



The relations between natural and civic place attachment and pro-environmental behavior

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ABSTRACT

The relation between place attachment and pro-environmental behavior is unclear. Studies have reported that place attachment is associated both with more and less pro-environmental behavior. To help clarify this, we distinguished two dimensions of place attachment: civic and natural, and explored their respective influences on pro-environmental behavior. A community sample of residents ($N = 104$) from two proximate towns with different environmental reputations reported the strength of their civic and natural place attachment, their performance of various pro-environmental behaviors, and a number of sociodemographic characteristics. Regression analyses revealed that natural, but not civic place attachment predicted pro-environmental behavior when controlling for the town, length of residence, gender, education and age. This demonstrates that research and theory on place attachment should consider its civic and natural dimensions independently.

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The world faces an environmental emergency. The Intergovernmental Panel on Climate Change's (IPCC, 2007) recent report on global warming warns that if we do not drastically reduce carbon dioxide emissions, parts of the world will soon experience water shortages, while others will encounter floods, starvation, and the continued loss of habitats. Pollution from human activities has already poisoned rivers, reduced air quality, and driven away entire species. Although environmental concern has increased over the past several decades, environmental action has not (e.g., Finger, 1994). Thus, one key question is how to encourage *pro-environmental behaviors* among individuals, including actions that are intended to minimize environmental harm, or improve environmental conditions, such as reducing home energy use, composting, or engaging in more sustainable forms of transportation.

The study of place attachment, the bonding that occurs between individuals and their meaningful environments (e.g., Giuliani, 2003; Low & Altman, 1992), may contribute to the understanding of this problem. Place attachment is a multidimensional concept with person, psychological process, and place dimensions (Scannell & Gifford, 2010). The person dimension delineates *who* is attached, and whether the attachment is based on individually or collectively held meanings. The psychological process dimension describes the affective, cognitive, and behavioral manifestations of the attachment. Typically, individuals who are highly attached to their place

refer to it with positive emotions such as pride and love, often incorporate the place into self-schemas, and express their attachment through proximity-maintaining behaviors. The place dimension includes varying aspects of place including spatial level, degree of specificity, and social or physical features of the place.

Surely, one's connections to a place (or lack thereof) influence one's willingness to protect it. Ecopsychologists assert that a disconnect from nature is an important cause of pro-environmental inaction, and that regaining a sense of connectedness should realign our values toward pro-environmental stewardship (e.g., Lovelock & Sydney, 1975; Reser, 1995; Roszak, 1992). Others have also speculated that feelings of attachment and connectedness to a place should result in greater efforts to protect it (e.g., Sobel, 2003). However, the empirical evidence surrounding this topic is far from definitive.

Place attachment has been linked to environmental perception, concern, and activism (e.g., Bonaiuto, Breakwell, & Cano, 1996; Vorkinn & Riese, 2001). However, whether person-place bonds are associated with more (Vaske & Kobrin, 2001) or less (Uzzell, Pol, & Badenas, 2002) frequent pro-environmental behavior remains unclear. One reason for this may lie in definitional inconsistencies and differing interpretations of place attachment and related concepts. Furthermore, place attachment is multidimensional, and these dimensions can vary in salience across individuals and places (Hidalgo & Hernández, 2001; Low & Altman, 1992; Scannell & Gifford, 2010). For example, the physical qualities of a place may form the basis of the attachment, such as an attachment to a place with a climate similar to places of one's childhood (Knez, 2005).

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Attachment is also rooted in the social aspects of a place, such as the positive interpersonal relations that occur within it. Thus, a consideration of place attachment as a multidimensional construct may help to clarify its relations to pro-environmental behavior.

1. Place attachment

As mentioned, place attachment has person, process, and place dimensions (Scannell & Gifford, 2010). Within the place dimension of place attachment, the emphasis may be on social characteristics, physical characteristics, or both. Much of the research on place attachment (and related concepts) has focused on its social aspects (e.g., Fried, 1963; Lalli, 1992; Twigger-Ross & Uzzell, 1996; Woldoff, 2002). Some of this research emphasizes the place as an arena for social interactions. Fried's (1963) classic study of neighborhood attachment showed that despite the poor physical conditions of the area, the residents were strongly attached to it because it afforded social interactions with others. Place attachment can also be social when the place comes to symbolize one's social group. According to Lalli (1992), spatial bonds become important because they symbolize social bonds. *Civic place attachment* is an instance of group-symbolic place attachment that occurs at the city level (e.g., Hidalgo & Hernández, 2001; Vorkinn & Riese, 2001).

Place attachment can also obviously rest on the physical features of the place (Stokols & Shumaker, 1981). The types of places that individuals find meaningful include a broad range of physical settings, from built environments such as houses, streets, certain buildings, and non-residential indoor settings, to natural environments such as lakes, parks, trails, forests, and mountains (Manzo, 2005). Thus, *natural place attachment* is a type of physical attachment directed toward the natural aspects of a place. A related concept, environmental identity (Clayton, 2003), refers to the inclusion of nature into one's self-concept. Clayton notes that self-definitions aligned with parts of the natural world may stem from a general attachment to nature. Again, this emphasizes that place attachment may be directed toward the physical aspects of the place – in this case, nature.

Other authors have described a combined physical-social place attachment (e.g., Mazumdar & Mazumdar, 2004; Mesch & Manor, 1998; Uzzell et al., 2002). Hidalgo and Hernández (2001) showed that the strength of the attachment varies according to spatial level. Socially-based place attachment was stronger than the physically-based place attachment for the home and neighborhood levels, but physically-based place attachment was stronger at the city level.

Both the social and physical types of place attachment were incorporated into the current study. The social aspects were represented by civic attachment in which place symbolizes one's group (e.g., Bonaiuto et al., 1996). The physical aspects were represented by the natural aspects of a place, given that a sense of connectedness to the natural aspects of a place may be more relevant to pro-environmental behavior (i.e., because hazards that threaten the quality of the natural environment may also threaten one's attachment). Measuring both types of attachment should be useful because whether they relate to pro-environmental behavior in the same way or not can be determined, which may account for the conflicting findings in the literature.

2. Place attachment and pro-environmental behaviors

Although one's connections to a place may influence pro-environmental behavior, the dearth of evidence on this topic means that definitive conclusions are difficult to draw. Furthermore, relevant studies typically have measured behavioral

intention, such as willingness to fight a hypothetical threat, rather than actual or reported behavior. In one study, for instance, more attachment was associated with a greater willingness to advocate hypothetical place-protective behaviors (Stedman, 2002). Similarly, residents who were particularly attached to their community expressed more opposition to a proposed freeway (Nordenstam, 1994).

However, what is known about the relation between place attachment and *actual* pro-environmental behavior? In support of a connection, Vaske and Kobrin (2001) found that those with a greater sense of emotional place attachment reported engaging in more pro-environmental behaviors. Similarly, Clayton (2003) showed that individuals who strongly identified with the natural environment ("environmental identity") reported significantly more ecological behaviors than those low in environmental identity, even when attitudes, values, and ideologies were held constant.

Others suggest that attachment could be associated with fewer pro-environmental behaviors. In one study, this was investigated in two neighborhoods of differing environmental quality (Uzzell et al., 2002). Residents in the environmentally superior neighborhood reported more place identity, but not more pro-environmental behavior. In fact, place identity was weakly, and negatively related to pro-environmental behavior, because presumably these residents saw no need to enhance the already pristine environmental quality of their neighborhood, and because other issues such as safety were of greater concern to the community. Residents in the lower quality neighborhood similarly reported low levels of pro-environmental behavior, but were less attached overall. Despite this, attachment was positively associated with pro-environmental behavior. Uzzell et al. explained that if individuals would strongly identify with a poor-quality environment, they may be more likely to protect it, but in general, attachment does not predict pro-environmental behavior because individuals tend to identify with environments of good quality.

One possibility for these discrepant findings is that the object of the attachment differed; attachment to nature (e.g., in Clayton's study) and attachment to one's community (e.g., in Uzzell et al.'s study) may have different relations to pro-environmental behavior. Hence the relation between (a clearly defined) place attachment and actual behavior requires further investigation.

3. Effects of a multidimensional place attachment

Most researchers agree that place attachment is a multidimensional concept (e.g., Hidalgo & Hernández, 2001; Low & Altman, 1992; Scannell & Gifford, 2010). Yet of the studies that have examined place attachment's relation to other concepts, few have incorporated its multidimensionality into their operational definitions, or tested the effects of its different dimensions separately. This is important because effects may differ depending on the type or level of the attachment (Kyle, Graefe, Manning, & Bacon, 2004; Stedman, 2002; Vorkinn & Riese, 2001). For example, place identity and place dependence exerted opposite effects on attitudes toward social and environmental conditions along the Appalachian Trail (Kyle et al., 2004). Participants with a greater sense of place identity were more opposed to problems along the trail (such as crowding, litter, or noise) but those with a greater sense of place dependence viewed these problems to be less important.

In another study, Norwegian residents who were strongly attached to specific areas of a municipality expressed more opposition to a proposed hydropower plant development, but those who were especially attached to the municipality as a whole were in favor of the development (Vorkinn & Riese, 2001). This supports the view that a simple measure of place attachment does not always

accurately predict attitudes or willingness to oppose threats, and that the type of the attachment must be considered. Vorkinn and Riese's (2001) results illustrate that place meaning can create opposite effects on behavioral intention. The prospect of a hydro-power plant may have seemed to offer stability for the municipality, but for others, it may have seemed to threaten the quality of the natural areas. If so, the hydropower plant would only be considered threatening for those who are attached to the natural areas.

4. Objectives

The present study investigates the relation between place attachment and self-reported pro-environmental behavior in one's local area. This goal was formulated to address two main gaps that emerged from the above literature review. First, several studies have examined the effects of place attachment on the intention to protect one's area from hypothetical threats, but few have examined actual (or self-reported actual) behaviors. Second, the various dimensions of place attachment do not necessarily exert uniform effects. Therefore, to best understand the relation between place attachment and pro-environmental behavior, the multidimensionality of place attachment should be considered. This study distinguishes between two types of place attachment (natural and social/civic) with potentially opposite effects on pro-environmental behavior.

Therefore, this study re-examines and clarifies the relation between place attachment and reported pro-environmental behavior. This is important for understanding how connections to place translate to behaviors with consequences for sustainability.

5. Hypotheses

5.1. Hypothesis 1

Residents with greater levels of attachment to the natural aspects of their local area will be more likely to engage in pro-environmental behaviors than those with less natural place attachment.

5.2. Hypothesis 2

Residents with greater levels of attachment to the social-symbolic (civic) elements of the place will not engage in more or less pro-environmental behaviors than those with less civic place attachment.

6. Method

6.1. Study context

Data were collected in two proximate towns, Trail and Nelson, located in south eastern British Columbia, Canada. Although they are similar in climate and population (Trail: 7237; Nelson: 9258; Statistics Canada, 2006a, 2006b), they possess quite different cultural and economic profiles.

To explore whether civic- and natural-based attachment have different effects on ecological behavior, we needed to measure attachment to a city whose goals are not primarily environmental. For this reason, Trail was selected as one location for data collection. Its motto is "The Home of Champions: Industry, Sports, and Lifestyle", and the city aims to project a reputation of "friendliness and civic pride" (BC Travel Website, 2007). The city has fared quite well economically over the past several decades and this success is anticipated to continue (Trail EDC, 2007). Nevertheless, Trail's environmental reputation is poor. For example, the Lonely Planet travel guide has described Trail as "possibly the most toxic place

you'll find in BC," (p. 64, Fanselow & Miller, 2001) because of its centrally located lead/zinc smelter and history of environmental problems. Potentially, attachment to Trail as a town and attachment to its natural aspects may diverge among residents.

On the other hand, Nelson is famed for its pristine location, and its appeal to those seeking alternative lifestyles, which in part, was influenced by the influx of US draft-dodgers during the Vietnam War. Nelson was named the best of 100 small arts towns in North America (Villani, 1996), and has more heritage buildings per capita than any other city in BC (Nelson Community Website, 2007). The local economy relies on tourism and outdoor recreation as its main sources of revenue. Environmental activists and organizations are commonplace and these concerns are reflected in the mission statement of the Nelson and District Chamber of Commerce that includes the goal of "development which recognizes the heritage and environmental values of our Community" (Nelson & District Chamber of Commerce, 2007). Because of this, attachment to Nelson as a town, and attachment to the natural aspects of Nelson are likely to be more congruent among residents, and thus, should not differentially predict pro-environmental behavior.

6.2. Participants

Data were collected in July, 2007 through intercept interviews, in which individuals were approached and asked if they would be interested in completing a short questionnaire. To obtain as broad a range of participants as possible, recruitment was done at a variety of settings and on different days. Participants were approached during the hours of 8:00 am and 8:00 pm, although the time of survey completion varied given that some participants took the survey home and returned it the following day. The location of data collection included public spaces such as parks, grocery stores, beaches, libraries and bus stops, as well as work places. These types of locations were selected because they were present in both towns, and thus data collection in the two cities could be made more standardized. In addition, recruitment in public areas was thought to be less intrusive than door-to-door visits. Residents in both towns were quite willing to participate, and the response rate was approximately 80% in both places. In total, 105 residents participated (53 in Trail, and 52 in Nelson).

All participants (30 males, 72 females) were current residents of Trail or Nelson. The number of years that participants had lived in Trail ranged from .50 to 59.00 ($M = 26.83$, $SD = 16.54$), and from 1.00 to 50.00 ($M = 19.60$, $SD = 13.56$) in Nelson. Although convenience sampling was employed, the characteristics of participants were similar to that of Nelson and Trail residents, as reported in the 2006 census. The representation of various occupations and education levels reflects that of the towns, although Trailites who work in the trades were slightly underrepresented, and their education levels were slightly overrepresented, compared to actual population values (Statistics Canada, 2006b). Age was also fairly representative (Statistics Canada, 2006b). In accordance with Human Research Ethics criteria, all participants were above the age of 18, and so ages ranged from 20 to 71 years ($M = 42.63$, $SD = 13.04$).

7. Measures

7.1. Place attachment

A number of scales have been created to measure place attachment and related concepts. Items from several place attachment scales were selected and adapted to meet local conditions and were based on the following criteria: (1) they were relevant to civic or natural attachment or easily written as such, and (2) they represented a variety of conceptualizations of place attachment (i.e.,

Billig, Kohn, & Levav, 2006; Brown & Perkins, 1992; Hidalgo & Hernández, 2001; Jorgensen & Stedman, 2001, Knez, 2005; Twigger, 1992; Williams & Vaske, 2003).

These items were each transformed into two questions – one to reflect attachment to the natural, and the other to reflect attachment to the civic, elements of the place. For example, the item, “This place is very special to me” (Williams & Vaske, 2003) was used to create two items: “The natural landscape of Trail is very special to me,” and, “The municipality of Trail is very special to me.” That is, the essence of the items did not change, but they were framed in civic or natural terms. The resulting scale was comprised of 10 civic and 10 natural attachment questions. Two versions of the scale were created so that items could be presented in different orders.

7.2. Demographics

Previous research has identified several demographic influences on place attachment, including gender (e.g., Hidalgo & Hernández, 2001; Mesch & Manor, 1998), age (Pretty, Chipuer, & Bramston, 2003), length of residence (Hay, 1998; Knez, 2005), and the number of years of education (pre- and post-age 18) (Mesch & Manor, 1998). Thus, these variables were included not only to assess the representativeness of the sample, but also to serve as covariates in the regression analysis. Occupation was also reported, but it was not included in the regression, given its categorical nature and its presumed lack of relevance to place attachment.

7.3. General ecological behavior scale

The general ecological behavior scale (GEB; Kaiser, 1998; Kaiser & Wilson, 2000) assesses 51 ecological behaviors in seven domains: garbage removal, water and power conservation, ecologically aware consumer behavior, garbage inhibition, volunteering in nature-protection activities, ecological automobile use and, finally, non-environmental prosocial behavior, included because environmental behavior is thought to reflect a larger category of prosocial behavior. Response options range from 1, “strongly disagree,” to 5, “strongly agree.”

The GEB has demonstrated acceptable reliability, internal consistency, and validity. For example, it correlates with action-related attitudes (e.g., willingness to perform easy and difficult pro-environmental behaviors), and other less-subjective ecological behaviors (e.g., number of kilometers driven in a year). As well, it has known group validity (e.g., an ecological versus non-ecological transport organization).

7.4. Procedure

Participants were informed, very generally, that the purpose of the research was to examine how feelings of local attachment are related to perceptions and behaviors. They then completed the GEB and the place attachment scale; the order of these scales was counterbalanced such that the possible orders were randomly presented to each participant. The survey required approximately 20 minutes. Upon completion, participants were debriefed about the study's rationale, expected findings, and purposes. As compensation for their time, participants were given the opportunity to enter a lottery draw for one of three \$50 prizes.

8. Results

8.1. Pilot testing of the place attachment scale

A pilot study was conducted to assess the reliability of the place attachment scale. Thirty-seven undergraduate students

participated. The natural attachment subscale presented an alpha of .79 for its ten items, and the civic attachment subscale presented an alpha of .78 for its ten items. Although these alphas are acceptable, the corrected item–total correlation values suggested that certain items did not correlate well with each subscale's total score; items with correlations of less than .3 were of concern (Field, 2005), and were dropped.

8.2. Data screening

Prior to the main analyses, data were screened for accuracy (i.e., recording errors, or inappropriate values) and missing values. Inspection revealed that 4.37% of the data were missing. Bonferroni-corrected independent *t*-tests showed that missing data did not differ in terms of respondents' city, age, years spent in local area, or the order of questions presented.

Of the 105 participants, one Nelson participant was missing more than 25% of their data, and so was dropped. Missing values for the rest of the participants were imputed using an expectation maximization (EM) approach, which is thought to be less biased than mean replacement or regression methods of imputation (Tabachnick & Fidell, 2007). In addition, EM is considered appropriate if data are missing completely at random. A non-significant Little MCAR's test showed that this latter assumption was valid, $\chi^2(34) = 34.66, p = .44$.

8.3. Reliabilities of the GEB

The scale of General Ecological Behavior (GEB) was found to be highly reliable ($\alpha = .86$). However, given participants' comments that some of its items were confusing or irrelevant to the local context, it became clear that using all of its items would be inappropriate. Three raters who had not participated in the main study, but who were residents of Nelson or Trail, evaluated the relevance of each item to their city on a scale that ranged from 1 “Not at all relevant,” to 3 “Very relevant.” Thirteen items had means of 2.00 or less, and so were considered to be less relevant to the local area than the other items on the GEB, for instance, “I wash dirty clothes without pre-washing.” These 13 items were dropped. The non-environmental, prosocial items were also excluded in the final GEB index. After these adjustments were made, the internal consistency of the remaining 30 items improved slightly ($\alpha = .89$). Descriptive statistics for the total sample and for each city are presented in Table 1, and correlations are presented in Table 2.

8.4. Exploring the structure of place attachment scale: exploratory factor analysis

As discussed, this study proposes and examines the natural and social/civic dimensions of place attachment. To investigate whether this natural-civic structure would emerge within the present set of variables, an exploratory factor analysis with an Oblimin rotation was conducted. Factors were assumed to be oblique because the social-symbolic and physical-natural aspects of attachment to one's city conceivably are related. For instance, one who is attached to British Columbia may feel that he or she is “British Columbian,” and that the province represents a social category to which he or she belongs (social-symbolic attachment). Or, one may be attached to the physical characteristics of British Columbia, and feel connected to the natural attributes of the province, such as the landscape (physical-natural attachment). Furthermore, those who are more attached to the place as a social symbol may also be more attached to the natural elements of the place. This notion was supported by the EFA solution; the factor correlation matrix in the

Table 1

Means and standard deviations for place attachment, general ecological behavior, age, and length of residence.

Variable	Nelson					Trail				
	N	Min	Max	Mean	SD	N	Min	Max	Mean	SD
Natural place attachment	51	2.33	5.00	4.41	.59	51	1.50	5.00	4.01	.90
Civic place attachment	48	1.55	5.00	3.88	.58	52	1.21	5.00	3.54	.98
General ecological behavior	40	2.80	4.33	3.55	.44	43	2.17	4.30	3.30	.45
Age	50	20.00	71.00	41.40	13.50	51	20.00	71.00	43.84	12.58
Length of residence	50	1.00	50.00	19.60	13.56	52	.50	59.00	26.83	16.54

final solution showed that the two components were correlated, $r = .51, p < .01$.

8.5. Exploring the number of factors

A preliminary scree test showed three factors above the point of inflexion. However, items with high-cross loadings were dropped, and the 11 remaining variables were re-factored. The subsequent scree plot clearly displayed two factors above the point of inflexion. Upon further examination, this two factor solution proved to be a good representation of the variables. The two factors explained approximately 65% of the total variance (see Table 3). In addition, all communalities were greater than .45 (see Table 4). The final pattern matrix shows the loadings of each item onto each factor (see Table 5). As expected, items were consistent with the civic and natural content of each factor. The loading for “city pride” on Factor 1, for example, was .83, which shows that this item is strongly related to the civic place attachment factor. The variable for “special natural areas” loaded strongly on Factor 2. Next, natural and civic factor scores were computed using the regression method, which is thought to be most appropriate when the factors are correlated (Field, 2005). These scores were saved for further hypothesis testing, including analyses involving correlation and regression.

Finally, the internal consistency of the items within the natural and civic subscales derived from the factor analysis was examined. The alpha for the items in the natural place attachment factor was .84, and the alpha for the items in the civic place attachment factor was .94.

8.6. Descriptives

8.6.1. Place attachment

A composite index, whereby items within each of the final factor solutions were averaged, was used to create natural and civic place attachment scores to derive means and standard deviations. Participants in both places expressed strong attachment to their cities (Table 1). Natural attachment was stronger ($M = 4.23, SD = .77$) than civic attachment ($M = 3.71, SD = .92$). A paired-

samples *t*-test showed that this difference was significant, $t(99) = 6.10, p < .001$. Also, natural attachment was significantly stronger in Nelson ($M = 4.40, SD = .60$) than in Trail ($M = 4.01, SD = .89$), $t(102) = 2.70, p = .008$. Civic attachment scores were also slightly stronger in Nelson ($M = 3.88, SD = .86$) than in Trail ($M = 3.54, SD = .97$), but these means were not significantly different. In sum, civic place attachment was similar in the two towns, but natural place attachment was stronger in Nelson.

8.6.2. General ecological behavior

Reversed items were re-coded, and scores on the 30 items of the GEB were averaged to create a total score for pro-environmental behavior. Self-reported environmental behavior was significantly greater in Nelson ($M = 3.46, SD = .42$) than in Trail ($M = 3.20, SD = .41$), $t(102) = 3.17, p = .002$.

8.7. Correlations

Intercorrelations among the variables were explored (Table 2). For correlations involving natural and civic place attachment, factor scores, rather than indices, were used given that items are weighted according to their relevance to the factor (Field, 2005). Several interesting associations emerged among some variables in one city but not the other. In particular, length of residence was associated with less natural attachment in Nelson, $r = -.31, p = .03$, but this association was not significant in Trail, $r = .23, p = .10$. When participants' age was controlled for in a partial correlation, however, length of residence no longer predicted natural place attachment in Nelson, $r = .20, p = .18$.

Also, length of residence was associated with greater civic place attachment in Trail, $r = .39, p = .004$, but not in Nelson, $r = -.19, p = .18$. Nevertheless, when age was partialled out from the association between length of residence and civic place attachment in Trail, the association remained, $r = .31, p = .03$. One concern was whether this difference in the two cities reflected a true distinction in the development of civic attachment, or whether it merely reflected pre-existing differences in length of residence¹. For instance, Trailites had lived in their areas for significantly longer periods of time than had Nelsonites, $t(102) = -2.41, p = .02$. Thus perhaps this restriction of range among Nelsonites resulted in the absent association. To address this issue, the ranges in both cities were made artificially equal by truncating outliers in Trail. Six Trail residents who had lived in their area for more than 50 years were removed, and correlations were re-examined. Again, the association remained significant only in Trail. Taken together, these exploratory analyses suggest that civic place attachment is stronger for long-time residents only in Trail.

Other significant correlations emerged between place attachment and pro-environmental behavior. Natural attachment was associated with greater levels of pro-environmental behavior in both Nelson, $r = .48, p < .001$, and Trail, $r = .31, p = .03$. Civic place

Table 2Correlation matrix for the major variables, by City (Nelson, $n = 50$; Trail, $n = 51$).

	Civic PA	Natural PA	GEB	Length of residence	Gender	Age	Education
Civic PA	–	.56*	.05	.39**	.11	–.23	–.26
Natural PA	.57**	–	.31*	.23	–.07	.14	–.11
GEB	.32*	.48**	–	.18	.19	.36*	.11
Length of residence	–.19	–.31*	–.46**	–	.20	.44**	–.42**
Gender	.20	.23	.17	.01	–	.29	–.15
Age	–.05	–.22	–.04	.49**	.28	–	–.08
Education	.23	.21	.24	–.04	.11	.19	–

Correlations above the diagonal are from the Trail sample; correlations below the diagonal are from the Nelson sample.

*Correlation is significant at the .05 level (2-tailed).

**Correlation is significant at the .01 level (2-tailed).

¹ Many thanks to the anonymous reviewer for this suggestion.

Table 3
Variance explained by civic and natural attachment factors.

Factor	Initial eigenvalues			Extraction sums of squared loadings			Rotation
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total
Civic attachment	6.46	58.78	58.78	6.12	55.63	55.64	5.90
Natural attachment	1.45	13.18	71.96	1.15	10.43	66.07	3.58

attachment was associated with pro-environmental behavior in Nelson, $r = .32$, $p = .02$, but not in Trail, $r = .05$, $p > .10$.

8.8. Predicting pro-environmental behavior

8.8.1. Place attachment and pro-environmental behavior

The main purpose of this study was to investigate the contentious question of whether place attachment relates to pro-environmental behavior, and if so, in which direction. Patterns in the data suggest that for the full sample, a greater sense of attachment to one's place was associated with more pro-environmental behavior, $r = .30$, $p = .002$. When this relation was examined separately for each town, it held in Nelson, $r = .39$, $p = .005$, but not in Trail, $r = .15$, $p = .29$.

The next step was to consider how the two types of place attachment would predict pro-environmental behavior. The two major hypotheses were examined using a hierarchical linear regression analysis. While testing the influence of natural and civic place attachment on pro-environmental behavior, the main effects of city, gender, age, and length of residence were also examined. Thus, the main effect variables were entered on the first step of the regression equation and included both types of place attachment (i.e., using the factor scores for civic and natural attachment). The interaction term (Natural Place Attachment \times City) was entered on the second step.

The linear combination of the seven predictors was significant, $F(7, 91) = 5.71$, $p < .001$. The coefficient of determination (R^2) was .31, indicating that 31% of the variance in pro-environmental behavior was accounted for by these variables, which represents a large effect size (Cohen, 1988). As shown in Table 6, results revealed that greater natural attachment was a significant unique predictor of pro-environmental behavior, ($\beta = .39$, $SE = .05$), $t(91) = 3.53$, $p = .001$. According to the squared semi-partial correlation, it explained 9.55% of the variance in pro-environmental behavior when the other variables were controlled for. Thus, our first hypothesis, that natural place attachment would predict pro-environmental behavior, was supported. The interaction of natural place attachment and city was not significant, ($\beta = -.14$, $SE = .05$), $t(91) = -1.36$, $p = .18$, suggesting that natural place attachment did not influence pro-environmental behavior differently depending on the town.²

Results from this regression were also in support of the second hypothesis, that civic place attachment would not be predictive of pro-environmental behavior. Although significant zero-order correlations between civic place attachment and pro-environmental behavior emerged in Nelson, civic place attachment was no longer a significant predictor of pro-environmental behavior once the other variables were taken into account, ($\beta = -.08$, $SE = .05$), $t(91) = -.74$, $p = .46$.

8.8.2. Socio demographic predictors of pro-environmental behavior

Three of the five sociodemographic predictors that were included in the regression significantly predicted pro-environmental behavior (Table 6). Specifically, living in Trail

relative to living in Nelson was associated with performing significantly fewer pro-environmental behaviors, ($\beta = -.21$, $SE = .04$), $t(91) = -2.28$, $p = .03$. The squared semi-partial correlation indicated that city accounted for approximately 4% of the variance in pro-environmental behavior. Living in one's local area for a greater number of years was marginally associated with fewer pro-environmental behaviors, when the other predictors were controlled for ($\beta = -.21$, $SE = .003$), $t(91) = -1.96$, $p = .05$, and it accounted for approximately 3% of the variance in the dependent variable. Contrary to this, participants who were older engaged in more pro-environmental behaviors when the other variables were controlled for ($\beta = .23$, $SE = .003$), $t(91) = -2.22$, $p = .03$, and age accounted for approximately 4% of the variance in pro-environmental behavior. Gender did not significantly predict pro-environmental behavior, ($\beta = .18$, $SE = .09$), $t(91) = 1.94$, $p = .06$, and neither did education levels ($\beta = .12$, $SE = .05$), $t(91) = 1.29$, $p = .20$.

9. Discussion

This study affirms that self-reported pro-environmental behavior is more frequent among residents who are attached to their local areas. The little research that has been conducted on this topic has produced divergent findings; some studies have suggested that place attachment is associated with more environmentally responsible behavior, and others have argued that it is associated with less. This discrepancy was addressed by demonstrating that *type* of attachment is important in determining the effects of place attachment on pro-environmental behavior.

Specifically, natural place attachment predicted pro-environmental behavior in both towns, but civic place attachment did not, once the other variables were controlled for.

9.1. Place attachment

This study provides evidence for two forms of place attachment: natural and civic. Both natural (e.g., Williams, Patterson, Roggenbuck, & Watson, 1992) and civic (e.g., Bonaiuto et al., 1996; Vorkinn & Riese, 2001) place attachment have previously been investigated, although not to our knowledge, simultaneously. Present results showed that attachment to the natural aspects of a place was stronger than attachment to its civic aspects. Hidalgo

Table 4
Communalities of the place attachment scale.

Variable	Initial	Extraction
This community reflects who I am	.62	.62
I am proud of my city	.69	.67
The green areas here are special	.58	.80
When I am away I miss the community	.76	.78
I am attached to the green areas here	.61	.65
I am attached to this city	.80	.81
I feel connected to the community	.76	.79
People like me live here	.49	.47
This city is special to me	.71	.72
I respect what this city stands for	.52	.45
The natural areas are special to me	.52	.52

² We also ran a regression where Civic Place Attachment \times City was the interaction term. This produced similar results to the previous regression, with no significant interaction ($\beta = -.13$, $SE = .05$), $t(91) = -1.40$, $p = .17$.

Table 5
Pattern matrix for the place attachment scale.

Variable	Factor	
	1	2
I feel connected to the community	.91	-.05
I am attached to this city	.90	-.01
When I am away I miss the community	.87	.02
I am proud of my city	.83	-.02
This city is special to me	.82	.04
I respect what this city stands for	.70	-.05
People like me live here	.67	.02
This community reflects who I am	.62	.25
The green areas here are special	-.14	.96
I am attached to the green areas here	.17	.70
The natural areas are special to me	.12	.62

and Hernández (2001) found that physical place attachment was the stronger at the city level, but social place attachment was stronger at the residential level. Although we measured physical and social attachment differently (i.e., natural and civic), our findings support the contention that physical attachment is stronger at the urban level.

General and natural place attachment were higher in Nelson. This finding fits with evidence which has shown that place attachment is greater for places of good environmental quality (e.g., Mesch & Manor, 1998; Uzzell et al., 2002). That civic attachment was strong in both towns suggests that not all types of place attachment depend upon a pristine physical quality, but may be derived from other positive environmental features, such as economic or social aspects.

Men and women did not differ in their levels of civic or natural place attachment, nor did those who were more highly educated, or older. Length of residence (controlling for age), however, was related to civic place attachment only in Trail; that is, Trailites who had lived in their town for a longer period of time were more attached to the place as a symbol of their social group. At first, this finding is not surprising, given previous research on place attachment and place identity (e.g., Giuliani & Feldman, 1993; Hay, 1998). As Hay described, longer-term residents have a stronger sense of place as local knowledge increases, and social networks and community ties strengthen over time. Nevertheless, this link between length of residence and place attachment was not evident in Nelson, and yet Nelsonites reported being very attached. Although these cross-sectional data do not lend themselves well to establishing the trajectory of place attachment over time, the difference between cities suggests that place characteristics may play a role in the development of the attachment. For instance, connections with aesthetically pleasing places have been documented. Stronger place attachment was reported by residents with access to a garden (Sime & Kimura, 1988), or a natural area (Cantrill, 1998), or those who live in neighbourhoods with unique terrain or urban design (Uzzell et al., 2002). Place characteristics could potentially determine the initial strength of the civic and natural place attachment, but exactly which characteristics are important precursors is an interesting possibility for future research.

9.2. Place attachment and pro-environmental behaviour

The relation between place attachment and pro-environmental behavior has not been thoroughly examined in the literature. Of the few studies to have investigated this, findings conflict: place attachment has been shown to be associated with more (Vaske & Kobrin, 2001), but also with less (Uzzell et al., 2002), pro-environmental behavior. This study supports the claim that individuals who are more attached to the natural aspects of their areas report engaging in more pro-environmental behaviors, and

suggests that the effect may be generalized to a community sample. Importantly, this study distinguishes between civic- and natural-based place attachments. Natural place attachment, a measure of attachment to the natural features of one's local area (as opposed to nature in general), predicted pro-environmental behavior in both places, once other variables were controlled for, but civic place attachment was not predictive.

In contrast to the findings of Uzzell et al. (2002), the negative relation between place attachment and pro-environmental behavior was not found in this study. Uzzell et al. speculated that place attachment may be associated with less pro-environmental behavior because individuals are unlikely to identify with a neighborhood of poor environmental quality in the first place, and therefore, would not perceive the need to engage in ecological behaviors. In the rare case that individuals happened to be attached to a poor-quality neighborhood, attachment was positively associated with pro-environmental behavior. In this study, however, place attachment was associated with more pro-environmental behavior even in the environmentally pristine town.

Why might residents attached to the good-quality neighborhood in Uzzell et al.'s (2002) study report less pro-environmental behavior, but residents attached to a town with good environmental quality, report more pro-environmental behavior? One possibility is that place attachment predicts behaviors congruent with the dominant values of the group. In Uzzell et al.'s study, residents of the good-quality neighborhood did not have the environment as their primary issue of concern; these residents were invested in other issues, such as crime. Nelson residents, on the other hand, value the environment. Thus, place attachment in Nelson may contribute to more pro-environmental behavior because of the group's environmental leanings.

Values represent what is most important to people, and the goals that they strive to attain (e.g., Schwartz, 1996). Thus, values predict behaviors (e.g., Bardi & Schwartz, 2003; Blarney & Braithwaite, 1997), and environmental values are major predictors of pro-environmental action (e.g., Dietz, Stern, & Guagnano, 1998; Schultz & Zelezny, 1999; Schultz, Zelezny, & Dalrymple, 2000; Stern, Dietz, Kalof, & Guagnano, 1995). Because values are transmitted and internalized by group members, attachment to the social-symbolic aspects of the place may predict pro-environmental behavior to the extent that the group values the environment. Follow-up studies should consider local environmental values as a mediator between civic place attachment and pro-environmental behavior.

Natural attachment was the strongest predictor of pro-environmental behavior in both cities. If attachment facilitates the formation of certain values, then perhaps attachment to nature

Table 6
Regression analysis for variables predicting pro-environmental behavior ($N = 100$).

Variable	B	SE_B	β	p	sr^2
Constant	18.49	7.01	–	.01	–
City	-.10	.04	-.21	.03	.04
Civic place attachment	-.04	.05	-.09	.46	.00
Natural place attachment	.19	.05	.39	.001	.10
Length of residence	-.01	.003	-.21	.05	.03
Age	.01	.004	.23	.03	.04
Gender	.18	.09	.18	.06	.03
Natural place attachment \times city	-.07	.05	-.14	.18	.01
Civic place attachment \times city	-.06	.04	-.13	.17	.01

$R^2 = .31$.

Note: City was coded such that "–1" represented Nelson and "1" represented Trail; Civic and Natural Place Attachment variables are based on scores from the factor analysis; Length of residence and Age were in years; and Gender was coded such that "1" was male and "2" was female.

predicts pro-environmental values. Again, future research could investigate the relation between place attachment and values.

9.3. Limitations

Several limitations of this study should be addressed. One potential confound is social desirability. This would influence responses if those who are more attached to their areas reported more pro-environmental behavior in order to convey a good impression of residents of their city. Although the three measures were counterbalanced so participants would not always consider their degree of place attachment first, future studies could employ alternate measures of pro-environmental behaviors to reduce potential social desirability effects. For instance, observable measures of pro-environmental behaviors, such as donations to a local environmental cause could be made more covertly.

Another issue is the small sample size of 104 participants. Ideally, more participants would increase the ability to detect smaller effects that could exist among these variables. For a multiple regression involving seven predictors, however, this sample size is still acceptable, given a minimum requirement of 15 predictors per participant (Field, 2005). Despite this small sample size, natural place attachment still emerged as an important predictor of pro-environmental behavior across both cities.

9.4. Directions for future research

The findings from this study suggest several possibilities for future research. Most importantly, results showed that attachment to nature is associated with more pro-environmental behavior. Several directions for research emerge from this. The first is to investigate possible causal mechanisms or third variables underlying this association, such as environmental values. The second would be to determine the ways in which natural place attachment could be encouraged among community members, and whether such an intervention would produce an increase in pro-environmental behavior. If cities incorporated environmental values into their image, would this change the behavior of individuals? Third, what effects other than pro-environmental behavior might natural place bonding provoke? For instance, to what extent does natural attachment carry over into the domains of leisure, consumer behavior, or even general well-being? Clearly, natural place attachment and identity are topics with great potential for future research.

10. Conclusion

The current study investigated two types of place attachment and their relations to pro-environmental behavior. For both cities, however, natural attachment was a predictor of pro-environmental behavior. Furthermore, levels of natural place attachment were high in both cities. If individuals have a proclivity to become attached to nature, this bodes well for the promotion of pro-environmental behavior, given that natural attachment predicted more environmentally responsible behavior in both cities. Behavioral change campaigns and environmental education programs could encourage natural place attachment, and cities could emphasize the “green” dimension of their image. Connectedness to nature is a source of hope in the endeavor to reform humans’ mistreatment of the environment.

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