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Cross-Language Measurement Equivalence of the Place Attachment Scale: A Multigroup Confirmatory Factor Analysis Approach

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Abstract

Cross-language (or cross-cultural) comparisons of theoretical constructs are of growing interest in leisure studies. In order for such comparisons to be meaningful, constructs are required to exhibit adequate measurement equivalence across languages. This study utilizes multigroup confirmatory factor analysis to examine measurement equivalence of an English and non-English version of the place attachment scale. Findings reveal a lack of measurement equivalence between the two groups. Researchers involved in cross-language and/or cross-cultural construct comparisons are cautioned against such comparisons unless measurement invariance of the concept(s) under investigation has been established. Ignoring measurement invariance testing could potentially threaten the validity of a study, limit the comparability of multi-lingual versions of a measure and ultimately lead to biased results.

KEYWORDS: Measurement invariance, Place attachment, Translations

Introduction

A growing and important emphasis area within leisure research is the inclusion of racially and ethnically diverse populations in investigations regarding outdoor recreation and natural resource management. One of the reasons for this has been the progressively diverse nature of the U.S. population. For example, the most recent census indicates that Hispanics are the fastest growing ethnic minority group in the U.S., and that Spanish speakers constitute a ratio of about 1 in 10 U.S. household residents (U.S. Census Bureau, 2000). Additionally, immigrants and refugees, some of whom have limited English proficiency, continue to add to the U.S. population (Garcia-Preto, 1996). Combine this with the over 1 million people each who speak Chinese, French, German or Tagalog at home (U.S. Census

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Bureau, 2000) and what results is a sizable proportion of people whose primary language of communication is a language other than English. This increasing diversity is considered to be "one of the most powerful demographic forces shaping U.S. and Canadian society" (Gramman & Allison, 1999, p. 283). Beyond the diversification of the U.S. population, an increasingly globalized world has resulted in rising international travel. For example, World Tourism Organization (2000) projections indicate that international tourist arrivals will hit 1 billion by 2010 and 1.56 billion by 2020. A growing awareness of other cultures resulting from increasing diversity or travel requires that leisure professionals better understand leisure behavior and preferences of heterogenous groups. For example, federal land managers are increasingly required to include viewpoints of ethnically diverse constituents in their decision-making processes (Baas, 1993). While some progress has been made in this regard, cross-cultural leisure research has been criticized for being inward looking (Shaw, 2000; Valentine, Allison & Schneider, 1999) and still faces some fundamental challenges. Among these challenges are that such studies are either rare, inappropriate or lack adequate methodologies (Dimanche, 1994). For instance, in a review of studies published in three leading leisure science journals, fewer than 2% of the articles were cross-national in nature, leading Valentine et al. (1999) to call for more of an international perspective in leisure sciences. Additionally, recognizing the gap in cross-cultural methodologies, leisure scholars have been urged to develop stronger theoretical frameworks and improved, culturally sensitive and inclusive methodological approaches (Floyd, 1998; McAvoy, Winter, Outley, McDonald, & Chavez, 2000). One approach toward this has been to offer translated versions of English language questionnaires (e.g. Chavez, Larson & Winter, 1995; Heywood, 1993). While translated materials encourage participation of non-English speakers, a set of items used to measure a construct in English might not accurately assess the underlying construct in a different language or culture (Knight, Roosa, & Umana-Taylor, 2008). In other words, cross-language differences in scale means might be due to systematic biases in the way non-English speakers respond to certain items or differences between languages. Given the potential for measurement bias to produce variance in a set of scores that is not a function of the construct under investigation but rather may be attributed to language differences, construct equivalence seems difficult to achieve, yet essential, if researchers intend to perform cross-language or cross-cultural comparisons (Steenkamp & Baumgartner, 1998). Such studies, though prevalent in psychology, cultural anthropology, public health and marketing fields are lacking in leisure and recreation.

The place attachment scale developed by Williams and Roggenbuck (1989) has been used extensively to examine the non-economic value of natural places and inform natural resource management decisions (Daigle, Hannon, & Stacey, 2003; Kyle, Graefe, Manning & Bacon, 2004; Warzecha & Lime, 2001). Given the paucity of cross-language investigations in leisure and outdoor recreation, and as a step toward exploring how places might have different meanings for different cultural groups, the purpose of this study was to explore cross-language equivalence of the place attachment scale. Specifically, the study compares the psychometric properties of the place attachment scale among English and non-English speaking

visitors at an urban green space in India. The study draws on measurement equivalence concepts and methods from the cross-cultural psychology literature and applies them to a leisure and outdoor recreation context. In addition, multigroup confirmatory factor analysis (CFA) is introduced as a useful statistical technique for cross-language investigations.

Literature Review

Cross-language Comparisons

Cross-cultural and cross-language researchers frequently use the terms "emic" and "etic" to describe concepts of interest (Pike, 1967; Triandis & Martin, 1983). Emic constructs are unique to a culture or language, and are described by behavior in that culture using concepts exclusive to that culture. Etic constructs, on the other hand, are universal constructs that exist in similar form across a range of cultures or languages (Behling & Law, 2000). The very nature of etic constructs allows them to be subjected to cross-cultural or cross-language comparisons. However, in order to do so, etic constructs need to exhibit functional, normative, semantic and conceptual equivalence (Behling & Law, 2000; Kozak, Bigné, & Andreu, 2003).

Functional equivalence is considered an initial and necessary condition in cross-cultural research (Kozak et al., 2003). Essentially, functional equivalence refers to ensuring the construct under investigation serves the same function in different cultures. Hui and Triandis (1985) explain this as "similarity between the goals of two behaviors" (p. 134). In a leisure context, this may be explained as ensuring that individuals from different cultures have the same leisure related needs, expectations or wants. Kozak et al. use the example of "overall cleanliness of facilities" as something that serves the same function regardless of culture.

Often, social conventions or norms vary among different cultures (Behling & Law, 2000). For example, certain societies are less willing to discuss certain topics or are more willing to talk to strangers. Researchers need to recognize these variations and adapt varying methodologies to ensure normative equivalence. Strategies such as employing field researchers who are familiar with the language/culture in which the study is being conducted as well as assurances of anonymity and confidentiality often enhance normative equivalence.

A next issue is that of semantic equivalence. Semantic equivalence refers to identifying words and phrases in one language that have matching meanings in another. It assumes that meanings in one language are preserved in translation. A lack of an appropriate matching word or phrase in a translated language may lead to difficulty in studying a particular concept. For example, Russell (2002) describes how the Sherpas in Nepal expressed difficulty understanding a question regarding leisure because they did not have a translated word that was equivalent to the English word "leisure." Translation/back-translation is commonly used to ensure semantic equivalence. In this approach, the original instrument is translated into the new language; another translator translates this version back to the original language, the original and translated versions are then compared, and any differences are modified (Ægisdóttir, Gerstein & Çinarbas, 2008; Behling & Law, 2000). Back-translation ensures that original meanings are as closely preserved as

possible in the translation. Despite its popularity and the fact that it can be a useful tool for target language instrument development, translation/back-translation is not an adequate test for translated and original language equivalence (Behling & Law, 2000). In an attempt to ensure semantic equivalence, back-translation has been used in combination with other techniques such as bilinguals discussing problematic back-translation results and pre-testing among a smaller sample (Beck, Bernal & Froman, 2003).

Occasionally, concepts that are seemingly universal may be understood differently in another culture or language. Conceptual equivalence, refers to the degree to which concepts operationalized in one culture (such as the U.S.) and developed in one particular language within that culture (e.g. English) exist in the same form in the minds of the people among whom the translated version is administered. Measurement experts argue that conceptual equivalence is necessary but not sufficient to establish equivalency. Instead, they examine whether or not items load on latent factors in the same way across groups (Vandenberg & Lance, 2000). This is termed metric equivalence. Conceptual and metric equivalence may be examined through empirical testing involving comparing the reliability and construct validity of measures in the original and translated versions (Knight et al., 2008).

Conceptual and Metric Equivalence

Theoretically, if an etic construct has conceptual and metric equivalence across languages, it should exhibit the same dimensions or factorial structure, relations among those factors, and internal structure of the factors regardless of the language. For example, place attachment has been conceptualized as consisting of three factors – place identity, social bonding and place dependence (Kyle, Graefe, & Manning, 2005). Only if similar factors as well as factor structures emerge in translated versions of place attachment can conceptual and metric equivalence be assumed and cross-language comparisons made. This is referred to as measurement equivalence or invariance. Invariance testing assesses whether measures are defined similarly across groups (e.g. Byrne & Campbell, 1999; Cheung & Rensvold, 1999; Kyle et al., 2005). Invariance testing is also increasingly used in cross-cultural research to establish validity, reliability and comparability of measures across cultures (e.g Sirikaya-Turk, Ekinci & Kaya, 2008; Cafri et al., 2008). If measurement invariance is not established one cannot ascertain whether differences between groups are due to actual differences in attitudes or psychometric properties of the scale items (Cheung & Rensvold, 2002).

A variety of statistical techniques for establishing measurement invariance such as utilizing regression parameters and coscoring methods have been discussed by Hui and Triandis (1985). However, multigroup confirmatory factor analysis (Jöreskog & Sorbom, 1993) has been accepted as a powerful and versatile tool to test measurement invariance between an existing and translated scale with a known factorial structure (Behling & Law, 2000; Steenkamp & Baumgartner, 1998). If the factorial structure of a scale has been established in one language, multigroup confirmatory factor analysis (CFA) can be used to test if that same factorial structure is present in the translated version of the scale. Multigroup CFA has often been used to compare English and translated scales in a number of

applied fields such as traumatic stress and consumer research (e.g. Marshall, 2004; Steenkamp & Baumgartner, 1998).

Measurement invariance testing using multigroup CFA involves a sequence of progressively stricter statistical tests that build on each other. Only when one form of equivalence has been satisfied can the subsequent test be performed. Conceptual invariance is based on the principle that the pattern of salient and non-salient loadings defines the structure of the scale. In terms of factorial invariance, this implies that the items comprising the scale exhibit the same configuration of salient and non-salient factor loadings across different language versions. It implies the same number of factors in each group and the same pattern of salient and non-salient parameters (Steinmetz, Schmidt, Tina-booh, Wieczorek, & Schwartz, 2008). Here, all salient factor loadings are significant, and the correlations between factors are below one. Conceptual invariance is supported if the data across different groups or language versions fits a specified model (Steenkamp & Baumgartner, 1998). Only after conceptual invariance is established can metric invariance be tested for.

Metric invariance testing examines whether factor loadings are equal across groups. If metric invariance is established it means those responding to different language versions, respond to the scale items in the same way. In other words, difference scores on the items can be meaningfully compared across languages. Finally, if metric invariance is satisfied, one can assess one more level of invariance - scalar invariance. Scalar invariance implies that cross-language differences in the observed mean items are due to differences in the underlying construct(s) (Steenkamp & Baumgartner, 1998). Only after configural, metric and scalar invariance are established can one directly compare different language versions of a scale.

Place Attachment

Place attachment has gained much attention in natural resource management (Bricker & Kerstetter, 2000; Kyle et al., 2004; Moore & Graefe 1994; Vaske & Kobrin, 2001; Williams & Roggenbuck, 1989). The concept is often described as the bonds humans form with places, and results from the meanings associated with places (Altman & Low, 1992; Williams & Patterson, 1999). Such meanings are derived from an "interplay of affect and emotions, knowledge and beliefs, and behaviors and actions" associated with that place (Kyle et al., 2005).

Although some have treated the people-place relationship as unidimensional, conceptual and empirical studies have indicated its multidimensionality (e.g. Bricker & Kerstetter, 2000; Williams, Patterson, Roggenbuck, & Watson, 1992). Widely accepted within the literature is Schreyer, Jacob and White's (1981) as well as Williams and Roggenbuck's (1989) two-dimensional conceptualization of place attachment. These two dimensions - an emotional/symbolic "place identity" and a functional "place dependence" have been described in a number of studies (Kyle, Absher, & Graefe, 2003; Kyle et al., 2004; Moore & Scott, 2003; Williams et al., 1992). Essentially, place identity refers to connections between a place and an individual's personal identity (Proshanksy, 1978). The focus here is on the psychological construct of identity. Proshansky, Fabian and Kaminoff (1983) explained that places offered individuals the opportunity to both express as well as affirm their identity. The

second dimension, place dependence occurs when users demonstrate a functional need for a place that is not transferable to another location (Stokols & Shumaker, 1981). It occurs when "a particular setting satisfies certain behavioral goals better than a known alternative" (Williams et al., 1992, p. 31). Often times, this functional attachment is to a physical characteristic of the resource (such as the ruggedness of a trail) that cannot be transferred to another place.

Other conceptualizations of the people-place relationship exist. Using an attitudinal framework, Jorgensen and Stedman (2001) described sense of place as personal or social meaning attached to a spatial setting. They associated place attachment with affect, place identity with cognitive and place dependence with conative elements of attitude. Jorgensen and Stedman provided some support for the notion that sense of place was an overarching concept encompassing place attachment, identity and dependence; however this model was only marginally superior to a first-order three factor model in which place identity, attachment and dependence were retained as distinct components of sense of place. These findings led Kyle et al. (2005) to conclude there was little empirical evidence supporting Jorgensen and Stedman's conceptualization of sense of place as a second order three factor model.

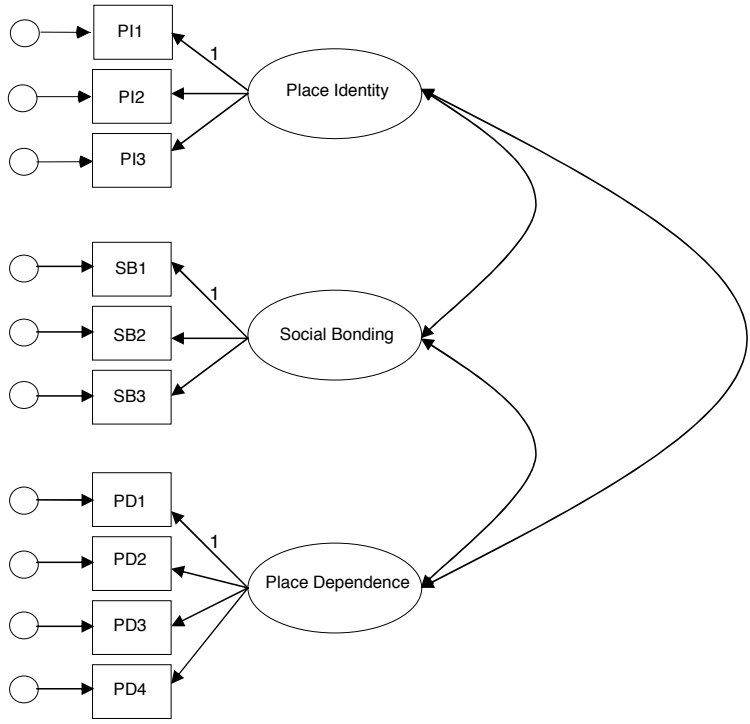
More recently, Kyle et al. (2005) explored place attachment dimensionality among two subsamples of randomly assigned hikers on the Appalachian Trail. Based on the environmental psychology literature (Altman & Low, 1992; Mesch & Manor, 1998), they included a third factor, social bonding, in addition to place identity and place dependence. Social bonding was described as "meaningful social relationships that occur and are maintained in specific settings" (p. 156). Considering that unidimensional and multidimensional conceptualizations of place attachment exist, Kyle et al. tested three models i) a single factor model where place identity, place dependence and social bonding loaded onto one dimension of place attachment, ii) a first order, three factor correlated model that allowed the three dimensions to differ within individuals and iii) a second order model consisting of place identity, place dependence and social bonding as first-order factors loading onto the single second order factor of place attachment. Their findings supported the latter two models; however, based on past literature indicating that place identity and place dependence do not elicit similar responses in association with other variables (e.g. Bricker & Kerstetter, 2000; Kyle et al., 2003), they decided to retain the first-order, three factor correlated model in which place identity, place dependence and social bonding were allowed to differ within individuals (Figure 1).

Methods

Study Site

The study site consists of approximately 1,730 acres, of hill top land located in the center of Pune, the seventh largest city in India. The resource is managed by the state forest department and represents one of the few places where city residents may socialize, recreate, and meditate in a natural setting. It is a popular place for urban residents seeking exercise, peace, quiet or fresh air. Several temples located on the hill draw people during early and later hours of the day. Estimated use is about 2,000 people a day.

Figure 1. First Order Three Factor Correlated Model of Place Attachment



Survey Instrument and Sampling

A six-page double-sided questionnaire available in English and the local Indian language of Marathi was used. Prior to being administered, the Marathi version was back translated as described by Behling and Law (2000). This was done to ensure semantic equivalence. Normative equivalence was achieved by assuring anonymity of responses and employing trained bilingual field researchers from the local community. Questions focused on demographics and place attachment. Place identity, place dependence, and social bonding were respectively measured by asking visitors to rate four items each on a five point Likert based scale ranging from "1 = Strongly Disagree" to "5 = Strongly Agree." The place identity and place dependence items were selected from a larger set developed by Williams and Roggenbuck (1989) and used by Kyle et al. (2005). The social bonding items mirrored those developed by Kyle et al.

A sample of 500 adult visitors during March 11th through March 18th, 2006 was surveyed. A researcher and assistant approached every 6th visitor/group encountered. Individual respondents were randomly selected from the group by requesting the person whose birthday was closest to the sampling day to participate. Participants could choose between the two language versions. Questionnaires were self-administered and took approximately twenty minutes to complete.

Model Specification and Analyses

Data were entered, cleaned, and analyzed using Statistical Package for Social Sciences (SPSS) Version 15.0. Data were screened for nonnormality. Descriptive statistics were used to determine individual and group means, percents, and frequencies. Following Kyle et al. (2005), a first-order, three factor correlated model was specified (Figure 1). Specifically, the model hypothesized a priori that place attachment could be explained by three intercorrelated factors (place identity, social bonding and place dependence). Items describing each of the dimensions are presented in Table 2.

Table 1. Socio-demographic and Visitation Characteristics

		Frequency	**Percent**
Gender (n = 368)			
	Male	270	73.4
	Female	98	26.6
Age in years (n = 363; M = 37)			
	16-20	74	20.3
	21-30	99	27.3
	31-40	41	11.3
	41-50	60	16.4
	51-60	38	10.4
	>60	52	14.3
Education completed (n = 383)			
	High school or less	88	30
	Associates degree	28	7.3
	Bachelor's degree	158	41.3
	Master's degree	98	25.6
	Ph.D. or equivalent	11	2.9
Years visited hills (n = 405; M = 8.5)			
	0-10	308	76.0
	11-20	73	18.0
	21-30	15	3.7
	31-40	4	1.0
	41 or more	5	1.2
Times visited in past year (n = 364; M = 133)			
	1-20	130	35.7
	21-75	49	13.6
	76-150	41	11.3
	151-500	139	38.2
	501 or more	5	1.4
Primary activity (n = 304)			
	Exercising	145	47.7
	Walking	128	42.1
	Socializing	8	2.6
	Meditating	7	2.3
	Studying nature	7	2.3

Table 2. Item and Scale Means and Standard Deviations, and Scale Reliabilities for Place Attachment Dimensions

	Overall		English		Marathi	
	M*	**S.D.**	**M***	**S.D.**	**M***	**S.D.**
Place Identity	**4.26**		**4.22**		**4.70**	
These hills mean a lot to me (PI1) या टेकडया माझ्यासाठी अत्यंत महत्त्वपूर्ण आहेत	4.56	0.82	4.46	0.79	4.70	0.84
I am very attached to these hills (PI2) या टेकडयांशी माझे जिव्हाळ्याचे संबंध आहेत	4.31	0.93	4.22	0.90	4.42	0.96
I identify strongly with these hills (PI3) या टेकडयांबरोबर माझी एक अशी खास ओळख आहे	4.01	1.13	3.97	1.11	4.05	1.16
Cronbach's α	*0.83*		*0.83*		*0.83*	
Social Bonding	**3.92**		**3.94**		**3.90**	
I have a lot of fond memories about these hills (SB1) या टेकडीशी माझ्या अनेक आनंददायी आठवणी जुळ्ल्या आहेत	3.83	1.14	3.95	0.99	3.73	1.28
I have a special connection to these hills and the people who recreate here (SB2) या टेकडया व येथे येऊन आनंद होणारे लोक याच्याशी माझे खास नाते आहे	3.67	1.08	3.72	1.00	3.58	1.20
I will bring my children to these hills (SB3) मी माझ्या मुलांना येथील भटकंतीसाठी आवर्जून आणेन	4.27	0.97	4.16	0.95	4.41	0.97
Cronbach's α	*0.69*		*0.67*		*0.83*	
Place Dependence	**3.85**		**3.69**		**3.96**	
I enjoy recreating on these hills more than on any other hill (PD1) या टेकडयांवर इतर कोणत्याही टेकडीच्या तुलनेत मी जास्त उल्हासित होतो	3.97	1.01	4.00	0.92	3.94	1.11
I get more satisfaction out of visiting these hills than from any other hill (PD2) या टेकडयांवर इतर कोणत्याही टेकडीच्या तुलनेत मला सर्वाधिक समाधान मिळते	3.97	1.01	3.93	0.93	4.01	1.10
Recreating here is more important than hiking in any other place (PD3) इतर कुठल्याही ठिकाणी भटकण्यापेक्षा येथे येऊन आनंद मिळवणे माझ्यासाठी जास्त महत्वाचे आहे	3.91	1.15	3.58	1.02	4.29	1.05
I wouldn't substitute any other trail for the type of recreation I do here (PD4) येथे मिळणाऱ्या आनंदाची मी इतर कुठल्याही भटकंतीशी तुलना करू इच्छित नाही	3.57	1.15	3.42	1.08	3.75	1.20
Cronbach's α	*0.79*		*0.77*		*0.81*	

*Items coded on 5-point scales ranging from strongly disagree/ पूर्णपणे असहमत (1) to strongly agree/ पूर्णपणे सहमत (5).

Multigroup CFA was used to test for conceptual invariance across two groups: English and non-English speaking respondents. The multigroup CFA model was fit using Mplus version 4.1 (Muthén & Muthén, 1998-2007). Factor loadings for the items "These hills mean a lot to me", "I enjoy recreating on these hills more than any other place" and "I have a lot of fond memories about these hills" were set to 1 for model identification. The overall fit of the model was determined by examining χ^2 statistics. A significantχ^2 value indicates an inadequate fit. However, since χ^2 statistics are influenced by sample size (Bollen, 1989) other alternative fit indices such as Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR) and the Root Mean Square Error of Approximation (RMSEA) were also used. Good fit was defined as CFI = > 0.95 (Hu & Bentler, 1998), SRMR < 0.08 (Hu & Bentler, 1998) and RMSEA < 0.05 (Browne & Cudeck, 1993).

Results

Socio-demographic and Visitation Characteristics

A total of 419 questionnaires were completed (response rate of 84%). Five surveys were eliminated from the analysis because the respondent was under 16 years (adjusted response rate = 83%). User demographics are presented in Table 1. Overall, respondents ranged in age from 16 years to 93 years, with a mean age of 37 years. The majority (73.4%) of respondents were male. Most respondents (70.2%) were visiting the resource with friends, family, or a combination of both. Median group size consisted of 2 adults. Respondents tended to be very well educated with the majority (69.7%) having a bachelor's degree or higher. About half (52.9%) chose to take the survey in English (N = 219).

Place Attachment

Mean place identity, place dependence and social bonding scores for the overall, English and Marathi samples are presented in Table 2. Results indicated a positive level of place identity, place dependence and social bonding among respondents. Cronbach alpha's indicated an acceptable level of reliability for the overall and English place identity scale (0.70 and 0.75 respectively); however the Marathi place identity reliability was lower at 0.65. Previous research has indicated that reverse-worded items likely limit a scale's cross-cultural measurement equivalence (Wong, Rindfleisch, & Burroughs, 2003). Therefore, the item "I feel no commitment to these hills" was dropped from the place identity scale. Subsequent analysis indicated higher reliability of the overall, English and Marathi place identity scale (α = 0.83, α = 0.83 and α = 0.83 respectively; Table 2). Similar to the place identity factor, the reverse-worded item "I don't tell many people about these hills" was dropped from the social bonding factor to improve scale reliability. Resulting Cronbach alpha's for the overall, English and Marathi social bonding scale were 0.69, 0.67 and 0.83. While Cortina (1993) recommends an alpha above 0.7 for establishing the internal consistency of scales, an alpha of 0.62 for social bond-

[1] A Satorra-Bentler scaled chi-square test was used because MLR estimation was carried out.

Table 3. Goodness of Fit Indices of Models Tested

Model	χ^2	df	CFI**	SRMR**	RMSEA**
Overall	170.05*	32	0.88	0.06	0.10
English	43.87	32	0.98	0.05	0.04
Marathi	189.37*	32	0.76	0.07	0.16

* Significant at $p<0.05$
** Good fit was defined as Comparitive Fit Index ≥ 0.95 (Hu & Bentler, 1998); Standardized Root Mean Residual ≤ 0.08 (Hu & Bentler, 1998) and; Root Mean Square Error ≤ 0.05 (Browne & Cudeck, 1993).

Table 4. Factor Loadings and Standard Errors for the English Data

	Place Identity	**Social Bonding**	**Place Dependence**	**SE**
These hills mean a lot to me (PI1)	1.00		–	0.00
I am very attached to these hills (PI2)	1.30		–	0.15
I identify strongly with these hills (PI3)	1.38		–	0.19
I have a lot of fond memories about these hills (SB1)	–	1.00	–	0.00
I have a special connection to these hills and the people who recreate here (SB2)	–	0.96	–	0.07
I will bring my children to these hills (SB3)	–	0.58	–	0.10
I enjoy recreating on these hills more than on any other hill (PD1)	–		1.00	0.00
I get more satisfaction out of visiting these hills than from any other hill (PD2)	–		1.00	0.09
Recreating here is more important than hiking in any other place (PD3)	–		0.77	0.11
I wouldn't substitute any other hills for the type of recreation I do here (PD4)	–		0.83	0.12

ing was considered sufficiently reliable by Kyle et al. (2005). The three remaining social bonding items were therefore retained. Reliabilities of the overall, English and Marathi place dependence scale indicated sufficient internal consistency (α = 0.79, α = 0.77 and α = 0.81). Data suggest the English and Marathi versions of the place attachment scale are reliable; however, are they comparable? Measurement invariance testing results are presented below.

Measurement Invariance

To assume normality, Kline (1998) suggested cutoff absolute values of 3.0 and 8.0 for skewness and kurtosis respectively. However, West, Finch and Curran (1995) have suggested a stricter standard of 2.0 and 7.0. Univariate skewness ranged from -1.51 to -0.33, and univariate kurtosis ranged from -0.78 to 2.30 for all place identity, social bonding and dependence items except "These hills mean a lot to me" (skewness = -2.50 and kurtosis = 7.12) and "I will bring my children to these hills (kurtosis = 2.8). These two item exhibited skewness and kurtosis based on West et al.'s standards. Data were therefore treated as nonnormal and the model was estimated using a robust maximum likelihood estimator (MLR).

The fit indices of the first order, three factor correlated model are summarized in Table 3. Findings indicate the data do not fit the specified model (χ^2_{32} = 170.05, p <0.05). To further explore this lack of fit, separate CFA's were run for the English and Marathi data. The fit indices indicate good fit for the English data. Factor loadings and standard errors for the English data are presented in Table 4. All salient factor loadings were significant, and the correlations between factors are below one

Fit indices indicate insufficient fit for the Marathi data (Table 3). Upon examination of the modification indices of the Marathi data, the errors of the two items "I enjoy recreating here more than any other place" and "I get more satisfaction out of visiting these hills than from visiting any other place" were allowed to correlate (the correlation value between the two items was 0.76). A Satorra-Bentler[1] scaled chi-square test (Satorra & Bentler, 2001) indicated a significant improvement of fit ($\Delta\chi^2$ = 24; p <0.001).

Discussion and Future Research

This study empirically examined the cross-language equivalence of the place attachment scale frequently used in natural resource people-place investigations. Semantic and normative equivalence were ensured through accepted methodological approaches highlighted in the cross-cultural literature. However, results from the multigroup CFA did not support conceptual invariance between the English and translated version of the place attachment scale. Specifically, the English version of the place attachment scale does not share measurement equivalence with its translated version. Implications of the findings are discussed below.

Comparisons of mean place identity, place dependence and social bonding scores for the English and Marathi speaking groups suggest that the latter have stronger identity and dependence levels, while the former exhibit stronger social bonding levels. However, the data's lack of fit with the specified model indicates that the number of factors and the pattern of salient and non-salient items

across groups are different. This suggests cross-language comparisons of the place attachment scale are inaccurate and provide empirical support for Behling and Law (2000) who note that translation/back translation is not sufficient to ensure equivalence but rather scales need to be subjected to empirical measurement equivalence testing. Researchers involved in cross-cultural and/or cross-language construct comparisons are therefore cautioned against such comparisons unless measurement invariance of the concept(s) under investigation has been established. Ignoring measurement invariance testing could potentially bias findings thereby leading to erroneous conclusions about groups.

A confirmatory factor analysis of English data suggested good fit with the specified model. In particular, the first order three factor correlated model of place attachment was supported. This reinforces the multidimensional nature of place attachment and supports Kyle et al. (2005)'s conceptualization of place attachment consisting of three correlated dimensions—place identity, social bonding and place dependence.

Cronbach's alpha, good fit indices and factor loadings of the English data also suggest reliability and construct validity of the English version of the place attachment scale in an Indian context. A separate study indicated the predictive validity of this scale through an exploration of the relationship between place attachment and pro-environmental behaviors (Budruk, Thomas, & Tyrrell, 2009). Thus, the reliability and validity of the scale indicate its potential usefulness for examining people-place relationships in an Indian context and provide initial support toward establishing the scale as a universal measure of place attachment. The development of universal scales will enhance Eurocentric theoretical frameworks and establish leisure and outdoor recreation as mature academic disciplines beyond U.S. borders.

The insufficient fit of the Marathi data with the specified model suggests the inappropriateness of this translated version of the scale for examining a first order, three factor correlated model of place attachment. This scale is therefore not useful in exploring place attachment among the Marathi speaking population. There could be several explanations for this. First, model fit was significantly improved by allowing the errors of the two place dependence items "I enjoy recreating here more than any other place" and "I get more satisfaction out of visiting these hills than from visiting any other place" to correlate. It is possible that in the translated version, these two items were tapping into a single perception of satisfaction (hence the high correlations between the items). These findings suggest that additional items describing place dependence in the translated version should be explored. Second, cross-cultural psychologists note that emic constructs are often associated with etic constructs (Pike, 1967). For example, personal space is an etic concept; however, the appropriate distance to be maintained between people varies from culture to culture. It is therefore possible that other place attachment dimensions specific to the Marathi speaking population are not being tapped in the translated version. Potential emic dimensions may be explored by increasing collaboration among scholars from different disciplines and integrating qualitative and quantitative research methods (Ægisdóttir et al., 2008). Qualitative methods such as focus groups may be especially useful in determining emic dimensions of an etic construct (Knight et al., 2008). For example, focus group meetings may

be conducted in the language of interest with the specific purpose of determining the meaning of places among participants. Emergent themes may then be used to develop items to measure that particular construct. For a detailed explanation of focus group methodology, see Krueger and Casey (2000).

The utility of multigroup CFA as a statistical tool to examine measurement invariance between two language versions of a scale is highlighted here. A review of the leisure, outdoor recreation and tourism literatures indicates only one study (Sirikaya-Turk et al., 2008) that has utilized this statistical technique in a cross-language investigation. Others have either assumed equivalence (e.g. Chavez et al., 1995) or relied on semantic and normative equivalence as well as scale reliabilities to establish equivalence (e.g. Schneider & Backman, 1996). Empirically establishing measurement invariance is a step toward developing theoretically and methodologically sound frameworks that are relevant across all groups; thereby heeding to Floyd's (1998) and McAvoy et al's. (1999) call for research and academic communities to move toward more culturally sensitive and inclusive forms of methodologies and strategies.

Other causes of measurement invariance highlighted in cross-cultural literature provide useful suggestions for future studies. McGorry (2000) discussed the effect of regional language differences on cross-cultural research. While such regional variations exist among Indian languages, differences in meaning attributed to such variations may be controlled for by using back-translations in combination with other methods as described by Beck et al. (2003). Excluding reverse-coded items improved the reliability of the Marathi place identity and social bonding factors in the current study. Concerns about using reverse- or mixed-worded items in cross-cultural research have been noted (Wong et al., 2003) and such items should be avoided in future studies. Other measurement invariance explanations include ethnocentricism (Schneider, Lankford, & Oguchi, 1997). In other words, although cross-cultural studies focus on other cultures and languages, a majority of these studies are conducted in English. Future cross-cultural leisure researchers may consider conducting such studies in languages other than English, thus providing a wider perspective of leisure behaviors and preferences. Finally, Hui and Triandis (1985) as well as Beck et al. (2003) have noted literal versus connotative translation related issues that cross-cultural researchers need to be aware of.

Marathi was chosen due to the author's ability as a bilingual researcher, and while findings are directly relevant for place attachment studies in India, implications of this study extend beyond India. As noted by Valentine et al. (1999), "a majority of leisure scholars and leisurely institutions are located in the United States, Western Europe, and Great Britain" (p. 241). As a result much of the scholarly work in this area is tied to English speaking western traditions. Studies such as the current one provide the international perspective that scholars in leisure sciences have been encouraged to pursue (Valentine et al.). Additionally, according to the U.S. Census report (2000), 18 percent of the US population aged 5 and over reported they spoke a language other than English at home. These figures were up from 14 and 11 percent respectively from 1990 and 1980. As the number of Spanish and other non-English language speakers in the U.S. grow, leisure providers and researchers will increasingly need to translate measures into lan-

guages other than English in order to solicit public involvement from these groups (Struglia & Winter, 2002). Similarly, rising international tourist arrivals indicate a need to understand leisure among heterogeneous groups. Finally, since leisure extends beyond cultural and geographical boundaries (Valentine et al.), ensuring cross-language equivalency of leisure research scales is both timely and of utmost importance.

Conclusions

Given the increased interest in and need for reaching out to non-English speaking respondents in leisure research, there is a critical need to address methodological challenges relevant to this topic. In particular, we need to be more precise in the design of instruments for cross-cultural/cross-language comparisons. Merely translating an instrument is an insufficient approach. Rather, empirically establishing measurement invariance between English and translated versions of a measure is necessary. This is especially important as a lack of equivalence can threaten the validity of a study, limit the comparability of multi-lingual versions of a measure and ultimately lead to biased results.

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References

Ægisdóttir, S., Gerstein, L. H., & Çinarbas, D.C. (2008). Methodological issues in cross-cultural counseling research: Equivalence, bias and translations. *The Counseling Psychologist*, *36*, 188-219.

Altman, I., & Low, S. (1992). Place attachment: A conceptual inquiry. In Altman, I. & Low, S. M. (Eds.), *Place attachment*, New York, NY: Plenum Press.

Baas, J. M. (1993). Assessing ethnic group participation in federal land management agency public involvement process. In A. W. Ewert, D. J. Chavez, and A. W. Magill (Eds.), *Culture, conflict, and communication in the wildland-urban interface.* Westview Press, Boulder, CO.

Beck, C. T., Bernal, H., & Froman, R. D. (2003). Methods to document semantic equivalence of a translated scale. *Research in Nursing and Health*, 26, 64-73.

Behling, O., & Law, K. S. (2000). *Translating questionnaires and other research instruments: Problems and Solutions*. Sage University Papers series on Quantitative Applications in the Social Sciences, 07-131. Thousand Oaks, CA: Sage.

Bollen, K. A. (1989). *Structural equations with latent variables*. New York, John Wiley and Sons.

Bricker, K.S., & Kerstetter, D. (2000). Level of specialization and place attachment: An exploratory study of whitewater recreationists. *Leisure Sciences*, *11,* 233-257.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In Bollen, K. A. Long, J. S. (Eds.), *Testing structural equation models*. Newbury Park: Sage Publications.

Budruk, M., Thomas, H., & Tyrrell, T. (2009). Urban green spaces: Place attachment and environmental attitudes in India. *Society and Natural Resource, 22*, 824-839.

Byrne, B. M., & Campbell, T. L. (1999). Cross-Cultural comparisons and the presumption of equivalent measurement and theoretical structure: A look beneath the surface. *Journal of Cross-Cultural Psychology, 30*(5), 555 – 574.

Cafri, G., Thompson, J. K., Roehrig, M., Rojas, A., Sperry, S., Jacobsen, P.B., & Hillhouse, J. (2008). Appearance motives to tan and not to tan: Evidence for validity and reliability of a new scale. *Annals of Behavioral Medicine, 35,* 209-220.

Chavez, D., Larson, & Winter, P. (1995). To be or not to be a park. *Proceedings of the second symposium on Social Aspects and Recreation Research. USDA PSW-GTR-156*

Cheung, G. W., & Rensvold, R. B. (1999). Testing factorial invariance across groups: A reconceptualization and proposed new method. *Journal of Management, 25*(1), 1-27.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating Goodness-of-Fit Indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(2), 233 – 255.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, *78*(1), 98-104.

Daigle, J.J., Hannon, J., Stacey, C. (2003). Factors Influencing Experience Quality: Comparing user groups and place attachment at the St. Croix International waterway. USDA Forest Service Proceedings RMRS-P-27.

Dimanche, F. (1994). Cross-cultural tourism marketing research: An assessment and recommendations for future studies. *Journal of International Consumer Marketing, 6*(3/4). 123-134.

Floyd, M. (1998). Getting beyond marginality and ethnicity: The challenge for race and ethnic studies in leisure research. *Journal of leisure research, 30*(1), 3 -22.

Garcia-Preto, N. (1996). Latino families: An overview. In M. McGoldrick, J. Giordano, & J. K. Pearce (Eds.), *Ethnicity and family therapy* (2nd ed.). New York: Guilford.

Gramman, J. H. & Allison, M. T. (1999). Ethnicity, Race and Leisure. *Leisure studies: Prospects for the twenty-first century,* 283-297.

Heywood, (1993). Behavioral conventions in high density, day use wildland/urban recreation settings: A preliminary case study. *Journal of Leisure Research, 25*(1), 39-52.

Hu, L.-T. & Bentler, P. M.(1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification, *Psychological methods*, *3*(4), 424-453.

Hui, C. H. & Triandis, H. C. (1985). Measurement in cross-cultural psychology: A review and comparison of strategies. *Journal of Cross-Cultural Psychology,16*, 131-152.

Jöreskog, K., & Sörbom, D. (1993). *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language.* Scientific Software International, Chicago.

Jorgensen, B. S., & Stedman, R. C. (2001). Sense of place as an attitude: Lakeshore owners attitudes towards their properties. *Journal of Environmental Psychology, 21*(3), 233-248.

Kline, R. B. (1998). *Principles and practice of structural equation modeling*. New York:

Kozak, M., Bigne, E., & Andreau, L. (2003). Limitations of cross-cultural customer satisfaction research and recommending alternative methods. *Journal of Quality Assurance in Hospitality and Tourism, 4*(3/4), 37-59.

Krueger, R. A., & Casey, M. A. (2000). *Focus groups: A practical guide for applied research* (Third ed.). Sage Publications.

Kyle, G., Absher, J., & Graefe, A. (2003). The moderating role of place attachment on the relationship between attitudes toward fees and spending preferences. *Leisure Sciences*, *25,* 33-50.

Kyle, G., Graefe, A., Manning, R., & Bacon, J. (2004). Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *Journal of Environmental Psychology*, *24,* 213-225.

Kyle, G., Graefe, A., Manning, R (2005). Exploring the dimensionality of place attachment in recreational setting. *Environment and Behavior*, *37* (2), 153-177.

Knight, G. P., Roosa, M. W., & Umaña-Taylor, A. J. (2008). *Research methods for studying ethnically diverse and economically disadvantaged populations* (in preparation). Under contract with APA Books.

Krueger, R. A. & Casey, M. A. (2000). *Focus groups. A practical guide for applied research.* 3rd edition. Thousand Oaks, CA: Sage Publications.

Marshall, G. N. (2004). Posttraumatic stress disorder symptom checklist: Factor structure and English-Spanish measurement invariance. *Journal of Traumatic Stress, 17*(3), 223-230.

McAvoy, L., Winter, P. L. Outley, C. W., McDonald, D., & Chavez, D. (2000). Conducting research with communities of color. *Society of Natural Resources, 13,* 479-488.

McGorry, S. K. (2000). Measurement in a cross-cultural environment: Survey translation issues. *Qualitative Market Research: An International Journal, 3*(2), 74-81.

Mesch, G. S. & Manor, O. (1998). Social ties, environmental perception, and local attachment. *Environment and Behavior, 30*(4), 504-519.

Moore, R. L., & Graefe, A. R. (1994). Attachment to recreation settings: The case of trail users. *Leisure Sciences, 16,* 17-31.

Moore, R. L. & Scott, D. (2003). Place attachment and context: Comparing a park and a trail within. *Forest Science, 49* (6), 877-884.

Muthén, L. K. & Muthén, B. O. (1998-2007). Mplus User's Guide. Fourth Edition. Los Angeles, CA.

Nunnally, J. (1967). *Psychometric Theory*. New York: McGraw-Hill.

Pike, K. L. (1967). *Language in relation to a unified theory of the structure of human behavior.* The Hague and Paris, Mouton & Co.

Proshansky, H. M. (1978).The city and self-identity. *Environment and Behavior*, 10(2), 147-169.

Proshansky, H. M., Fabian, A.K., & Kaminoff, R. (1983). Place identity: Physical world socialization of the self. *Journal of Environmental Psychology, 3*(1), 57

Russell, R. (2002). *Pastimes: The context of contemporary leisure*. Sagamore Publishing.

Satorra, A. I., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika, 66*(4), 507-514.

Schneider, I. E., & Backman, S. J. (1996). Cross-cultural equivalence of festival motivations: A study in Jordan. *Festival Management and Event Tourism 4,* 139-144.

Schneider, I.E., Lankford, S., & Oguchi, T. (1997). The cross-cultural equivalence of the TIAS: Summary results. *Annals of Tourism Research, 24*(4), 994-998.

Schreyer, R., Jacob,G., & White, R. (1981). Environmental meaning as a determinant of spatial behavior in recreation. *In Proceedings of the applied geography conferences Vol 4.* Binghampton, NY: SUNY Binghampton.

Shaw, S. M. (2000). If our research is relavent, why is nobody listening? *Journal of Leisure Research, 32*(1), 147-151.

Sirikaya-Turk, E., Ekinci, Y., & Kaya, G. (2008). An examination of the validity of the SUS-TAS in cross-cultures. *Journal of Travel Research, 46,* 414-421.

Steenkamp, J. –B. E. M., & Baumgartner, H. (1998). Assessing measurement invariance in cross-national consumer research. *Journal of Consumer Research, 25*(1), 78- 90.

Steinmetz, H., Schmidt, P., Tina-booh, A., Wieczorek, S., & Schwartz, S. H. (2008). Testing measurement invariance using multigroup CFA: differences between educational groups in human values measurement. Quality and Quantity.

Struglia, R. & Winter, P. L. (2002). The role of population projections in environmental management. *Environmental Management, 30*(1), 13-23.

Stokols D. & Shumaker, S.A. (1981). *People and places: a transactional view of settings*. In: Harvey, J. (Ed) Cognition, Social Behavior and the Environment, pp. 441-488 Hillsdale, NJ: Erlbaum.

Triandis, C., & Martin, F. (1983). Etic plus emic versus pseudoetic: A test of a basic assumption of contemporary cross-cultural psychology. *Journal of Cross-cultural Psychology, 14*(4), 489.

U.S. Census Bureau (2000). Census 2000 Summary File (SF1). United States Census Bureau, Washington DC.

Valentine, K., Allison, M. T., & Schneider, I. (1999). The one-way mirror of leisure research: A need for cross-national social science perspectives. *Leisure Sciences, 21*, 214-246.

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods, 3*(1), 4-70.

Vaske, J., & Kobrin, (2001). Place attachment and environmentally responsible behavior. *The Journal of Environmental Education, 32*(4), 16-21.

Warzecha, C. A., & Lime, D. W. (2001). Place attachment in Canyonlands National Park: Visitors' assessment of setting attributes on the Colorado and Green Rivers. *Journal of Park and Recreation Administration,* 19, 59-78.

West, S. G., Finch, J. F., & Curran, P. J. (1995). *Structural equation models with nonnormal variables: problems and remedies*. In Hoyle, R.H. (ed.) Structural equation modeling: Concepts, issues, and applications. Thousand Oaks, CA, US: Sage, (56-75).

Williams, D. R., & Patterson, M. E., (1999). *Environmental psychology: Mapping landscape meanings for ecosystem management.* In H. K. Cordell and J. C. Bergstrom (Eds.), Integrating social sciences and ecosystem management: Human dimensions in assessment, policy and management (pp. 141-160). Champaign, IL: Sagamore Press.

Williams, D. R., Patterson, M. E., Roggenbuck, J. R., & Watson, A. E. (1992). The variability of user-based social impact standards for wilderness management. *Forest Science, 14*, 29-46.

Williams, D. R., & Roggenbuck, J. R. (1989). Measuring place attachment: Some preliminary results. Paper presented at the Session on Outdoor Planning and Management NRPA Symposium on Leisure Research. San Antonio, TX 20-22 October 1989.

Wong, N., Rindfleisch, A., & Burroughs, J. E. (2003). Do reverse-worded items confound measures in cross-cultural consumer research? The case of the Material Values Scale. Journal of Consumer Research, Inc. 30, 72 – 91.

World Tourism Organization (WTO) (2000). Long-term prospects: tourism 2020 vision. Accessed from, http://www.world-tourism.org/facts/2020.html accessed on December, 20th, 2008.