = 0.056; CFI = 0.900; SRMR = 0.066) fit the sample data in accordance with established criteria (Kline 2011). Following an examination of modification indices, three sets of measurement error terms were allowed to covary within the individualist cultural value construct

and one set of error terms within the hierarchical cultural value construct. In line with our hypotheses, we found that the individualist cultural value was positively correlated with all dimensions of individual values including biospheric ($=2.78$), altruistic ($=2.11$), and hedonic ($=2.51$) (see Fig. 2). Hierarchical cultural value on the other hand was negatively correlated with all individual value dimensions including biospheric ($= -3.18$), altruistic ($= -2.65$), and hedonic ($= -2.55$) (see Table 4). The biospheric ($\beta=0.29$) value construct was a positive predictor of ecological integrity, while hedonic ($\beta= -0.22$) was a negative predictor. In turn, ecological integrity ($\beta=0.06$) positively predicted social environmentalism.

Results from our assessment of relationships between individual values and intended behavior revealed that biospheric and hedonic values played the most important role in explaining respondents' intentions to engage in pro-environmental activities after returning home from Denali. We also found that as biospheric value increased, so too did conservation lifestyles ($\beta=0.42$), social environmentalism ($\beta=0.58$), and environmental citizenship ($\beta=0.58$), as expected. Conversely, and also in line with our hypotheses, hedonic value negatively correlated with conservation lifestyles ($\beta= -0.16$), social environmentalism ($\beta= -0.20$), and environmental citizenship ($\beta= -0.26$), while altruistic value positively predicted conservation lifestyles ($\beta=0.12$). Contrary to our expectations, egoistic value was positively correlated with social environmentalism ($\beta=0.07$). Finally, eudaimonic values did not account for a significant degree of variation in social value or intended behavior. The R^2 values of the constructs measuring

Fig. 2 Structural equation model showing the effects of cultural, individual, and social values on pro-environmental behaviors intended by visitors to Denali National Park and Preserve. The graphic includes R squared values, standardized regression coefficients between endogenous constructs (β) and between endogenous and exogenous constructs (γ)

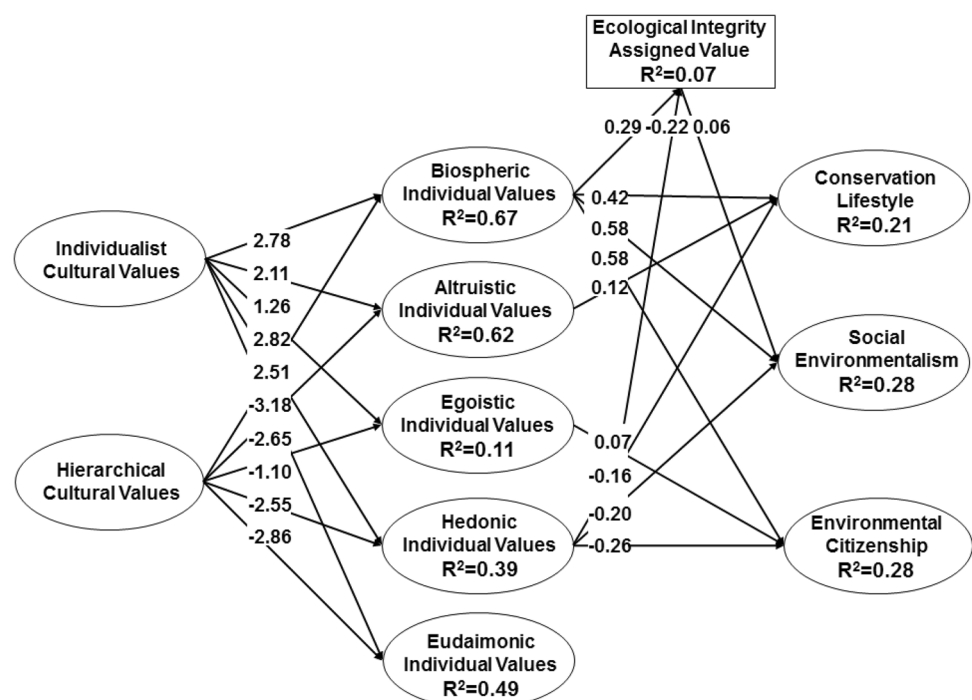


Table 4 Results from two-step structural regression modeling procedure

Dependent variables	Predictors	γ	β	SE	<i>t</i> value	R^2
Conservation lifestyle	Ecological integrity	–	–	–	–	0.21
Social Stewardship	Ecological integrity	–	0.06	0.03	2.08	0.28
Environmental citizenship	Ecological integrity	–	–	–	–	0.28
Conservation lifestyle	Biospheric	–	0.42	0.06	6.69	–
Social Stewardship	Biospheric	–	0.58	0.04	13.67	–
Environmental citizenship	Biospheric	–	0.58	0.05	12.88	–
Ecological integrity	Biospheric	–	0.29	0.05	6.23	0.07
Conservation lifestyle	Egoistic	–	–	–	–	–
Social Stewardship	Egoistic	–	–	–	–	–
Environmental citizenship	Egoistic	–	0.07	0.04	2.12	–
Ecological integrity	Egoistic	–	–	–	–	–
Conservation lifestyle	Altruistic	–	0.12	0.06	2.09	–
Social Stewardship	Altruistic	–	–	–	–	–
Environmental citizenship	Altruistic	–	–	–	–	–
Ecological integrity	Altruistic	–	–	–	–	–
Conservation lifestyle	Eudaimonic	–	–	–	–	–
Social Stewardship	Eudaimonic	–	–	–	–	–
Environmental citizenship	Eudaimonic	–	–	–	–	–
Ecological integrity	Eudaimonic	–	–	–	–	–
Conservation lifestyle	Hedonic	–	–0.16	0.05	–3.09	–
Social Stewardship	Hedonic	–	–0.20	0.05	–3.99	–
Environmental citizenship	Hedonic	–	–0.26	0.05	–4.91	–
Ecological integrity	Hedonic	–	–0.22	0.05	–4.51	–
Biospheric	Individualist	2.78	–	0.60	4.65	0.68
Biospheric	Hierarchical	–3.18	–	0.60	–5.27	–
Egoistic	Individualist	1.26	–	0.35	3.57	0.11
Egoistic	Hierarchical	–1.10	–	0.35	–3.12	–
Altruistic	Individualist	2.11	–	0.47	4.50	0.62
Altruistic	Hierarchical	–2.65	–	0.46	–5.64	–
Hedonic	Individualist	2.51	–	0.55	4.61	0.39
Hedonic	Hierarchical	–2.55	–	0.55	–4.65	–
Eudaimonic	Individualist	2.82	–	0.61	4.62	0.49
Eudaimonic	Hierarchical	–2.86	–	0.61	–4.67	–

γ standardized regression coefficients between exogenous and endogenous constructs, β standardized regression coefficient between endogenous constructs, *SE* standard error

pro-environmental behavior ranged from 21 to 28%, individual values ranged from 11 to 66%, and the social value of ecological integrity had a R^2 value of 7%.

Discussion

Relationships between multi-level values and behavior

Building on a long-standing body of previous research focused on the drivers of pro-environmental behavior (Steg and Vlek 2009; Sagiv et al. 2017; Stern et al. 1999), this study showed how visitors to Denali National Park and Preserve in Alaska drew on their cultural, individual, and social values to make decisions about the environment. Given that the bulk of previous environmental social science research has revolved around concepts such

as environmental attitudes and norms (Heberlein 2012), we called attention to the importance of value concepts, many of which are formed slowly over the course of a person's life (Manfredo et al. 2014; Kenter et al. 2019; van Riper et al. 2018; Schwartz 1994). These stable psychological processes deserve widespread and deep consideration in sustainability science, because if leveraged, they can bring about transformative systems change (Ives and Fischer 2017). We distinguished among multiple levels of values that vary across individuals, groups, communities, and broader levels of societal organization by testing the effects of 'long-term' predictors (i.e., cultural and individual values) in relation to 'short-term' predictors (i.e., social values), which in turn, influenced the intended pro-environmental behaviors of visitors to a U.S. protected area. Thus, we provided evidence of the relationship between multi-level values and behavior, as well as established a scale to measure eudaimonic values, which has been positioned as the missing pillar in the environmental values literature (van den Born et al. 2018).

Cultural values influence individual value-behavior linkages

Findings from our research indicated that cultural values provided a basis for understanding individual and social values as well as pro-environmental behavior in the context of a protected area. We observed a clear pattern of effects between cultural and individual values. Specifically, individualist and egalitarian (i.e., less hierarchical) cultural values were related to all five individual values in similar ways, and were stronger predictors of both biospheric and altruistic individual value orientations. These findings align with past work that has suggested people with preferences for equality in the social roles of society have higher environmental concerns and risk perceptions (Price et al. 2014). Our work also supports previous indications of individualist and hierarchical cultural values being exogenous constructs that exert opposing forces on behavioral intentions and policy preferences (Gastil 2005). Given the strong predictive capacity of our model insofar as the relationship between cultural and individual values, we contend that people's preferred patterns of social relations fundamentally shaped individual decisions (Steg and Sievers 2000). Although multiple scales of cultural value exist, Kahan's (2012) conceptualization of cultural value theory (Douglas and Wildavsky 1983) enabled us to generate valid insights on psychologically stable factors that have been previously underrepresented in sustainability science. Given that many Americans tend to be disengaged in decision-making (Wildavsky 1987), heuristics and biases in information processing also likely played substantive roles in shaping the opinions of survey respondents, and warrant attention in future behavior change research.

Multiple dimensions of individual and social values predict behavior

Results showed partial support for our hypotheses that five dimensions of individual values predicted the social value of ecological integrity and intended pro-environmental behavior performed after survey respondents returned home from a visit to Denali National Park and Preserve. Biospheric and hedonic values were rated as most important and performed as expected. In line with past work, our findings indicated that respondents guided by concern for non-human species were most likely to ascribe nature-based qualities to a protected area landscape and engage in activities that reflected environmentalism (van Riper et al. 2017). Conversely, respondents who were guided by hedonic values focused on short-term self-fulfillment and were less likely to express ecological integrity values, and in turn, behavioral intentions.

Results showed that four out of five individual values provided a basis for understanding the dynamics of less stable psychological processes (i.e., social values). Specifically, individual values had a direct impact on perceived ecological integrity, indicating a concern and sensitivity to landscape change and conditions that support environmental sustainability. An exception to this trend was observed in eudaimonic values, which did not perform as expected. Literature from the well-being sciences suggests that both hedonia and eudaimonia are required for an individual's well-being, meaning that fulfillment of both short-term and long-term individual needs are needed to reach higher degrees of mental health (Keyes 2002; Huta 2015; Deci and Ryan 2008). Steg et al. (2014) demonstrated that hedonic values were both empirically distinguishable and theoretically meaningful. Thus, we anticipated that eudaimonia and hedonia would perform similarly, because both value types related to personal development and self-actualization. It could be that other attitudinal variables omitted from this research mediated the relationship between individual and social values, and were particularly important for the predictive capacity of eudaimonic values in our structural model. Our results add to a growing literature on multi-level values (Manfredo et al. 2017; Kendal and Raymond 2019), which provide valuable insights on how people think and feel about the environment.

Although we effectively predicted the behavioral patterns of visitors to a U.S. national park, our findings highlighted potential problems associated with egoistic values when measured alongside other indicators of Schwartz's (1994) self-enhancement motivational axis, namely hedonic and eudaimonic values. Egoistic values had the weakest predictive capacity of all individual values. Additionally, despite a substantive body of previous research indicating egoistic values should be negatively correlated with pro-environmental

outcomes (De Groot and Steg 2009), we found a positive association with social environmentalism. These results may have resulted from the socio-demographic homogeneity of the sample, in combination with social desirability bias. Alternately, the scale may not have performed well due to method effects (Williams and Anderson 1994), the negative connotation of statements, or the conceptual space that was otherwise accounted for by the other self-enhancing value orientations.

Management implications

Our results carry implications for how resource management agencies can advance environmental sustainability in contexts such as parks and protected areas. Sustainability demands considerable changes in human behavior and interventions from managers to encourage more environmentally-friendly activities (Fischer et al. 2012). Awareness of how human behavior is driven by individual value orientations alongside shared values and beliefs will enhance agencies' abilities to anticipate the needs and expectations of stakeholders. Given that individual values predict attitudes and behaviors (Braito et al. 2017; van Riper and Kyle 2014), managers can adapt their practices to work within and move closer to existing value structures (Manfredo et al. 2016). The strong connection between cultural and individual values found in this paper verifies that decision-makers will have greater success with behavior change if they consider value-based dynamics across individual and group levels (Kendal and Raymond 2019). We suggest that stakeholders with more pronounced individualist cultural values and self-enhancement individual values will be more likely to respond to framing that emphasizes qualities such as individual achievement. On the other hand, people oriented towards communitarian cultural values and self-transcendent individual values will be more likely to respond to messages that emphasize societal needs and benefits extending beyond the self. That is, leveraging cultural and individual values will better enable managers to tailor their communication strategies to effectively engage a broad range of visitors in meaningful exchanges about places of importance such as protected areas.

The core management objectives guiding Denali National Park and Preserve are articulated by governing authorities and should also reflect the values of stakeholders if the goal is to strengthen environmental governance. Denali's core objective is focused on ecological integrity, alongside wilderness character, visitor enjoyment and inspiration, and subsistence use. Results from this research indicate that visitors guided by biospheric, altruistic, and egoistic values will be more likely to recognize the social value of ecological integrity as the

reason why the protected area is considered important. Future research and practice should consider alignment between the values of visitors and local communities to understand how all values are upheld and interpreted by management agencies, and guide agency investments in research and public outreach programs. Particularly in the context of U.S. public lands where management agencies are mandated to respond to public interest, decisions should reflect publically espoused values to generate support for park planning efforts. Research and practice that actively makes space for public deliberation will be more likely to ensure broad representation of stakeholder interests (Stewart et al. 2003), minimize social conflicts over competing forms of human use (Fordam and Robinson 2019) and encourage greater compliance with rules and regulations (Ban et al. 2011).

Conclusion

This research shows how multiple levels of values influence intended behaviors that shape environmental sustainability in the context of Denali National Park and Preserve in Alaska. We argue that values are formed and spread through a broad cultural context, and that this context has an impact on the behavioral intentions of individuals and collectives in nature-based settings such as protected areas. There is a strong need for future research to elaborate on the mechanisms linking values and behaviors, both in relation to long- and short-term drivers of decisions as well as the mechanisms that connect values and behavior across spatial and temporal scales. Accomplishing this will require the integration of multiple disciplinary perspectives and sound measurement of social science concepts. This research approach will enact long-term change by helping to close the prominent value-action gap and yield practical implications for balancing human use alongside economic prosperity and more sustainable environmental management practices.

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