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Analyzing the deeper motivations for nature-based tourism facility demand: A hybrid choice model of preferences for a reindeer visitor center

Abstract

Wildlife interpretive centers may increase the attractiveness of natural areas for visitors, provide local employment and income, and channel visitors to reduce wildlife disturbance. However, interpretive center success depends on understanding visitor preferences. This is facilitated by integrated analysis of individual characteristics, such as attitudes and demographic factors, and situational characteristics, such as interpretive center features.

The current study integrates these characteristics via a hybrid choice model estimated with multi-level structural equation modeling in the context of prospective visits to a wild reindeer center in Norway. Results indicate that interpretive preferences vary, with foreigners prioritizing guided options more highly than do Norwegians. Neither sample prioritized technologically-intense media options. Both samples prioritized avoiding negative effects on wildlife habitat, with foreigners prioritizing it more highly. Connectedness to nature predicted preferences for visiting the interpretive center over not visiting. Consistent with the value-attitude hierarchy, intrinsic values predicted these preferences only indirectly, via connectedness. Comparison of the hybrid choice model with a basic multinomial logit model highlights the benefits of including latent variables to understand the "deeper structure" of preferences.

Keywords

Nature-based tourism, connectedness to nature, intrinsic values, interpretive center, environmental education

1. Introduction

Many communities near protected natural areas promote nature-based tourism as a means to generate local employment and income. These communities typically seek to present natural attractions, including wildlife, while minimizing disturbance of wildlife and habitat. Nature or wildlife interpretive centers can serve important roles in attracting and educating visitors. They also may serve a channeling function, with the centers guiding visitor spatial patterns and, for many visitors, serving as a substitute for direct experience of wildlife. Thus, they may attract visitors while avoiding or minimizing environmental disturbance.

As Healy, van Riper, & Boyd (2016, pp. 575, 576) observe, a "key element in creating successful and sustainable interpretive facilities comes from understanding visitors' needs, desires and expectations," yet "little is known about the extent to which these facilities reflect visitor preferences for development." It is important to better understand the effect of situational factors (such as visitor center features) and individual characteristics (such as intrinsic values, nature connectedness, and demographics) on likelihood of center engagement by potential visitors.

The current study contributes to the field of nature-based tourism interpretive centers by integrating individual and situational factors using a hybrid choice model estimated with multi-level structural equation modeling. The relationship between intrinsic values, nature connectedness, and visit likelihood was assessed in the latent variable component, while the relationship between center features and visit likelihood was assessed in the choice component. Results have implications for center development and marketing – as well as for understanding potential interest over time by assessing the path from nature connectedness to center engagement.

Visits to interpretive centers can be a form of pro-environmental behavior (PEB). Similar PEBs involving environmental education include reading publications covering human history of national parks (van Riper and Kyle 2014), watching television programs about the environment (Thapa 2010), and educating others about environmental issues (Larson et al. 2015). Thus, this study also contributes to the literature on PEBs, beyond its primary focus on understanding consumer preferences for interpretive centers. PEB research has enhanced understanding of the role of individual characteristics, often via value-attitude-behavior or related models (Hurst et al., 2013). The effect of situational characteristics on PEB or behavioral intention has been be evaluated via discrete choice and related models (Czajkowski, Kądziela, & Hanley, 2014). This analysis illustrates integration of individual and situational characteristics in a PEB context.

The study context is intended visit behavior to a wild reindeer center in the Hardangervidda region of Norway. The next section covers relevant literature, and is followed by a description of methods, then results and discussion / conclusion.

2. Literature review

2.1. Environmental attitudes, nature experiences, and interpretive centers

Environmental attitudes, an individual characteristic, may affect the type of recreation or tourism activity engaged in. For example, Thapa (2010) found that Pennsylvania (US) state forest visitors with ecocentric attitudes were more likely than others to report "appreciative" activities as their most important recreation activity. Perkins and Brown (2012) found amongst visitors at two sites in Australia (Seaworld and an "ecolodge") that strong biospheric values positively predicted the importance of ecotourism activities when choosing a holiday or trip and negatively predicted participation in shopping.

The desirability of alternate interpretation intensities at visitor centers, a situational factor, has been debated, with intensity referring to the type, diversity, and quantity of interpretation (Hughes & Morrison-Saunders, 2005). Low intensity experiences may be desirable to avoid overwhelming visitors, especially those seeking predominantly leisure rather than educational experiences. In addition, some natural environments may create significance for visitors without requiring the facilitation of interpretation. On the other hand, high intensity experiences may help create meaning and significance.

The desirability of alternate intensity levels may vary across site and visitor characteristics, as well as interpretive objectives. In their mixed-method evaluation of the Cliffs of Moher interpretive center in Ireland, Healy, van Riper, and Boyd (2016) concluded that lower intensity interpretation was preferred. Ross, Norman, and Dorsch (2003) used a rating task (conjoint) to assess preferences for an interpretive center in an estuarine reserve in South

Carolina (US). With respect to exhibits, they found that live animal touch tanks were the most preferred, followed by fish tanks, computer touch screens, and, lastly, photographs. For educational opportunities, educational boat trips were most preferred, followed by a wildlife observation deck, self-guided walking tours, and a guided walking tour. However, the study sample size was small (N=110).

2.2. Values, connectedness to nature, and behavior

A value is defined by Rokeach (1973, p. 5) as "an enduring belief that a specific mode of conduct [instrumental value] or end-state of existence [terminal value] is personally or socially preferable to an opposite or converse mode of conduct or end-state." The List of Values (LOV) was designed to measure consumer values and predict consumer behavior (Kahle, 1983). The LOV items comprise fundamental aspects of life, such as belonging, relationships, respect, accomplishment, security, enjoyment, and excitement. As summarized by Ladhari et al. (2011), many consumer analysts prefer the LOV scale over the Rokeach Values System and the Value and Lifestyles System (VALS), as LOV is simpler, more efficient to administer, and has greater predictive utility than VALS in consumer behavior trends (Kahle, Beatty, & Homer, 1986).

Though values can affect behavior directly, the effect is commonly posited to be indirect, with attitude as a mediator (e.g., Milfont, Duckitt, & Wagner, 2010). The Connectedness to Nature scale (CNS; Mayer & Frantz, 2004) is an environmental attitude scale based on Aldo Leopold's concept of the land ethic; it measures an individual's "experiential sense of oneness with the natural world" (Frantz & Mayer 2014, p. 86; Mayer & Frantz, 2004, p. 504). The CNS is relatively new, but assessments indicate a one-factor solution (Frantz & Mayer, 2014; Mayer & Frantz, 2004; Perrin & Benassi, 2009). Connectedness may be a particularly strong predictor of behavior related to nature-based tourism.

With respect to demographic predictors of environmental attitude, research indicates that female and more educated respondents display greater environmental concern (e.g., Xiao & Dunlap, 2007, p. 488; Xiao & McCright, 2012). Mixed results have been found for age (Wiernik, Ones, & Dilchert, 2013; Xiao & Dunlap, 2007, p. 488). For CNS in particular, Mayer and Frantz (2004) found no significant relationship between CNS and gender, age, or income. In one sample they found a positive relationship between CNS and educational level.

The general value-attitude-behavior model posits a hierarchical relationship from the more abstract (values) to mid-range (attitudes) to specific behaviors (Homer & Kahle, 1988; Milfont, Duckitt, & Wagner, 2010). There is a conceptual foundation for a hierarchical relationship between intrinsic values, connectedness to nature, and pro-environmental behavior, such as visiting interpretive centers. However, empirical evaluation of these associations remains limited. Insofar as future generations may be less connected to nature (Louv, 2008), and insofar as that trend can be affected (Liefländer et al., 2013), interventions may have implications for public and visitor support of nature interpretive centers and related facilities.

The above literature provides a knowledge foundation, but also illustrates knowledge gaps with respect to visitor preferences for interpretive center features and with respect to the deeper structure of these preferences. The present study addresses some of these gaps.

3. Methods

3.1. The discrete choice approach

Discrete choice models are widely used to understand preferences across alternatives, to assess the importance of specific attributes, and to estimate willingness-to-pay for goods and services characterized by such attributes (Boxall et al., 1996; Hensher, Rose, & Greene, 2015; van Oel & van den Berkhof, 2013).

The basic discrete choice model uses random utility theory (Ben-Akiva & Lerman, 1985; Manski, 1977) to relate the probability that a certain alternative is chosen to i) the characteristics of the alternative, ii) competing alternatives, and iii) characteristics of the individual. A linear-in-parameters form commonly is assumed, with respondent preferences or utilities for an alternative represented as a weighted sum of their preferences associated with each characteristic of the alternative.

The utility of alternative *i* out of a choice set with *I* alternatives is given by the following (subscripts for specific individuals are omitted):

(1) $$U_i = V_i + \varepsilon_i$$

Where U_i is the utility of alternative *i*, V_i is the systematic component of the utility function, and ε_i is the random error component. V is characterized as:

(2) $$V_i = \beta_k X_{ik}$$

Where β_k is a vector of *k* coefficients and X_i is a vector of attributes associated with alternative *i*.

The number of attributes and alternatives typically is limited due to concerns about cognitive complexity. An illustrative choice task involves respondents choosing across three alternatives, with one being a "null" or "neither" option, such as not visiting an interpretive center. The other two alternatives are change or visit options, with the visit experience being characterized by multiple attributes. Hereinafter, "neither" is used instead of null or status quo option, and "visit" is used to refer to the non-neither options (there were two visit options in the current study). Each attribute is represented by two or more levels. The selection of attributes and levels is inherently case-based, with the most common element across study contexts being a cost-related attribute to facilitate monetary valuation.

In estimation, each alternative is specified in the form of a utility function. The choice of Option 1, for example, would depend on the level of each of the attributes presented in that alternative. When respondent characteristic variables, such as age, are entered into the utility functions of the visit alternatives – but not the neither alternative – coefficients indicate the effect of each variable on the likelihood of visiting, independent of the alternative's attribute levels.

Although discrete choice models can be estimated for actual behavior, they often are estimated based on responses to hypothetical scenarios. Thus, choices reflect reported behavioral intention.

3.2. Hybrid choice, multilevel structural equation modeling extension

Latent variables are psychological constructs, such as values and attitudes, presumed to reflect a continuum that is not directly observable (Kline 2016). Indicators are observed variables (responses to survey questions) used as indirect measures of these constructs. The integration of choice and latent variable models is referred to as hybrid choice modeling (Hensher, Rose, and Greene 2015, pp. 927-936). Such modeling extends choice analyses that incorporate attitudes via single items, factor scores, sum scores, or similar measures. Hybrid choice models complement other extensions of multinomial logit choice models, such as mixed logit and latent class models, that focus on assessing preference heterogeneity.

Latent variables allow researchers to account for measurement error, and failure to do so may lead to biased coefficients (Geiser, 2013). Importantly, inclusion of latent variables may enhance understanding of the relationship between psychographic characteristics (e.g., values and attitudes) and choices. Ben-Akiva et al. (2002, pp. 432,433) note that "choice models have traditionally presented an individual's choice process as a black box, in which the inputs are attributes of available alternatives and individual characteristics, and the output is the observed choice" and that "researchers have worked to enrich choice models by modeling the cognitive workings inside the black box, including the explicit incorporation of factors such as attitudes and perceptions" (c.f., McFadden 1986).

Discrete choice models often involve repeated choice tasks, which creates a repeated-measures data structure. The present analysis uses multilevel structural equation modeling (SEM) to incorporate latent variables and reflect the repeated-measures data structure (Hox, 2010; Luke, 2004;).

Multilevel analysis is used when characteristics or processes at a higher level influence characteristics or processes at a lower level (Luke, 2004). Multilevel analysis recognizes the potential for correlated errors within a given level 2 unit (e.g., for students in the same classroom or for choices by the same individual). In the choice setting, each choice is affected by attribute levels (level 1 units are choice tasks) and by characteristics of the individual (level 2 units are respondents).

4. Material

4.1. Study area

The choice model reflected potential features of a reindeer interpretive center in the town of Skinnarbu, Norway, located south of Hardangervidda National Park along one of the entrance routes to the Hardangervidda mountain plateau (see Figure 1). Hardangervidda preserves the largest wild reindeer habitat in Norway (Andersen & Hustad, 2004). The new interpretive center opened in the summer of 2013, after the survey was completed, and is located adjacent to a wild reindeer research center.

4.2. Survey method and measures

The survey was conducted online, between June 2012 and February 2013 with a sample comprised of persons who provided their email address via two prior contact mechanisms. For the Norwegian sample, respondents were contacted while traveling in the region. For the Foreigner sample, respondents were contacted when leaving the country, as part of Norway's foreign visitor survey (Farstad, Rideng, & Landa Mata, 2011). The survey response rate was 29% across both samples combined, with 1304 choice observations (326 respondents with four choice tasks each) for the Norwegian sample and 1496 choice observations (374 respondents) for the Foreigner sample, after removal of observations with item nonresponse.

Table 1 describes value and connectedness indicators as well as demographic variables. The survey utilized List of Values (LOV) items generally found to reflect low materialism values in Richins and Dawson (1992, p. 312). LOV items included all three of those in Richins and Dawson with higher percentages (and lower median rankings) amongst respondents low in materialism than amongst those high in materialism. Also included were "being well-respected" and "security," with the latter overlapping with "safety" and being broader than the financial security and family security items used in Richins and Dawson.[1] Using the terminology of Unanue et al. (2016) and Kasser and Ryan (1996), these LOV items reflect intrinsic (rather than extrinsic) values or life goals (see also Hurst et al., 2013; Kasser, 2016).

A Connectedness to Nature scale (CNS), in abbreviated form, was utilized for the attitudinal level given the nature of the behavior evaluated here – education focused on wildlife and ecosystems, rather than recycling, energy use reduction, or other behaviors less directly related to experience of the natural environment.

Gender was dichotomous, while age was grouped into decennial units. Education was grouped into four categories. Due to a response category coding error, education was not accurately measured in the German language version of the survey, which affected the Foreigner data file. Therefore, two Foreigner models were estimated. The first excluded the observations from the German language version (26% of the Foreigner sample). During estimation of this model, the education variable was removed due to non-significance in each of the three model components in which it appeared. Therefore, the second Foreigner model included all observations but excluded the Education variable. Results from that model are shown in Table 3.

Due to the range of home currencies and variability of home country income distributions, income was reported as relatively high, average, or relatively low. For analysis, the latter two categories were combined to create a dummy variable with the value of relatively high set to one.

As shown in Figure 2, each choice task involved a scenario in which respondents chose between two "visit" alternatives (reindeer interpretive center options) and a "neither" option of not visiting. Respondents were asked to assume they were in Skinnarbu and deciding whether to visit the interpretive center.

Attribute selection was based on an interview with the developer of the interpretive center, with attributes reflecting concepts that guided center development. For example, multiple movie concepts were considered, with six different movies being offered as of early 2018.

[1] *Trygghet* was used in the Norwegian version of the survey and *Sicherheit* in the German version.

Likewise, guided options and landscape views were components of the development concept. The levels for the price attribute bracketed the anticipated entrance fee.

Each visit alternative was described by five attributes, each of which took on one of three levels (see Table 2 for attributes and levels; note that "level" used in the attribute context differs from "level" used in the multilevel model context). Level 1 was used as the base for Food, Media, and Guide, while Level 2 was used as the base for Eco; dummy variables were created for the remaining two levels. For example, the variable Food_2 refers to level 2 of the food attribute (a restaurant without a mountain view).

The average exchange rate during the survey period was approximately 7.4 Norwegian kroner (NOK) to the euro, and 5.7 NOK to the US dollar. Price was presented in both NOK and euro. In model estimation, the Price variable was converted from NOK to thousands of NOK.

The software package Ngene was used to create an efficient (D-optimal) fractional factorial design of 16 scenarios. Each survey contained four scenarios. To cover the 16 scenarios, four survey versions were created and administered on a random selection basis.

4.3. Data preparation and analysis

Good data screening and preparation practices were followed (see, for example, chapter 4 in Kline 2016). Although SEM software can utilize datasets with item nonresponse, a conservative listwise deletion approach was taken here. Observations with any nonresponse on model variables, including the value and attitude indicators, were removed from the dataset.

No outliers were detected, based on the criterion of mean ± three standard deviations for any variable. No variables suffered from substantial skew or kurtosis. Indicator variables demonstrated reasonable spread and approximated the normal distribution. Relative variances fell within the guideline of ten for the ratio of largest to smallest.

Cronbach alphas for the LOV scales were 0.87 and 0.80 for the Foreigner and Norwegian samples, respectively; for the CNS scales, they were 0.85 and 0.79. All LOV and CNS indicators had R^2 values of at least 30%. In each measurement model, the loading for the first indicator was set to 1 to scale the latent variable. These indicators do not have a standard error or p-value. The hybrid choice models shown in Table 3 were estimated using Mplus version 7 and its default settings, except adaptive quadrature integration was turned off due to small cluster sizes (four choice observations per respondent cluster) and 5,000 Monte Carlo integration points were used.

The constants shown in Table 3 reflect preference for either visit option over the neither option, all else held constant. Because the choice alternatives were unlabeled, the constant and attribute coefficients were constrained as equal across the two utility functions. Choice was specified as nominal (unordered categorical).

The Foreigner and Norwegian models were estimated separately. All attribute variables were retained regardless of statistical significance, but other variables with non-significant paths were removed based on a cut off of $\alpha=0.10$. To facilitate comparison across the two samples, final models were then estimated using all variables that were significant for either sample.

For example, Income was included as a predictor of CNS in the final Foreigner model, despite non-significance, because it was significant in the Norwegian model. The same approach was used in estimation of the multinomial logit choice models shown in Table 3.

4.4. Evaluated relationships (effects) in the current study

The flexibility of multilevel SEM in this context is illustrated by the model shown in Figure 3. Effects were evaluated in the following groupings, with, for example, Effect 1 abbreviated as E1 in Figure 3.

Effect 1 – attribute predictors of choice. Choice alternative characteristics (attribute levels) were hypothesized to affect likelihood of selecting an alternative. This is shown by the lower path from Attributes to Utility in Figure 3. Given the pattern of levels shown in Table 2, the coefficients for the Food, Media, and Guide variables were expected to have positive signs, the Price coefficient a negative sign. Level 1 of the Eco variable (small negative effect on habitat) was expected to have a negative sign relative to the level 2 base of no effect, while level 3 was expected to have a positive sign.

Effect 2 – connectedness as moderator of attribute predictors. CNS was hypothesized to affect Utility in interaction with attributes, shown by the path from Connectedness to the upper path from Attributes to Utility. For Price, the sign was expected to be positive; the negative effect of Price on Utility will be less negative for respondents with high CNS scores than for those with low CNS scores. For Eco, signs were expected to reinforce preferences for avoiding negative habitat effects and achieving positive effects. Expected signs for interactions with other attributes were less clear.

Effect 3 – predictors of selecting a visit alternative over the neither option. This is shown by the paths from Value, Connectedness, and Demographics to Utility. It was hypothesized that the effect of Value will be mediated by Connectedness, such that the direct path from Connectedness to Utility will be positive, but the direct path from Value to Utility will be non-significant. The path for Education was expected to be positive, with no *a priori* expectations for the signs on remaining demographic variable coefficients.

Effect 4 – predictors of nature connectedness. LOV was hypothesized to affect CNS, shown by the path from Value to Connectedness, with *a priori* expectation of a positive sign. Demographic characteristics were hypothesized to affect CNS. Prior research on environmental attitudes indicated that gender (female, relative to male) and level of education may be positively associated with CNS, though research on CNS in particular provides some indication only for education.

Effect 5 – predictors of LOV / intrinsic value. Respondent demographic characteristics were hypothesized to affect LOV, but with no *a priori* expectations for coefficient signs given limited previous evaluation.

5. Results

5.1. Hybrid choice models

Absolute fit statistics were not available for such hybrid choice models using nominal outcomes and maximum likelihood estimation, but changes in log likelihood (LL) values indicate substantial improvements relative to base "blank" models. For foreigners, the model LL was -6,963 and the base LL was -17,022. For Norwegians, the model LL was -6,284 and the base LL was -14,842.

The focus here is the significance of paths in the Figure 3 model. Blank cells in Table 3 indicate the variable was removed due to non-significance.

Effect 1 – attribute predictors of choice. Results were mixed with respect to the effect of attributes on choice. Neither of the Media dummy variables was significant in either model. The lower level of Food (Food_2) was non-significant in both models, while the higher level was significant and with positive sign. The lower level of Guide was significant only for Foreigners, while the higher level was significant for both models.

As expected, the coefficient on level 1 of Eco (small negative habitat effect, relative to a level 2 base of no effect) was negative and significant for both foreigners and Norwegians, though only at the $\alpha = 0.10$ level for Norwegians. The coefficient on level 3 of Eco was non-significant for foreigners, unexpectedly negative but significant only at $\alpha = 0.10$ for Norwegians. The coefficient on price was negative and statistically significant, as expected.

Effect 2 – connectedness as moderator of attribute predictors. None of the interaction terms was significant, so Effect 2 was not supported.

Effect 3 – predictors of selecting a visit alternative over the neither option. For both Foreigners and Norwegians, there was a positive relationship between CNS and likelihood of selecting a visit alternative, though only at the $\alpha = 0.10$ level for Norwegians. Stronger connectedness to nature was associated with preference for visiting the interpretive center over the neither option of not visiting. LOV did not directly affect likelihood of selecting a visit alternative.

The effect of demographic characteristics varied across the samples. For Foreigners, Age was negatively correlated with the visit option (older respondents were less likely to choose a visit option with a given set of attribute levels) and Income positively correlated, though only at the $\alpha = 0.10$ level. For Norwegians, Female was negatively correlated with the visit option.

Education was not significantly associated with selecting a visit option in either sample. As noted above, Education was not included in the final Foreigner model but was non-significant in the initial Foreigner model that excluded German-language responses due to inaccurate response categories.

Note that respondent characteristics also may affect likelihood of selecting a visit alternative via indirect paths. For example, Age was not a direct predictor for Norwegians (Effect 3 group) but was an indirect predictor insofar as it predicts CNS (Effect 4), which in turn predicts likelihood of selecting a visit alternative (Effect 3).

Effect 4 – predictors of nature connectedness. LOV predicted CNS scores, with higher intrinsic value scores associated with higher CNS scores. Of the demographic characteristics, only Age affected CNS scores in both models, with older respondents reporting stronger connectedness to nature. For the Norwegian model, Income was negatively correlated with CNS, but only at the $\alpha = 0.10$ level.

Effect 5 – predictors of LOV / intrinsic value. None of the predictors of LOV was significant in the Foreigner model, while Female, Age, and Income were significant in the Norwegian model.

Lastly, the LOV and CNS measurement models reflect the set of indicators for those latent variables. All indicators were highly significant.

5.2. Multinomial choice models

The multinomial choice models were estimated to provide comparison points for the hybrid choice models. Attributes (Effect 1) had similar effects on choice in this context, with no changes in coefficient signs or significance levels and only minor changes in coefficient magnitude.

There is somewhat greater variation across the model types for demographic variables (Effect 3), which is expected due to differences across model types being centered on inclusion of non-demographic respondent characteristics in the hybrid choice models. There were no coefficient sign changes for demographic variables across model types, but the Age variable in the Foreigner sample and the Female variable in the Norwegian sample were more highly significant in the hybrid choice models. Changes in coefficient magnitude also were greater for the demographic characteristics than for the attributes.

6. Discussion and conclusions

The integration of situational factors (center attributes associated with choice alternatives) with individual characteristics (intrinsic values, nature connectedness, and demographics) facilitates understanding of consumer participation in nature interpretive center visits. In the current study, situational factors and individual characteristics both were significant predictors of intention to visit the center.

With respect to the importance of interpretive center attributes (Effect 1), the technology features represented by the Media attribute – beyond the base level of a reindeer movie – did not affect respondent choice of alternative. This is consistent with the conclusion of Healy, van Riper, and Boyd (2016) that high intensity interpretation is not preferred in some contexts. It is important to note that the center and its interactive exhibits were not open at the time of the survey, so respondent evaluations of the media and other attributes presumably were based on prior experience elsewhere. Exhibits that are particularly innovative – and marketed as such – may have greater impact on visit decisions.

Comparison across samples is facilitated by calculation of willingness-to-pay (WTP) estimates, using the coefficient ratio for the variable of interest relative to Price (Boxall et al. 1996). Thus, the WTP of foreigners for Guide_2 over the base is (0.213 / 2.842) * 1,000 = 75 NOK = $13 for the addition of an "Everything you wanted to know…" presentation.

Across samples, the significance of coefficients for Guide_2 and Guide_3 was greater for foreigners than for Norwegians. In addition, the WTP for Guide_3 relative to the base of no guiding is greater for foreigners ($44) than for Norwegians ($28). This is a reminder that interpretation preferences vary across nature-based tourists, in this case potentially due to pre-visit levels of familiarity with the interpretive topic.

Across levels, the magnitude and significance of coefficients for foreigners and Norwegians were greater for Guide_3 than for Guide_2, reflecting the value of outdoor guiding to a lookout post with telescope. Consistent with Ross, Norman, and Dorsch (2003), this indicates preference for an outdoor activity involving potential for visual interaction with actual reindeer, as opposed to indoor interaction with media images of, and information about, reindeer.

Though Food options were not a primary focus here, the significance of Food_3 (restaurant with mountain view) compared to the non-significance of Food_2 (restaurant without a mountain view) reflects preferences amongst both foreigners and Norwegians for at least visual interaction with natural environments.

For both samples, the negative and significant coefficients on Eco_1 were expected, with foreign visitors more highly prioritizing avoidance of negative habitat effects, potentially due to greater novelty of reindeer and lower familiarity regarding areal extent of available habitat. The Eco_3 coefficients were somewhat surprising; the coefficient for foreigners was non-significant while the coefficient for Norwegians was marginally significant at $\alpha = 0.10$ but unexpectedly negative. This suggests that respondents care more about avoiding negative effects on wild reindeer habitat than about gaining positive effects. The mixed results also may reflect skepticism that an interpretive center could increase habitat, at least to a substantial degree relative to available habitat. Lastly, some respondents may have assumed any positive habitat effect would result from an extension of the protected area, with some Norwegians potentially opposing such a change.

The negative coefficient for price was expected and reflected a preference for lower-cost options over higher-cost options, *ceteris paribus* (for options that otherwise are equivalent).

None of the interactions between CNS and attributes was significant in either model (Effect 2), which indicates similar responses to attribute changes. For example, respondents with low versus high CNS scores were similar in their reaction to price differences.

With respect to individual characteristics (Effect 3), some, but not all, affected the choice to visit the interpretive center relative to the neither option. Though not directly comparable, the positive correlation between connectedness to nature and intention to visit is consistent with Cheng and Monroe (2012), Perkins and Brown (2012), and Thapa (2010). In the broader context of CNS predicting pro-environmental behavior, results are consistent with Davis, Le, and Coy (2011) and Frantz and Mayer (2014).

Likewise, not all paths from demographic characteristics to latent variables (Effect 4 and Effect 5) were significant (Ben-Akiva et al., 2002, p. 453; Fleischer, Tchetchik, & Toledo, 2012). Amongst foreigners, Age and LOV were associated with CNS, but none of the other variables was correlated with either CNS or LOV.

In the Norwegian sample, respondents who were female, younger, and with higher income were more likely to have higher scores on LOV / intrinsic value. Both Age and Income affected CNS directly and indirectly (via LOV), with the indirect path being of opposite sign than the direct path.

The lack of direct association between gender and CNS is consistent with the findings of Mayer and Frantz (2004). Gender differences have been found for measures of environmental concern, but those differences may be due in part to risk and safety considerations that are less relevant to nature connectedness than to concern-oriented measures (Xiao and McCright 2012).

The non-significance of Education on visit choice, CNS, or LOV in either model was surprising, but it may reflect the nature of these samples, which displayed limited variability in educational level. Foreigners who took the German-language version of the survey were excluded for the technical reason described above. Amongst others in the Foreigner sample, only 21% had a highest educational level below university (lower two categories), while 79% had a university undergraduate or graduate degree (higher two categories). For the Norwegian sample, the figures were 23% and 77%, respectively. Though demographic predictors were not the primary focus of this analysis, the current study adds to the limited literature on demographic predictors of LOV / intrinsic value and CNS.

With respect to the value-attitude-behavior hierarchy, the effect of values on choice was mediated by attitude in the present study. That is, CNS was a direct predictor of choosing a visit alternative (Effect 3), though only at the $\alpha = 0.10$ level for Norwegians, whereas LOV was only an indirect predictor via CNS (non-significant in Effect 3, significant in Effect 4). This is consistent with the findings of Milfont, Duckitt, and Wagner (2010). The positive relationship between LOV / intrinsic value and CNS is consistent with Hurst et al.'s (2013) observation that materialism measures can predict environmental behaviors and attitudes.

Hybrid choice models allow assessment of this hierarchy in choice contexts and, more generally, provide insight into the deeper structure of factors affecting choices. Comparison of the hybrid choice and multinomial choice models in Table 3 indicates that attributes have similar effects on choice in this interpretive center context. The benefit of the hybrid choice approach is evident in the remainder of the model components, as it provides insight into how values and attitudes affect choice, as well as how demographic characteristics affect choice via their relationships with psychographic characteristics.

The above discussion focuses on conceptual relationships, but results also have practical relevance. Evaluation of situational characteristics can facilitate effective development and management of interpretive centers, from prioritizing outdoor guiding to providing dining options with views of natural features. In the case of the reindeer center, respondents in this pre-opening evaluation did not value technology-oriented educational material, indicating that "traditional" approaches to such material, at least, would not attract visitors.

Respondents did value interpersonal (guided) education, which confirms developer priority on this component of the center. The price attribute can be used to estimate willingness-to-pay entrance fees across combinations of center facilities and interpretive offerings. For example, the combination of price and guide attributes can be used to judge whether willingness-to-pay for guiding options will be sufficient for visitor fees to cover the cost of providing those options. If not, the service might not be offered or may need to be subsidized based on educational or other benefits.

Respondents also valued mountain views in the context of the Food attribute, which confirms developer priority on providing landscape views. The Eco attribute provides an indication of the importance of "eco-friendly" infrastructure that minimizes negative impacts, which may be particularly the case in this context where visitation reflects a form of pro-environmental behavior. Knowledge of these concerns might lead, for example, to interpretive content about how wild reindeer habitat is being sustained in Norway.

Lastly, results facilitate understanding of the relative importance of attributes and levels across samples, in this case domestic versus foreign visitors. This may be useful in customizing marketing messages, such as via differing content in the Norwegian and English-language versions of the center's website.

Assessment of individual characteristics provides a reminder that interest in, and support for, interpretive facilities may depend on the level of societal connection to nature. This complements the more frequently-assessed converse relationship of environmental attitudes and nature connection depending on participation in environmental education. Though the present analysis is cross-sectional, results suggest that increased levels of CNS in individuals or cohorts over time will lead to increased interest in nature interpretive centers. Conversely, decreased levels, potentially due to lack of childhood experiences in natural settings (Louv 2008), may lead to decreased interest. Hybrid choice models facilitate inclusion of CNS and other latent variables, thereby facilitating identification of these relationships.

As always, the present results may depend on the sample and context. This assessment is valuable in part because it reflects a multi-cultural population (Hurst et al., 2013). However, replication with other populations and contexts is recommended. In addition, demographic characteristics may be more richly measured if particular interest is on their role as predictors of latent variables.

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Figure 1. Map of the study area

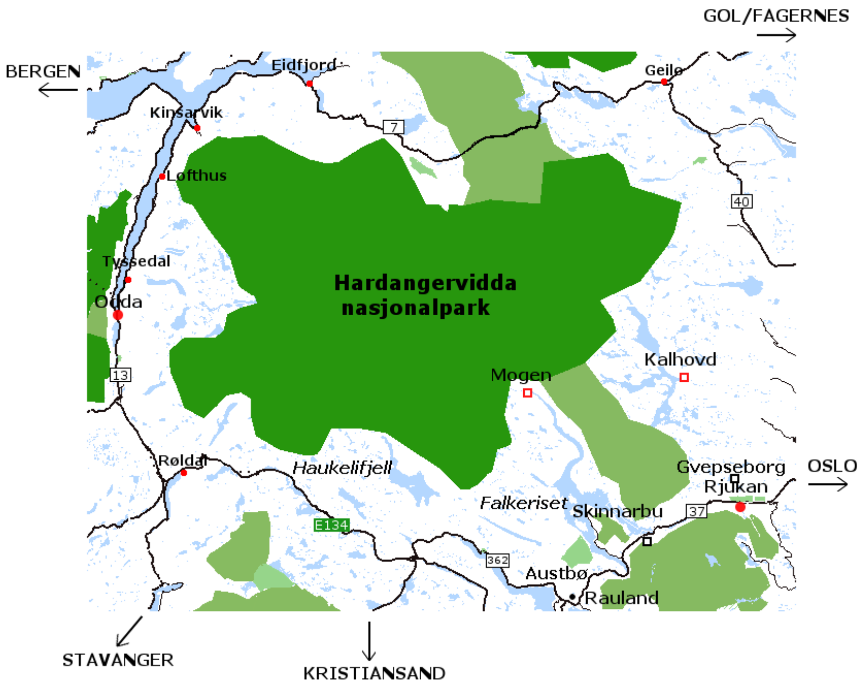

Figure 2. Sample choice task

Characteristics	Option 1	Option 2	Neither option
Restaurant/café within interpretive center	No	Yes, with mountain view	
Multimedia room	Reindeer movie Interactive tools to learn about reindeer	Reindeer movie	
Expert presentation / guiding	No	"Everything you wanted to know about reindeer" expert presentation (indoors) Guiding to lookout post with telescope (outdoors)	
Effect on reindeer habitat	No impact	Small negative effect	
Entrance price (adult)	50 NOK (6 €)	200 NOK (25 €)	

Figure 3. Model relationships

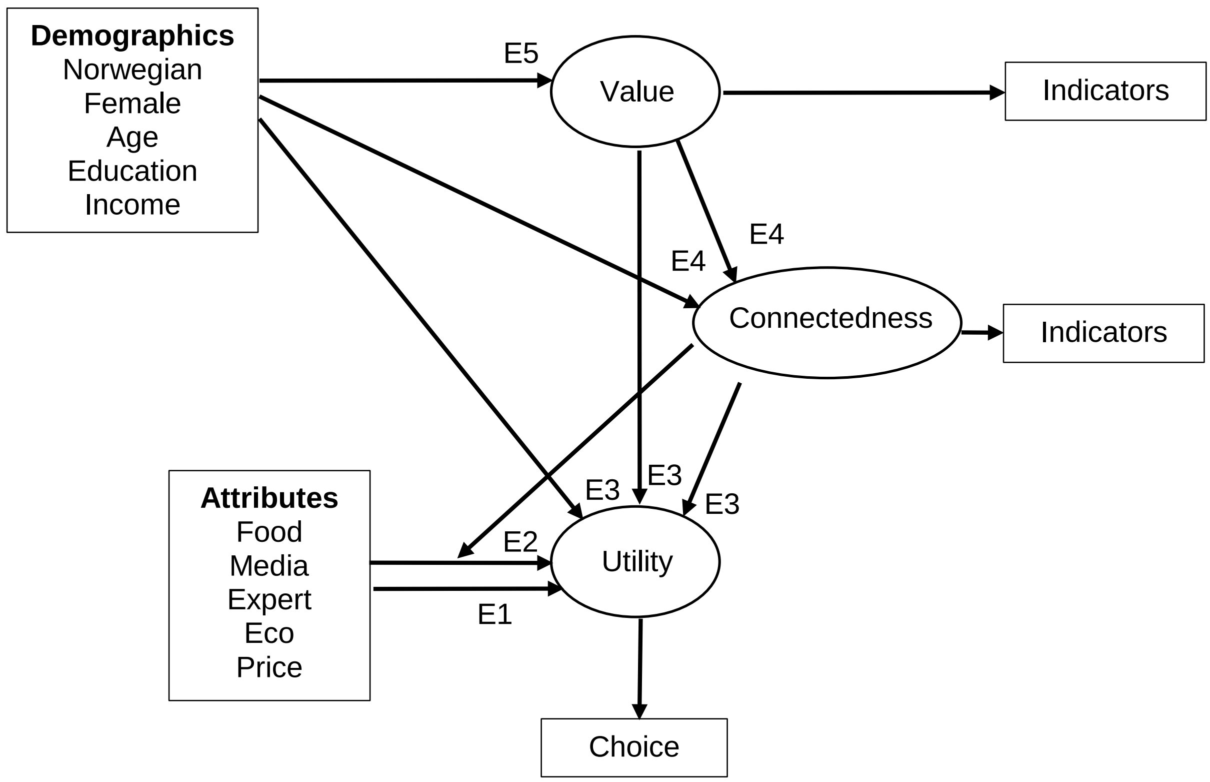

Table 1. Non-attribute variables

Variable	Description	Foreigner		Norwegian	
		Mean	SD	Mean	SD
Respondent characteristics					
Female	1 if female, 0 otherwise	0.33	0.47	0.43	0.50
Age	Age in decennial units (2=29 or younger, 3=30s, …, 7=70 or older)	4.50	1.42	4.79	1.40
Education	1=primary/secondary school (<12 years), 2=high school (approx. 12 years), 3=undergraduate university studies (1-4 years post high school), 4=graduate university studies (>4 years post high school)	3.11[a]	0.89	3.14	0.86
Income	1 if self-rated income is "relatively high," 0 otherwise ("relatively low" or "average")	0.31	0.46	0.33	0.47
Intrinsic value indicators, 1=Very unimportant to 7=Very important					
LOV1	Warm relationships with others	5.64	1.46	4.98	1.46
LOV2	Being well respected	5.41	1.31	5.25	1.44
LOV3	Security	5.61	1.37	5.35	1.36
LOV4	Self-respect	5.79	1.37	5.62	1.23
LOV5	A sense of accomplishment	5.45	1.40	5.25	1.26
Connectedness indicators, 1=Strongly disagree to 5=Strongly agree					
CNS1	I often feel a sense of oneness with the natural world around me	3.57	1.01	3.65	0.91
CNS2	I think of the natural world as a community to which I belong	3.98	0.94	3.91	0.88
CNS3	When I think of my life, I imagine myself to be part of a larger cyclical process of living	3.81	1.03	3.74	1.03
CNS4	I feel as though I belong to the Earth as equally as it belongs to me	3.66	1.03	3.54	1.00
CNS5	I often feel part of the web of life	3.52	0.96	3.31	1.00
CNS6	Like a tree can be part of a forest, I feel embedded within the broader natural world	3.64	0.96	3.43	0.97

[a]Excluding respondents to the German language version; see narrative for details.

Table 2. Attributes and their levels

Attribute	Variable name	Level 1	Level 2	Level 3
Restaurant/café within interpretive center	Food	No	Yes, but without mountain view	Yes, with mountain view
Media (technological) education	Media	Reindeer movie	Reindeer movie Interactive tools to learn about reindeer	Reindeer movie Interactive tools to learn about reindeer Web camera on reindeer's antler
Guided (interpersonal) education	Guide	None	"Everything you wanted to know about reindeer" expert presentation (indoors)	"Everything you wanted to know about reindeer" expert presentation (indoors) Guiding to lookout post with telescope (outdoors)
Effect on reindeer habitat	Eco	Small negative effect on wild reindeer habitat	No effect on wild reindeer habitat	Small positive effect on wild reindeer habitat
Entrance price (adult)	Price	50 NOK (6 €)	100 NOK (13 €)	200 NOK (25 €)

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Table 3. Model results

	Hybrid choice models				Multinomial choice models			
	Foreigner		Norwegian		Foreigner		Norwegian	
Variable	**Coeff**	**Coeff/SE**	**Coeff**	**Coeff/SE**	**Coeff**	**Coeff/SE**	**Coeff**	**Coeff/SE**
1. Effect of attributes on choice								
Constant	1.684***	3.583	0.822*	1.871	1.588***	3.555	0.732*	1.722
Food_2	-0.079	-0.921	0.030	0.292	-0.086	-1.000	0.024	0.234
Food_3	0.500***	6.233	0.688***	7.595	0.493***	6.191	0.679***	7.586
Media_2	-0.041	-0.479	-0.007	-0.075	-0.041	-0.479	-0.009	-0.095
Media_3	-0.111	-1.180	-0.115	-1.124	-0.113	-1.212	-0.120	-1.179
Guide_2	0.213**	2.107	0.132	1.243	0.208**	2.068	0.125	1.191
Guide_3	0.716***	6.768	0.439***	3.964	0.707***	6.760	0.426***	3.891
Eco_1	-0.491***	-5.578	-0.164*	-1.767	-0.486***	-5.555	-0.160*	-1.732
Eco_3	0.068	0.899	-0.144*	-1.650	0.066	0.875	-0.148*	-1.707
Price	-2.842***	-3.596	-2.791***	-3.839	-2.723***	-3.479	-2.657***	-3.726
2. Effect of attribute interactions with CNS (C) on choice								
C*Food_2								
C*Food_3								
C*Media_2								
C*Media_3								
C*Guide_2								
C*Guide_3								
C*Eco_1								
C*Eco_3								
C*Price								
3. Effect of respondent characteristics on "visit" option over neither								
CNS	0.778**	2.269	0.750*	1.857				
LOV								
Female	-0.045	-0.171	-0.495**	-2.065	-0.062	-0.244	-0.349	-1.622
Age	-0.212**	-2.329	-0.089	-1.145	-0.160*	-1.899	-0.044	-0.593
Education [a]								
Income	0.511*	1.806	-0.250	-1.080	0.460*	1.680	-0.289	-1.303
4. Effect of respondent characteristics on CNS								
LOV	0.235***	5.392	0.191***	3.303				
Female								
Age	0.062***	2.840	0.071***	3.144				
Education [a]								
Income	-0.043	-0.641	-0.120*	-1.648				
5. Effect of respondent characteristics on LOV								
Female	0.053	0.405	0.513***	4.580				
Age	-0.020	-0.490	-0.071**	-2.187				
Education [a]								
Income	0.020	0.170	0.197**	1.998				
CNS measurement model								
CNS1[b]	1.000		1.000					
CNS2	1.127***	11.195	0.941***	9.829				
CNS3	1.207***	9.830	1.032***	8.046				
CNS4	1.132***	10.245	1.203***	10.203				
CNS5	1.122***	10.365	1.193***	9.588				
CNS6	1.247***	11.920	1.141***	12.457				
LOV measurement model								
LOV1[b]	1.000		1.000					
LOV2	0.958***	16.063	1.418***	9.099				
LOV3	0.991***	11.567	1.246***	8.652				
LOV4	1.187***	14.537	1.269***	7.759				
LOV5	1.014***	13.444	0.880***	6.332				

"Coeff" = coefficient, "SE" = standard error. Blank cells indicate non-significance in both samples. Shaded cells indicate latent variable components included only in the hybrid choice model.
[a]See narrative for handling of education. [b]Coefficient is fixed; significance is not applicable.
*, **, *** coefficient significant at $\alpha = 0.10$, 0.05, and 0.01, respectively.