TESTING A NEW SCALE OF PLACE IDENTITY IN THE TEXAS HILL COUNTRY

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Abstract.—In this study, we proposed a three-factor structure of place identity comprising the dimensions of structure, function, and affect. This conception of place identity was tested against three competing models that viewed place identity as consisting of either: 1) a single dimension of place identity; 2) two dimensions of cognition and affection; or 3) a second-order model where structural, functional, and affective dimensions were subsumed to a higher-order factor of place identity. The four models were tested on data collected from a random sample of Texas Hill Country landowners. Performance of the models was evaluated based on fit indices, convergent validity, internal consistency, and discriminant validity. Study findings suggested that conceptualization of place identity as comprising the cognitive and affective dimensions best addressed the evaluative criteria.

1.0 INTRODUCTION

Place identity has been conceptualized as comprising multiple domains by research using the qualitative approach (Korpela 1989, Twigger-Ross and Uzzell 1996). However, quantitative examination of this concept primarily measured it as a uni-dimensional construct (e.g., Williams and Vaske 2003, Jorgensen and Stedman 2006). According to identity theory, self-identity consists of meanings that form the defining characteristics of the identity (Burke and Tully 1977). Thus, place identity can be viewed as encompassing meanings that characterize one's self-identity cultivated through interactions with a specific geographic location. Literature has suggested that meanings that individuals attribute to a place can be categorized into three distinguishable yet correlated dimensions: structural (i.e., biophysical features of a place), functional (i.e., activities and functions supported by the place), and affective (i.e., emotions and feelings attributed to the place) (Relph 1976, Proshansky 1978).

In our study, a model of place identity consisting of three correlated first-order dimensions (i.e., structural, functional, and affective) was proposed. This model of place identity (Model A) was tested against three alternative explanations of place identity. The first alternative was a first-order model (Model B) where the cognitive and affective dimensions of place identity were correlated. In this model, the structural and functional dimensions suggested in the proposed model were combined into the cognitive dimension due to the interdependence between meanings pertaining to the biophysical features of a place (i.e., the structural dimension) and functions supported by these features (i.e., functional dimension). The second alternative explanation was a single-factor model (Model C) that comprised one dimension of place identity (Cuba and Hummon 1993). The third alternative was a second-order model (Model D) where three first-order factors (i.e., structural, functional, and affective dimensions) loaded onto a single second-order factor (i.e., place identity) (Jorgensen and Stedman 2001).

2.0 METHODS

2.1 Study Area

The study was conducted in the private properties of the Hill Country, which encompasses 25 counties in the central part of Texas. This region has been dominated by the ranching industry since the first

settlement by Europeans in the mid-1800s (Texas Parks and Wildlife Department 2007). Rapid population growth and urban development, however, have forced many large ranches to become fragmented and converted to other types of land uses.

2.2 Scale Development

Development of the place-identity scale primarily followed Netemeyer et al. (2003). Items used to measure the three place-identity dimensions (structural, functional, and affective) were created based on the results of semi-structured interviews with a convenience sample of Hill Country landowners. The interviews were aimed at identifying the meanings that landowners attributed to their property. In addition, two items adapted from an existing place-identity scale (Williams and Vaske 2003) were included in the initial item pool to measure the affective dimension. The refined scale contained 19 items after a series of pilot tests.

2.3 Data Collection and Analysis

Stratified random sampling was applied to select 1,080 individuals who possessed properties of at least 10 acres in three counties of the Hill Country (Hays, Blanco, and Gillespie counties). Stratification was implemented based on property size and the county where a property was located. The survey was administered following the multiple-contact procedure adapted from Dillman (2000). To measure study participants' place identity related to their property, they were asked to indicate "to what extent you agree or disagree with the following statements regarding your feeling about your property." The response format was a 7-point scale where 1 represented "strongly disagree;" 4, "neutral;" and 7, "strongly agree."

The survey was implemented between February and May 2007. Two months later, a short version of the survey was sent to 150 randomly selected nonrespondents in order to examine nonresponse biases.

After data screening, confirmatory factor analysis (CFA) was applied using LISREL Version 8.70 to "confirm an a priori hypothesis about the relationship of a set of measurement items to their respective factors" (Netemeyer et al. 2003, p. 148). Fit indices, convergent validity, internal consistency, and discriminant validity were used to evaluate the performance of the models.

3.0 RESULTS

Overall, 528 usable questionnaires were returned, which resulted in an effective response rate of 51 percent. Thirty-two landowners responded to the short version of the survey sent to initial nonrespondents. No significant difference was found between respondents to the two versions of the survey in terms of their socio-demographic characteristics and responses to the place-identity scale.

3.1 Landowner Characteristics

Respondents' socio-demographic characteristics are summarized in Table 1. They were predominantly male (70.5 percent), averaged 61.8 years old, and had an education level of at least some college (80.0 percent). More than half (52.7 percent) had an annual household income of $80,000 or more.

Table 1.—Respondents' socio-demographic profile

Gender (N=509)		
Male:	359	(70.5%)
Female:	150	(29.5%)
Education (N=509)		
Less than high school:	9	(1.8%)
High school graduate or GED:	78	(15.3%)
Vocational/Technical training:	15	(2.9%)
Some college:	108	(21.2%)
Bachelor's degree:	153	(30.1%)
Post-graduate degree:	146	(28.7%)
Age (N=507)		
Mean=61.8 years	(S.D.=11.6)	
Income (N=461)		
Less than $20,000:	27	(5.9%)
$20,000-$39,999:	57	(12.4%)
$40,000-$59,999:	74	(16.1%)
$60,000-$79,999:	60	(13.0%)
$80,000-$99,999:	52	(11.3%)
$100,000 or more:	191	(41.4%)

3.2 Responses to Place-Identity Scale

In general, respondents exhibited a slightly to very high level of place identity tied to the biophysical attributes of and functions supported by the property, and emotional meanings they attributed to the property (Table 2). However, a large majority did not agree that the meaning of their property was connected to its importance as a source of income (Mean=3.2).

3.3 Model Testing

Exploratory factor analysis based on principal component analysis and varimax rotation was first applied to identify items that might contribute to the failure of a converged solution in CFA (Netemeyer et al. 2003). Three items, PS5 ("Native plants of the property are of little value to me"), PF3 ("The property provides an important source of income"), and PF7 ("There are better places to enjoy the activities I do on the property"), highly cross-loaded on dimensions other than the ones they were hypothesized to measure and were dropped prior to CFA. Responses to the rest of the 16 items were used to test the four competing models based on CFA.

Due to the exploratory nature of the study, all the models were respecified to "detect and correct for specification errors" (Jöreskog and Sörbom 1996, p. 274) after an examination of the estimated factor loadings and modification indices. As a result of the respecification procedures, PS2 ("Water features are a crucial element of the property"), PS4 ("Native wildlife is an important feature of the property"), PF1 ("The property provides the opportunity to work on the land"), PF6 ("I enjoy the friendship with neighbors"), PA1 ("The property says a lot about who I am and what I like to do"), and PA2 ("The property is important to my family heritage") were dropped. After respecification, all four models were improved by a significant reduction in S-B χ^2. S-B χ^2 and other fit indices indicated that the final form of Model B outperformed the other competing models (Table 3). Although the proposed model (Model A) and second-order model (Model D) also showed acceptable model fit, study findings failed to provide evidence for discriminant validity between the structural and functional dimensions of both models. Analyses further evaluated the final form of Model B based on its internal consistency and discriminant validity.

Table 2.—Descriptive statistics of the place-identity scale

Items	Mean (St. Dev.)
Structural dimension	
PS1: The natural environment makes the property special	6.7 (.8)
PS2: Water features are a crucial element of the property	5.9 (1.6)
PS3: The terrain is an essential quality of the property	6.3 (1.0)
PS4: Native wildlife is an important feature of the property	6.4 (1.1)
PS5: Native plants of the property are of little value to me[a]	5.8 (1.8)
PS6: There are places on the property that are special to me (e.g., a spot along a creek/on a hilltop, or an old house)	6.4 (1.1)
Functional dimension	
PF1: The property provides the opportunity to work on the land	6.2 (1.3)
PF2: The property provides a quality living environment	6.5 (1.0)
PF3: The property provides an important source of income	3.2 (2.1)
PF4: The property is a great place to enjoy the outdoors	6.7 (.6)
PF5: I enjoy having people visit me on the property	6.1 (1.3)
PF6: I enjoy the friendship with neighbors	5.6 (1.5)
PF7: There are better places to enjoy the activities I do on the property[a]	5.1 (4.7)
Affective dimension	
PA1: The property says a lot about who I am and what I like to do	6.1 (1.3)
PA2: The property is important to my family heritage	5.5 (1.8)
PA3: I feel at home when I'm here	6.6 (.9)
PA4: I feel the property has become a part of me	6.4 (1.1)
PA5: I feel spiritually connected to the property	5.9 (1.5)
PA6: The property doesn't mean much to me[a]	6.6 (1.0)

[a] Items were reverse coded

Table 3.—Estimates of fit indices (initial and final forms)

Model	χ^2 (df)	S-B χ^2	Adjust RMSEA	SRMR	Robust CFI	GFI	Difference in: S-B χ^2	df
Model A							256.38***	70
Initial	482.42 (101)	331.24	.067 (.058-.076)	.067	.94	.89		
Final	133.38 (31)	74.86	.053 (.044-.061)	.054	.97	.95		
Model B							305.90***	71
Initial	517.82 (103)	365.54	.071 (.062-.080)	.069	.93	.88		
Final	104.58 (32)	59.64	.042 (.032-.050)	.044	.98	.96		
Model C							372.30***	71
Initial	720.43 (104)	534.62	.091 (.081-.101)	.076	.91	.82		
Final	266.12 (33)	162.32	.088 (.078-.098)	.076	.94	.89		
Model D							262.74***	70
Initial	490.89 (102)	339.49	.068 (.059-.077)	.067	.94	.89		
Final	135.96 (32)	76.75	.053 (.044-.061)	.053	.97	.95		

***p < .001

Evaluative criteria: a: Root mean square error (RMSEA)<=.06; b: Standardized root mean square residual (SRMR)<=.08; c: Comparative fit index (CFI)>=.95; d: Goodness of fit index (GFI)>=.90

Evidence of convergent validity is revealed when items have statistically significant loadings on the factors they are to measure at p<.01 (Netemeyer et al. 1996) and magnitude of the loadings between .60 and .90 (Bagozzi and Yi 1988). Due to the exploratory nature of our study, factor loadings no less than .50 were deemed acceptable. Table 4 shows that all the factor loadings were equal to or greater than .50 and significant at p<.01, an indication of convergent validity.

Composite reliability, Cronbach's alpha coefficients, and average variance extracted estimates (AVE) were used to examine the internal consistency of the final form of Model B (Table 5). The composite reliability estimates for the two dimensions of Model B met the criterion of .70 suggested by Hair et al. (1998). Cronbach's alpha coefficients of the two dimensions, .75 and .83 respectively, met the criterion of .7 that is widely suggested (Netemeyer et al. 2003). However, the estimate of AVE of the Cognitive Dimension in Model B (.38) fell short of the threshold of .45 suggested by Netemeyer et al. (2003) for newly developed scales.

Discriminant validity was examined first by comparing the differences of chi-square values between the model that fixed the correlation between Cognitive Dimension and Affective Dimension to 1 and the model that freely estimated the correlation (Table 6).

Table 4.—Factor loadings and standard errors of Model B (final form)

Items	Factor Loading[ab] Cognitive Dimension	Affective Dimension	SE	t-value
PS1	.62		--	--
PS3	.52		.17	6.90
PS6	.62		.26	5.81
PF2	.71		.21	6.89
PF4	.69		.13	6.70
PF5	.54		.23	6.61
PA3		.84	--	--
PA4		.86	.11	11.26
PA5		.79	.16	9.55
PA6		.59	.12	7.11
Cronbach's Alpha	.76	.83		

[a] Completely standardized solution

[b] All the factor loading are significant at p < .01

Table 5.—Internal consistency estimates for Model B (final)

	Composite Reliability	Cronbach's Alpha Coefficient	Average Variance Extracted (AVE)
Cognitive Dimension (6 items)	.79	.76	.38
Affective Dimension (4 items)	.86	.82	.61

Table 6.—Discriminant validity estimates for Model B (final form)

	S-B χ^2	df	S-B χ^2 Difference[a]
Unconstrained Model Latent factor correlation freely estimated	59.64	32	
Constrained Model Correlation between Functional and Affective Dimension set to 1	118.62	33	58.98***

[a] S-B χ^2 difference between constrained and unconstrained models with 1 degree of freedom change.
***p < .001

Results showed that the values of S-B χ^2 significantly increased by forcing the correlation of the latent factors to be perfectly correlated with 1 degree of freedom change ($\chi^2 \geq 3.84$). In other words, the model was significantly deteriorated by forcing the two dimensions to be perfectly correlated. This result provides the evidence of discriminant validity for Model B.

4.0 DISCUSSION AND CONCLUSIONS

Quantitative research has frequently operationalized place identity as a uni-dimensional construct. However, findings of our study suggested that viewing place identity as a single latent factor (i.e., Model C) was less than optimal to conceptualize this construct. Although the proposed three-dimensional structure of place identity (Model A) and the second-order model (Model D) fit the data well, the lack of discriminant validity between the structural and functional dimensions implies that both dimensions may be distinguishable conceptually but difficult to be separated from each other empirically. On the other hand, Model B, which conceptualized place identity as consisting of the cognitive and affective dimensions, displayed the best model fit and showed evidence of convergent validity, internal consistency, and discriminant validity. This model differs from the conceptualization of place attachment in much of the natural resource and outdoor recreation research, which views this construct as comprising the dimensions of place dependence and place identity (Williams and Vaske 2003, Kyle et al. 2005). Place dependence represents the functional aspect of place attachment. In our study, the functional aspect of place meanings along with the structural aspect of place meanings constituted the cognitive dimension. Place identity in the past literature encompasses the affective meanings individuals attribute to a place and is comparable to the affective dimension of place identity tested in our study. Furthermore, an interpretation of place identity based on identity theory provides the theoretical basis to explain the motivational force of place identity on place-related behaviors when there is a need to maintain the identity (Stryker 1987, Burke 1991).

Some limitations of our study need to be noted. The low AVE in the cognitive dimension of Model B raises concern that the variance contributed by measurement errors was greater than the one captured by the latent construct of cognitive place identity (Claes and David 1981). This result may be attributed to two factors. First, measurement errors might come from the variation in responses due to the heterogeneity of respondents. A second factor might derive from the failure of the scale to capture other components important to the cognitive aspect of landowners' identity of their property. Further effort will be needed to improve the ability of the scale to capture the essential components of the cognitive dimension of place identity.

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