Testing the dimensionality of place attachment and its relationships with place satisfaction and pro-environmental behaviours: a structural equation modelling approach

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Testing the Dimensionality of Place Attachment and its Relationships with Place Satisfaction and Pro-Environmental Behaviours: A Structural Equation Modelling Approach

Abstract

Drawing on literature from environmental psychology, the present study examined place attachment as a second-order factor and investigated its relationships with place satisfaction and visitors' low and high effort pro-environmental behavioural intentions. Confirmatory factor analysis and structural equation modelling were used to test a model using a sample of 452 visitors at the Dandenong Ranges National Park, in Australia. Results supported the four-dimensional second-order factor of place attachment and indicated (a) positive and significant effects of place attachment on both low and high effort pro-environmental behavioural intentions of park visitors, (b) a significant and positive influence of place attachment on place satisfaction, (c) a significant and positive effect of place satisfaction on low effort pro-environmental behavioural intentions, and (d) a negative and significant influence of place satisfaction on high effort pro-environmental behavioural intentions. The main theoretical contribution relates to the inclusion of the four dimensions of place attachment in a single model. Findings are discussed with respect to their applied and theoretical relevance.

Key words: Place attachment; place satisfaction; low effort and high effort pro-environmental behavioural intentions; first and second-order factor; national parks

1. Introduction

Natural areas serve as important venues for spending time, and seeking out new experiences interacting with nature and other visitors (Negra & Manning, 1997, Snepenger, Snepenger, Dalbey, & Wessol, 2007). Such natural settings yield restorative effects such as stress reduction (Davis, Green, & Reed, 2009; Hipp & Ogunseitan, 2011) and promote psychological well-being of visitors (Korpela, Ylen, Tyrvainen, & Silvennoinen, 2009; Parks Forum, 2008). For these and other reasons, they often become favourite places and hold special meanings for many people (Ferreira, 2011). As such, visitors can become dependent on such environments which meet their desired experiences (Scannell & Gifford, 2010a). This can result in increased visitation that put severe pressure on environmental resources, requiring researchers, scholars, and practitioners to find ways to protect natural resources. Environmental behavioural scientists are increasingly seeking to apply principles of behaviour analysis to management of natural areas in an attempt to decrease behaviours that are detrimental to the natural environment and promote pro-environmental ones (Lehman & Geller, 2004). This argument rests on the premise that conservation of natural resources is likely to happen by influencing visitor behaviour and stimulating responsible actions by visitors (Blackstock, White, McCrum, Scott, & Hunter, 2008). Place attachment is recognized by some researchers as a potential concept that may be used to influence behaviour by capitalizing on an individual's willingness to protect important and meaningful places (Dregde, 2010; Ramkissoon, Weiler, & Smith, 2012; Scannell & Gifford, 2010b; Sobel, 2003), although evidences are not conclusive.

Place attachment has been defined differently by researchers and scholars, and the general consensus is that it is a multidimensional construct (Halpenny, 2010; Hidalgo & Hernández, 2001; Scannell & Gifford, 2010a). Dimensions of place attachment include place identity (Hinds & Sparks, 2008; Prayag & Ryan, 2012; Stedman, 2002), place affect (Hinds

& Sparks, 2008; Kals, Shumaker, & Montada, 1999), place social bonding (Hammitt, Backlund, & Bixler, 2006; Ramkissoon et al., 2012), and place dependence (Bricker & Kerstetter, 2000; Prayag & Ryan, 2012). Research on place attachment has been growing in the literature within several disciplines including environmental psychology, natural resource management, environmental education, and tourism (e.g., Halpenny, 2010; Kyle, Graefe, & Manning, 2005; Ramkissoon et al., 2012; Raymond, Brown, & Robinson, 2011; Vaske & Kobrin, 2001) and considerable theoretical and methodological advancements have been made in this area by researchers and scholars (Kyle et al., 2005).

A number of studies have demonstrated significant associations between place attachment and pro-environmental behaviours of individuals (e.g., Devine-Wright & Howes, 2010; Gosling & Williams, 2010; Halpenny, 2010; Hernández, Martin, Ruiz, & Hidalgo, 2010; Raymond et al., 2011). Pro-environmental behaviour is defined as an action by an individual or group that promotes or results in the sustainable use of natural resources (Sivek & Hungerford, 1989/1990). Although existing research suggests place attachment is a potentially useful concept to promote pro-environmental behaviours, findings on the relationships between the two constructs are contradictory and far from conclusive (Scannell & Gifford, 2010b). This may be due to the fact that the different dimensions of place attachment and their relationships with pro-environmental behaviours have been investigated in various combinations by previous researchers (e.g., Halpenny, 2010; Kyle et al., 2005; Vaske & Kobrin, 2001), with the implication that only a few studies (e.g., Ramkissoon et al., 2012; Ramkissoon, Smith, & Weiler, in press) considers place attachment as a multidimensional construct, comprising of place dependence, place identity, place affect, and place social bonding in a single study. Some research also suggests that place attachment influences visitors' satisfaction with a place (Prayag & Ryan, 2012; Yuksel, Yuksel, & Bilim, 2010), and still other studies find that place satisfaction is an important determinant of pro-

environmental behaviours (Stedman, 2002; Uzzell, Pol, & Badenas, 2002). However, similar conceptualisation problems of place attachment can be found in many of these studies which fell short of considering place attachment as comprising of several dimensions.

Researchers have argued that the influence of each dimension of place attachment on environmental behaviour is also likely to be different, depending on the types of place attachment (Scannell & Gifford, 2010b; Stedman, 2002). Therefore, studies that take into account all four recognised dimensions of place attachment and the latter's influence on pro-environmental behaviours in a single theoretical model are needed. This study addresses this by considering place attachment as a second-order factor comprising place dependence, place identity, place affect, and place social bonding. In the context of the present study, the second-order model represents the hypothesis that these distinct, but related constructs can be accounted for by a common underlying higher-order construct conceptualised as "place attachment". In contrast to first-order models with correlated factors, second-order factor models have the advantage of providing researchers with a more parsimonious and interpretable model when it is hypothesised that higher-order factors underlie the data (Chen, Sousa, & West, 2005). A second-order model can also test whether the hypothesised higher-order factor (i.e. place attachment) accounts for the pattern of relations between the first-order factors (the different sub-constructs of place attachment) (Gustafsson & Balke, 1993; Rindskopf & Rose, 1988). Chen et al. (2005) argue that a second-order factor model separates variance due to specific factors from measurement error, leading to a theoretically error-free estimate of the specific factors.

Given researchers' assertion that place dependence, place identity, place affect, and place social bonding represent the different underlying dimensions of place attachment needs empirical testing, considering place attachment as a second-order factor is both theoretically

and statistically plausible and justified. The research uses confirmatory factor analysis to confirm the dimensionalities of the place attachment construct and structural equation modelling to test the influence of place attachment on place satisfaction and pro-environmental behavioural intentions. The relationships among the theoretical constructs of interest in this study are presented in Figure 1. The model is tested using data collected from visitors to the Dandenong Ranges National Park, Australia.

INSERT FIGURE 1 ABOUT HERE

The study sets out to make some important theoretical contributions to the literature. Researchers (e.g., Devine-Wright & Clayton, 2010; Scannell & Gifford, 2010b) have stressed on the need for more research on the relationship between place attachment and pro-environmental behaviours because findings are unclear and contradictory. Devine-Wright and Clayton (2010, p. 269) have also argued that it is important that researchers and scholars avoid "an increasing fragmentation of the empirical literature" and have urged researchers to empirically test "new conceptual frameworks that can encompass or discriminate between the various dimensions of self-environment relations." Kyle et al. (2005) noted that although existing measures of place attachment appear to be reliable and valid, further research that confirms the factor structure of place attachment is warranted. These researchers called for more studies on place attachment using latent structural equation modelling approaches to confirm the dimensionalities of place attachment. Considering place attachment as a second-order factor model is likely to provide a better theoretical and statistical understanding of its relationship with pro-environmental behaviour. Scholars have also been calling for further studies on place attachment (Dredge, 2010; Tsai, 2011; Yuksel et al., 2010) and place satisfaction in nature-based settings (O'Neill, Riscinto-Kozub, & Hyfte, 2010). This study aims to address these gaps in the literature. It seeks to confirm the factor structure of the

place attachment construct by providing empirical evidence that the four dimensions of place attachment (place identity, place dependence, place social bonding, and place affect) are an accurate representation of place attachment when considered simultaneously in a single model.

The study seeks to provide important practical implications to managers of nature-based settings. Recognition of the deleterious impacts caused by growing visitation has led to an increasing call to promote environmentally sustainable practices in such settings (Stockdale & Barker, 2009). If not well managed, increased visitation can put at risk the park's resources. Place attachment is seen as a potentially important antecedent to awareness of the value of conserving natural resources, pro-environmental attitudes and pro-environmental behaviours in nature-based settings (Lee, 2011; Raymond et al., 2011; Scannell & Gifford, 2010b). Evidence shows that sustainability practices in national parks and other natural areas can be improved by fostering place attachment (e.g., Halpenny, 2010) and by encouraging environmentally responsible practices among visitors (e.g., Ballantyne, Packer, & Hughes, 2009).

2. Place attachment: a multidimensional construct

A plethora of terms describing the relationship between people and spatial settings exists in the literature. These include sense of place (Jorgensen & Stedman, 2001), place attachment (Altman & Low, 1992; Guiliani & Feldman, 1993), community attachment (Perkins & Long, 2002), neighbourhood attachment (Brown, Perkins, & Brown, 2003; Lewicka, 2010), and connectedness to nature (Gosling & Williams, 2010) among others. An extant review of the literature reveals place attachment as the most popular term used. Place attachment refers to the bonding people share with places (Raymond et al., 2011; Scannell & Gifford, 2010a, 2010b) and emerges as people get to know a place and endow it with value

(Milligan, 1998; Tuan, 1980). The concept is widely understood to have originated from attachment theory (Bowlby, 1969, 1975, 1980). Operationalisations of the place attachment construct, however, have been very diverse across several disciplines, posing a challenge to researchers. It has often been conceptualised as place dependence (Stokols & Shumacker, 1981), place identity (Vaske & Kobrin, 2001; Walker & Chapman, 2003), place social bonding (Kyle, Mowen & Tarrant, 2004), and more recently, place affect (Halpenny, 2010).

2.1. Place dependence

In a tourism and leisure context, place dependence is described as visitors' functional attachment to a specific place and their awareness of the uniqueness of a setting, which contributes to meeting their visitation goals (Williams, Patterson, Roggenbuck, & Watson, 1992). This functional attachment reflects the importance of a resource in providing required services for desired recreational activities (Stokols & Schumaker, 1981) and is embodied in the physical characteristics of a setting (e.g., hiking trails, rock climbing routes, etc.) (Vaske & Kobrin, 2001).

2.2. Place identity

Place identity (Prohansky, 1978) refers to the connection between a place and one's personal identity and contains both cognitive and affective elements. Natural settings offer individuals the opportunity to develop a sense of identity with a place (Budruk, Thomas & Tyrell, 2009; Halpenny, 2010) due to its uniqueness or distinctiveness from other places (Twigger-Ross & Uzzell, 1996). A number of researchers have operationalised place attachment using just the two sub-constructs of place dependence and place identity (e.g., Prayag & Ryan, 2012; Vaske & Kobrin, 2003; Walker & Chapman, 2003).

2.3. Place affect

Some other researchers conceptualise place attachment as including place affect (Kals et al., 1999; Ramkissoon et al., 2012). While it is widely acknowledged in the environmental psychology and leisure/recreation literature that places are grounded in environmental and social experiences (Felonneau, 2004; Moore & Graefe, 1994), they also note an affective link that individuals develop (Rolero & De Picolli, 2010) by building their sentiments about the place (Tuan, 1977). In a tourism/leisure context, affective connection with natural locations generates a sense of psychological well-being for visitors (Kaplan & Talbot, 1983; Korpela et al., 2009). Natural settings tend to further increase positive emotions in individuals about the setting (Hartig, Book, Garvill, Olsson, & Garling, 1996; Ulrich, 1979). Individuals with greater experience with natural environments may express stronger emotional attachment with those environments than those with lesser experience (Hinds & Sparks, 2008).

2.4. Place social bonding

Another sub-dimension of place attachment is place social bonding. A place can be valued by an individual because it facilitates interpersonal relationships (Hammitt, 2000; Scannell & Gifford, 2010a, 2010b) and fosters "group belonging" (Hammitt, Kyle, & Oh, 2009). In these spatial contexts, individuals develop communal bonds with other people through people–place interaction (Hammitt et al., 2006; Scannell & Gifford, 2010b). Kyle et al. (2004) and Ramkissoon et al. (2012) argue that natural settings set the context for social experiences which, if maintained in these settings, are likely to lead to higher levels of attachment (Kyle et al., 2005). Place social bonding was found to be a strong predictor of place attachment in the study by Tumanan & Lansangan, (2012). Social bonds, in fact, can be the primary source of meaning in some contexts (Kyle et al., 2005).

Taken together, the multivalent nature of place illustrates cultivation of place attachment through dependence, identity, affect, and the socially-shared experiences associated with the place. The above review suggest that place attachment is a multi-dimensional construct comprising of place dependence, place identity, place social bonding, and place affect. Each sub-construct is conceptually different from the others and reflects the various underlying dimensions of place attachment (Brocato, 2006; Kyle et al., 2005; Low & Altman, 1992; Ramkissoon et al., 2012). Yet, only few studies have considered all four sub-constructs of place attachment in a single theoretical model (e.g., Ramkissoon et al., 2012; Ramkissoon et al., in press). For example, Halpenny (2010) operationalised place attachment as place affect, place dependence, and place identity, but did not consider place social bonding as a sub-construct of place attachment. Kyle et al. (2005) tested the dimensionality of place attachment by considering the construct as a second-order factor. Their data supported a correlated three-factor model of place attachment, consisting of place identity, place dependence, and place social bonding. Although this study is very useful to researchers and scholars, it did not consider place affect as an important sub-construct of place attachment. Vaske and Kobrin (2001) conceptualised place attachment as place dependence and place identity but not social bonding and place affect as important sub-dimensions of place attachment. Research that considers all four sub-dimensions of place attachment and investigates whether they represent an accurate representation of the latter is needed. Based on the above, the following hypothesis is proposed:

Hypothesis 1: *Place attachment is a second-order factor, comprised of the sub-dimensions of place dependence, identity, affect, and social bonding.*

3. Place attachment and pro-environmental behaviour

Within the literature on place attachment and pro-environmental behaviours, a number of studies have demonstrated significant associations between these two constructs in different contexts and situations (e.g., Devine-Wright & Howes, 2010; Gosling & Williams, 2010; Halpenny, 2010; Hernández et al., 2010; Raymond et al., 2011). While some studies have suggested that higher levels of place attachment are associated with lower intentions to engage in pro-environmental behaviours (Uzzell, Pol, & Badenas, 2002), other researchers have found that the opposite is also possible (Vaske & Kobrin, 2001). Place attachment has been found to be significantly associated with environmental volunteering (Gooch, 2003). Walker and Chapman (2001) found that place attachment was a strong predictor of park visitors' intentions to pick up other people's litter in the park. A similar finding was reported by Halpenny (2010) who noted that place attachment was positively associated with pro-environmental behavioural intentions of park visitors. Kelly and Hosking (2008) found place attachment was positively linked to behaviours such as volunteering and environmental conservation in Western Australia. Further, place attachment, conceptualised as community attachment (Brehm, Eisenhauer, & Krannich, 2006) and connectedness to nature was found to be a significant predictor of pro-environmental behavioural intentions in other studies (e.g., Gosling & Williams, 2010; Kals et al., 1999; Mayer & Frantz, 2004). However, despite the significant attention devoted to the two constructs of place attachment and pro-environmental behavioural intentions, the strength and direction remains unclear in the existing literature (Scannell & Gifford, 2010b). Existing studies on the topic have fallen short of considering place attachment as comprising of the sub-constructs of place identity, place dependence, place affect, and place social bonding simultaneously in a single theoretical model. Accordingly, the following hypothesis was developed:

Hypothesis 2: *Place attachment as second-order factor positively influences pro-environmental behavioural intentions of park visitors*.

4. Place satisfaction

Visitor satisfaction has attracted the interest of many researchers in tourism, leisure and recreation (Neal & Gursoy, 2008; Sirgy, 2010). Satisfaction is perceived to be a key to the success of many organizations (Bosque & Martin, 2008). Emotions are seen to play an important role in satisfaction formation in organisations (Yu & Dean, 2001). Stedman (2002) defined place satisfaction as a multidimensional summary judgement of the perceived quality of a setting, meeting an individual's needs for the physical characteristics of a place, its services, and social dimensions. Although some studies have demonstrated the links between place attachment and place satisfaction (e.g., Yuksel et al., 2010), further research is warranted to investigate the relationship between these two constructs. Evidence suggests that place attachment, conceptualised as place dependence, place identity (Hwang, Lee, & Chen, 2005; Prayag & Ryan, 2012) and place affect (Yuksel et al., 2010) may be significantly predictive of visitors' satisfaction. However, the association between place social bonding and place satisfaction is yet to be established in the literature (Ramkissoon et al., 2012). Moreover, research to date has not yet investigated the relationship between place attachment as a second-order factor with its four sub-dimensions and place satisfaction. There is thus a need to examine place attachment as a second-order factor, with the four sub-dimensions of place dependence, identity, affect and social bonding, and its role in predicting place satisfaction. Consequently, the following hypothesis was developed:

Hypothesis 3: *Place attachment as a second-order factor positively influences park visitors' place satisfaction.*

Individuals who are more satisfied with a place are in some cases more willing to engage in pro-environmental intentions and behaviours (Jabarin & Damhoureye, 2006; Oguz, 2000; Lospez-Mosquera & Sanchez, 2011). Studies have demonstrated positive correlations between satisfaction and willingness to pay in relation to green spaces (Baral, Stern & Bhattarai, 2008; Bigné, Andreu & Gnoth, 2005; Lospez-Mosquera & Sanchez, 2011). Jabarin and Damhoureyeh (2006) also noted that visitors who were more satisfied with the functional value offered at Dibeen National Park reported higher willingness to pay for the park. Davis, Le, & Coy (2011) noted that individuals with greater satisfaction with the environment were more likely to feel committed to the environment. This in turn led to greater willingness to sacrifice for the well-being of the environment at the expense of their immediate self-interest, costs and efforts.

However, contrary to these studies, Stedman's (2002) research found place satisfaction to inhibit environmental behaviour. He showed that people with lower levels of satisfaction were more willing to engage in place-protective behaviours, and showed greater willingness to counter environmental changes to the lake. Most of these studies suggest that place satisfaction is likely to be a significant predictor of pro-environmental intentions and behaviours, although the direction of the relationship may vary in different contexts. Based on the above review, the following hypothesis was developed:

Hypothesis 4: *Place satisfaction positively influences park visitors' pro-environmental behavioural intentions.*

5. Research design

The model and hypothesised relationships were tested using data collected from visitors to the Dandenong Ranges National Park, situated in the state of Victoria, in Australia, located about 35 km east of the centre of Melbourne city. Managed by Parks Victoria, the

park attracts over one million visitors annually due to its easy accessibility (with multiple access points), free entrance, and recreational facilities on offer. Recreational facilities encompass a variety of outdoor activities such as picnicking, bushwalking, photography, nature study, bird watching, car touring, cycling, and horse riding. The park also provides food and beverage outlets, free parking, toilet facilities and other amenities as well as a number of volunteering opportunities to assist in the protection of its rich flora and fauna. The park attracts both first-time and repeat visitors, and its attractive natural environment leads to increasing visitation (over one million visitors per year) that puts severe pressure on resources, requiring the park authority to find ways to manage visitor impacts and preserve the natural environment. This makes it an ideal case study for examining place attachment and pro-environmental behavioural intentions.

The fieldwork for this study was conducted in the months of June to September 2011 at four locations within the national park, namely the Thousand Steps, Ferntree Gully Picnic Ground, Grants Picnic Ground, and a children's playground. While little is known about the distribution of visitation to Dandenong Ranges National Park and how visitor numbers and profiles may vary within the park, these four sites were identified by Parks Victoria as high use sites appropriate for data collection for this study. Data were collected from 600 respondents with approximately 150 questionnaires collected from each location in both off-peak (weekdays) and peak times during weekends and school holidays. This ensured that a range of visitors (locals and non-locals; intrastate and interstate; individuals, families, and other groups; first-time and repeat visitors) were included in the sample. Data collection at exit was considered impractical, as there are multiple entry and exit options necessitating interception in car parks, where visitors are often in a hurry to leave. It was considered more appropriate to approach visitors during their visit since they were more relaxed, increasing the chances of participation. After explaining the purpose of the study to respondents, a self-

completed questionnaire was administered to adult visitors on a next person basis. An average of 150 questionnaires was collected from each location.

The field work yielded to a 79% response rate. Twenty-two questionnaires were eliminated due to missing data (Hair, Anderson, Tathan, & Black, 1998). This is one of the oldest and most popular methods used in psychological research to avoid statistical bias (Schafer & Graham, 2002). This resulted in 452 surveys retained for the analysis with almost equal proportions of female (53%) and male (47%) respondents. More than half of the respondents were under the age of 35; the age distribution was 23% (18-24 years), 29% (25-34 years), 19% (35-44 years), 15% (45-54 years), 11% (55-64 years) and 9% (65+ years of age). The vast majority (97%) were from Australia, and had completed university studies (70%). Virtually all respondents were day visitors with 47% being on repeat visits. The visitor profile is comparable to statistics collected by Parks Victoria (2010) for the Dandenong Ranges National Park.

For the place attachment construct, four dimensions were included in this study: place dependence (three items), place identity (three items), place affect (three items), and place social bonding (three items) borrowed from Kyle et al., (2004) and Yuksel et al. (2010). Three items borrowed from Yuksel et al. (2010) were used for the place satisfaction construct. Each item was measured on a 5-point Likert scale (1=strongly disagree, 5=strongly agree). Twelve items, derived from Halpenny (2010) were used to measure visitors' pro-environmental behavioural intentions. A 5-point rating scale was used (1=not probable at all, 5=very probable). As a result of modifications necessary to customise Halpenny's scale to the present context, the pro-environmental behavioural scale was subjected to an exploratory factor analysis (EFA) using principal component method. The

purpose of the EFA was to ensure unidimensionality and internal consistency of this construct in the present context. The EFA was conducted using a pre-test sample of 115 respondents who were intercepted at different locations in the Dandenong Ranges National Park. This process resulted in the elimination of two items, "encourage others to reduce their waste and pick up their litter when they are at this national park" and "pick up litter at this national park left by other visitors", reducing the number of items from twelve to ten.

The pro-environmental behavioural intentions construct was subjected to another EFA analysis using the main sample size (n=452) to further confirm scale dimensionality. This was considered important since the scale items had been modified to suit the context of the study. This resulted in the deletion of one item which was the respondent's stated likelihood to "contribute to donations to ensure protection of this national park" due to cross-loadings (Gursoy & Gavcar, 2003). The nine remaining items used to measure the pro-environmental behavioural intent construct loaded onto two factors. Based on the items, factor 1 was labelled "low effort pro-environmental behavioural intent" while factor 2 was labelled "high effort pro-environmental behavioural intent". The six items that loaded on the first factor were: "volunteer to reduce my use of a favourite spot in this national park if it needs to recover from environmental damage", "tell my friends not to feed animals in this national park", "sign petitions in support of this national park", "volunteer to stop visiting a favourite spot in this park if it needs to recover from environmental damage", "pay increased park fees if they were introduced for this national park's programs" and "learn about this national park's natural environment". Three items loaded on the second factor: "participate in a public meeting about managing this national park's programs", "volunteer my time to projects that help this national park" and "write letters in support of this national park". Therefore, the pro-environmental behavioural intent construct was examined as having two dimensions. Internal consistency was evaluated using Cronbach's alpha and both factors

showed a measurement greater than 0.7, indicating adequate to strong levels of internal consistency (Nunally, 1978). Further, given the two-factor structure of the pro-environmental behavioural construct, hypotheses 2 and 4 were divided into two sub-hypotheses each as follows:

Hypothesis 2a: *Place attachment as a second-order factor positively influences low effort pro-environmental behavioural intention of park visitors*.

Hypothesis 2b: *Place attachment as a second-order factor positively influences high effort pro-environmental behavioural intention of park visitors*.

Hypothesis 4a: *Place satisfaction positively influences low effort pro-environmental behavioural intention of park visitors.*

Hypothesis 4b: *Place satisfaction positively influences high effort pro-environmental behavioural intention of park visitors.*

5.1 Modelling process

Structural Equation Modelling (SEM) has two components: the measurement model and the structural model. Amos (V. 19), one of the most commonly used SEM software applications (Nachtigall, Kroehne, Funke, & Steyer, 2003) was utilized to determine the overall fit of the measurement and structural models using the maximum likelihood method of estimation (Anderson & Gerbing, 1988). The chi-square was used as the first fit index. However, since it has been found to be sensitive to sample size (Byrne, 2001), other fit indices were necessary. The root mean square error of approximation (RMSEA), goodness of fit index (GFI, Joreskog & Sorbom, 1989), comparative fit index (CFI, Bentler, 1990), normed fit index (NFI, Bentler, & Bonnett, 1980), incremental fit index (IFI, Hu, & Bentler, 1995), parsimonious goodness of fit index (PGFI, Mulaik et al., 1989) and parsimonious normed fit index (PNFI, Mulaik et al., 1989) were included in the study. Values for GFI, CFI,

NFI, PGFI and PNFI range from 0 to 1, with values closer to 1.00 indicating a good model fit (Byrne, 2001; Hair, Black, Babin, & Anderson, 2010; Mulaik et al., 1989).

The measurement model specifies causal relationships between the measures and illustrates ways in which the variables are operationalised through their indicators. First, the overall measurement model for place attachment was tested. The overall fit was then evaluated using the fit indices. Second, the overall measurement model with place attachment, place satisfaction, low effort pro-environmental behavioural intentions, and high effort pro-environmental behavioural intentions was tested. This resulted in the deletion of three items "volunteer to stop visiting a favourite spot in this national park if it needs to recover from environmental damage" (PEB5), "pay increased park fees if they were introduced for this national park's programs" (PEB7) and "learn about this national park's natural environment" (PEB10) on the low effort pro-environmental behavioural intentions construct. The measurement model was respecified, and the overall fit was then evaluated using the fit indices. Composite reliability and variance extracted were used to further evaluate the reliability and validity of the overall measurement model.

6. Findings

The first stage was to test the second-order factor model to determine whether the four sub-dimensions (place dependence, place identity, place affect, and place social bonding) can be viewed as appropriate indicators of place attachment. While researchers have recognized that place attachment is a multidimensional construct (e.g., Hidalgo & Hernández, 2001; Ramkissoon et al., 2012; Scannell & Gifford, 2010a), studies have fallen short of confirming that the above-mentioned four first-order factors together represent a second-order factor "place attachment". The measurement model for the place attachment constructs (Figure 2) had good model fit indices (Table 1): $\chi 2$ = 178 (p = 0.00); GFI = 0.94; CFI = 0.93; PGFI =

0.61; PNFI = 0.71; IFI = 0.96; NFI = 0.90; and RMSEA = 0.067. This indicates that the model fits the data fairly well (Hair et al., 2010). In sum, results confirm that place attachment is represented as an overarching concept (i.e. second-order factor) consisting of place dependence, place identity, place affect, and place social bonding (first-order factors).

INSERT TABLE 1 ABOUT HERE

INSERT FIGURE 2 ABOUT HERE

The second-order model proposes that (1) place attachment positively influences visitors' low effort pro-environmental behavioural intentions; (2) place attachment positively influences visitors' high effort pro-environmental behavioural intentions; (3) place attachment positively influences visitors' levels of place satisfaction; (4) place satisfaction positively influences visitors' low effort pro-environmental behavioural intentions; (5) place satisfaction positively influences visitors' high effort pro-environmental behavioural intentions. The initial testing of the overall measurement model resulted in the deletion of three items on "low effort pro-environmental behavioural intentions" due to low factor loadings. The model fit indices for the final overall measurement model as shown in Table 2 indicated that it was acceptable: $\chi 2$ 531.9 (p = 0.00); GFI = 0.90; CFI = 0.93; PGFI = 0.70; PNFI = 0.76; IFI = 0.93 and RMSEA = 0.07. The CMIN/df value was 2.97 which was an acceptable fit (Hair et al., 2010).

INSERT TABLE 2 ABOUT HERE

INSERT TABLE 3 ABOUT HERE

The measurement model was further validated for its reliability and validity. Composite reliability and average variance extracted were used as reliability measures. As

indicated in Table 3, the composite reliability scores for all the constructs exceeded the recommended level of 0.70, indicating the internal consistency of the indicators (Hatcher, 1994). Table 3 also shows that the variance extracted estimate for each construct meets the desirable level of 50% or higher (Fornell & Larcker, 1981). Construct validity is the extent to which indicators of a construct measure what they are supposed to measure (Bagozzi & Yi, 2012). Convergent validity was assessed from the measurement model by determining whether each indicator's estimated pattern coefficient on its posited underlying construct factor was significant (Anderson & Gerbing, 1988; Marsh & Grayson, 1995). All factor loadings for items retained as shown in Table 2 were greater than 0.5 and were statistically significant ($p < 0.001$), indicating convergent validity (Cabrera-Nyugen, 2010). To assess discriminant validity, the average variance extracted for each construct must be greater than the squared correlations between the construct and other constructs in the model (Fornell & Larcker, 1981; Nusair & Hua, 2010). Table 4 shows evidence of discriminant validity between each pair of constructs. For instance, the average variance extracted for high effort pro-environmental behavioural intentions was 0.69 while the shared variance between high effort PEB and other constructs ranged from 0.02 to 0.35 indicating that discriminant validity has been achieved.

INSERT TABLE 4 ABOUT HERE

After ensuring that the overall measurement model was valid and acceptable, the structural model was tested. The fit indices for the structural model (Figure 3) were as follows: $\chi 2 = 540.7$ ($p = 0.00$); GFI = 0.90; CFI = 0.93; PGFI = 0.70; PNFI = 0.77; IFI = 0.93; RMSEA = 0.067 (see Table 5) and CMIN/df = 3. All indices suggest a good fit (Hair et al., 2010) showing that the model fits the data well. The high factor loadings further

demonstrate that the proposed indicators capture well the constructs that they were hypothesised to measure.

INSERT TABLE 5 ABOUT HERE

INSERT FIGURE 3 ABOUT HERE

Once it was ensured that the measurement and structural models were valid and reliable, the path relationships among the different constructs were tested. Results are presented in Table 6, and indicate support for four of the five hypotheses that were originally proposed. Place attachment was found to positively influence both low and high effort pro-environmental behavioural intentions of park visitors, as well as place satisfaction. Interestingly, while place satisfaction was found to exert a positive effect on low effort pro-environmental behavioural intentions, it negatively influenced high effort pro-environmental behavioural intentions.

INSERT TABLE 6 ABOUT HERE

7. Discussion and implications

This study considered place attachment as a second-order factor, comprised of sub-dimensions of place dependence, identity, affect, and social bonding. The goodness of fit statistics as reported above show that the model fits the data well and suggest that the four dimensions are an accurate representation of the place attachment construct, confirming Hypothesis 1. It is interesting to note that place identity has the highest predictive power, followed by place affect, place dependence and place social bonding. Our findings are in line with Kyle et al. (2004) who noted that place attachment is comprised of four sub-dimensions. Additionally, a number of hypotheses to test the relationships between place attachment, place satisfaction, and pro-environmental behavioural intentions were proposed and tested.

Results from the factor analysis indicated the need to delineate the pro-environmental behavioural construct into two factors: low effort and high effort pro-environmental behavioural intentions, and this resulted in the development of additional hypotheses. Although this finding is somewhat unexpected, it is in line with researchers arguments' that pro-environmental behaviours can be of different types (Devine-Wright & Clayton, 2010; Vaske & Kobrin, 2001), depending on the amount of effort, resources needed and physical action required (Thøgersen, 2004).

Hypotheses 2a and 2b tested the direct effects of place attachment on visitors' low and high effort pro-environmental behavioural intentions. Findings suggest that place attachment has a strong and direct positive effect on both visitors' low (t = 4.089, p < 0.001; β = 0.32) and high pro-environmental behavioural intentions (t = 5.882, p < 0.001; β = 0.49). This lends support to early place theories (Relph, 1976; Tuan, 1977), suggesting that experience with a place leads to attachment which leads to intentions to protect the place. Consistent with literature (e.g., Bricker & Kerstetter, 2000; Halpenny; 2010; Harmon, Zin, & Gleason, 2005; Walker & Ryan, 2008), the study has revealed greater detail about relationships between place attachment and pro-environmental behavioural intentions. Investigations of these relationships in national park contexts are limited (Ramkissoon et al., 2012). Further, to the authors' knowledge few if any, studies have treated place attachment as a second-order construct (with four dimensions of place dependence, identity, affect and social bonding), and investigated its influence on intentions of visitors to engage in low and high effort pro-environmental behaviours. Hypothesis 3 tested the relationship between place attachment and place satisfaction. The strength of the relationship between the two constructs provided evidence for this relationship (t = 6.670, p < 0.001; β = 0.54). This implies that those visitors who were more attached to the place were also more likely to be satisfied with their decision to visit the park as compared to those who had lowers levels of place attachment. These

findings are consistent with other studies in tourism (e.g., Prayag & Ryan, 2012; Yuksel et al., 2010) and leisure, and recreational fields (e.g., Halpenny, 2010; Williams & Vaske, 2003).

Hypotheses 4a and 4b investigated the influence of place satisfaction on visitors' low and high effort pro-environmental behavioural intentions. Findings indicate that place satisfaction was a significant determinant of low effort pro-environmental behavioural intentions (t = 3.164, $p < 0.01$; $\beta = 0.20$) confirming Hypothesis 4a. This implies that the more satisfied visitors were with their decision to visit the park, the higher was their intention to engage in low effort pro-environmental behaviour. This finding is in line with studies (e.g., Jabarin and Damhoureyeh 2006; Lopez-Mosquera & Sanchez, 2011; Oguz, 2000) who reported a positive correlation between satisfaction and low effort pro-environmental behavioural intentions (e.g., willingness to pay for park use and subsidies). Unlike Hypothesis 4a, Hypothesis 4b was not supported by the pooled data. A negative relationship was noted between place satisfaction and high effort pro-environmental behavioural intentions (t = -3.775, $p < 0.001$; $\beta = -0.25$). This suggests that the more satisfied visitors were with their decision to visit the national park, the weaker their intentions were to engage in high effort pro-environmental behaviours. The inverse effect of place satisfaction on visitors' high effort pro-environmental intentions is consistent with Stedman (2002) and Prester, Rohrmann, & Schellhammer (1987) in that place satisfaction negatively influences pro-environmental behaviour.

Results indicate that while place satisfaction exerted a positive influence on visitors' low effort pro-environmental behavioural intentions, it negatively influenced high effort pro-environmental behavioural intentions. Visitors who are generally satisfied with their decision to visit the park may not see the need to improve the park's environment, perhaps because the

park and its resources are already meeting their visitation goals and are perceived to be in an optimal condition by such visitors. Thus, these visitors may not find any need to enhance the environment by engaging in environmental behaviours that involve high effort, but are willing to engage in those environmental behaviours that involve low efforts to maintain and protect the park's environment. Our findings reinforce the need to consider pro-environmental behaviour as something other than a uni-dimensional construct and suggest that the same factor can have different effects, depending on the type of environmental behaviour.

An important learning that emerges from the above findings is that park managers may need to consider increasing visitors' attachment to the park by investing in the park's distinctive attributes, infrastructure, affective components, and activities. Evidence suggests that these elements are likely to influence place attachment (e.g., Jorgensen & Stedman, 2001; Williams et al., 1992). The authors suggest that this can be done by provision of information (e.g., leaflets, information desk, tour guides, websites) and allow park users to contribute to the well-being and protection of the park's environment. Findings indicate that place identity and place affect contributed significantly to place attachment. This confirms the merits of park management attempts to promote the affective component of the park and invest in strategies that are likely to make visitors identify themselves more with the park. Strategies to promote affective components could range from on-site marketing and post-visit communication/interpretation aimed at encouraging repeat visitation to sophisticated message development and delivery aimed at building emotional attachment, a sense of belonging, and enhanced personal meaning.

These strategies are likely to increase place satisfaction and pro-environmental behavioural intentions of park visitors. However, park authorities may need to recognize that

visitors who are highly satisfied with their decision to visit the park are less likely to engage in high effort pro-environmental behaviours. Park managers thus may also need to communicate to visitors why high effort pro-environmental behavioural intentions are of benefit to themselves, the park and society generally. Clear articulation of the threats to park sustainability and the efficacy of visitor pro-environmental behaviour in reducing these threats may be required. Visitors need to see for example how the current global economic crisis has impacted on the capacity of Parks Victoria to staff and to maintain Dandenong Ranges National Park, particularly its recreational opportunities. To address these threats, visitors may be asked to volunteer on a specific park-related activity (e.g., clean-up Australia Day or pull up weeds that encroach on the park) or to write a letter to support the park (e.g., seeking additional facilities, services and staff to enhance or expand recreational activities within the park). Environmental behaviour literature argues that people will act only if they see the efficacy of their behaviours (in this case how they will directly benefit the park visitor and protect or enhance the current quality and range of visitor experiences at the park) (Barr, Gilg, & Shaw, 2011).

It may also be important for the park authorities to segment visitors based on their place satisfaction levels. Park managers may consider collecting information on satisfaction levels and demographic background of visitors through surveys. This information would allow park managers understand the characteristics of visitors with high levels of place satisfaction. Data collected can then be used to segment visitors, and based on results, post-visitation marketing and behavioural change strategies may be implemented to encourage visitors with high place satisfaction to engage in high effort pro-environmental behavioural intentions. This is likely to be a successful strategy given that the park attracts many repeat visitors. It may also be useful for the park authority to provide on-site information (e.g., through leaflets) to visitors about the benefits of engaging in high effort pro-environmental

behaviours for the park and wider society. These strategies are likely to target and benefit both first time and repeat visitors to the park.

8. Conclusion and recommendations for future research

By considering place attachment as a four-dimensional construct and investigating its relationships with place satisfaction and pro-environmental behaviours in a single model, this study offers new theoretical insights to researchers and scholars. The overall measurement model for place attachment showed a good fit to the data which required no re-specification. This implies that the measurement model imposed for the place attachment construct (Figure 2) is consistent with the place attachment observations in the literature. From a methodological perspective, the confirmatory factor analytic method applied supported the validity of the place attachment scale as a second-order factor and will be of interest to researchers wishing to capture place attachment in other contexts. Furthermore, while place dependence, identity, and more recently affect have been used as sub-constructs of place attachment, researchers have seldom included the social bonding dimension in a national park context. Yet, as argued in literature, it remains an important component of the human-place interaction (Kyle et al., 2005).

The effects of place attachment on place satisfaction and low and high effort pro-environmental behavioural intentions were further examined using structural equation modelling. Upon establishing a valid measurement model, the structural model was tested. While previous research did consider the effect of place attachment on pro-environmental behavioural intentions, a notable theoretical contribution of this study is that it delineates pro-environmental behavioural intentions into low and high effort intentions. Researchers have called for more empirical research on the different types of pro-environmental behaviours that individuals exhibit (Dono, Webb, & Richardson, 2010). Our findings suggest that place

satisfaction has differential effects on the two types of pro-environmental behavioural intentions that were investigated. This suggests that it may be important for researchers not to consider pro-environmental behavioural intent as a uni-dimensional construct. Future studies can further test Halpenny (2010) in other national park settings to further this stream of research. Another contribution of this study is that it contributes to research on place satisfaction in a nature-based setting (O'Neill, et al., 2010; Ramkissoon et al., 2012). The differential effects of place satisfaction on low and high effort pro-environmental behavioural intentions suggest the need for studies to delve further into the nature of park-related pro-environmental behaviours.

Although the structural model tested in the present study is an improvement over existing ones, future studies can expand on the model by including other variables such as normative concerns (Raymond et al., 2011), recreation involvement (Lee, 2011), and environmental activism (Dono et al., 2010) that may influence pro-environmental behaviours. Inclusion of these variables may improve the predictive power of the model. The ways in which some of the variables of the study have been defined may give rise to some limitations. Existing studies suggest that overall satisfaction is a function of visitors' satisfaction with different elements of a setting (Tonge & Moore, 2007). Bolton and Drew (1991) also noted that satisfaction comprises overall and specific place/product evaluations. It is for these reasons that Ryan, Shuo, and Huan (2010) argued in favour of a "multi-attribute importance evaluation approach" (p. 188). Thus, there may be value for future studies to delineate the satisfaction construct into other sub-dimensions in order to shed further light on the relationships between place attachment and place satisfaction.

The notion of place attachment also poses some conceptual problems. While domestic visitors may have more opportunities to repeatedly visit a place, international

visitors are often not in a position to make repeat visits due to geographical, financial, or other constraints. Thus, place attachment may have limited relevance in the case of international visitors. In addition, they may simply be attached to a particular destination or be loyal to tour operators rather than be attached to an attraction within that destination. Some others may simply be engaging in habitual behaviour without having any emotional connection with a place. These pose some challenges when investigating place attachment which future studies should address. Given the contextual nature of place attachment, it is also important that future research tests the model in other recreational contexts and settings to confirm the external validity of the current study's findings.

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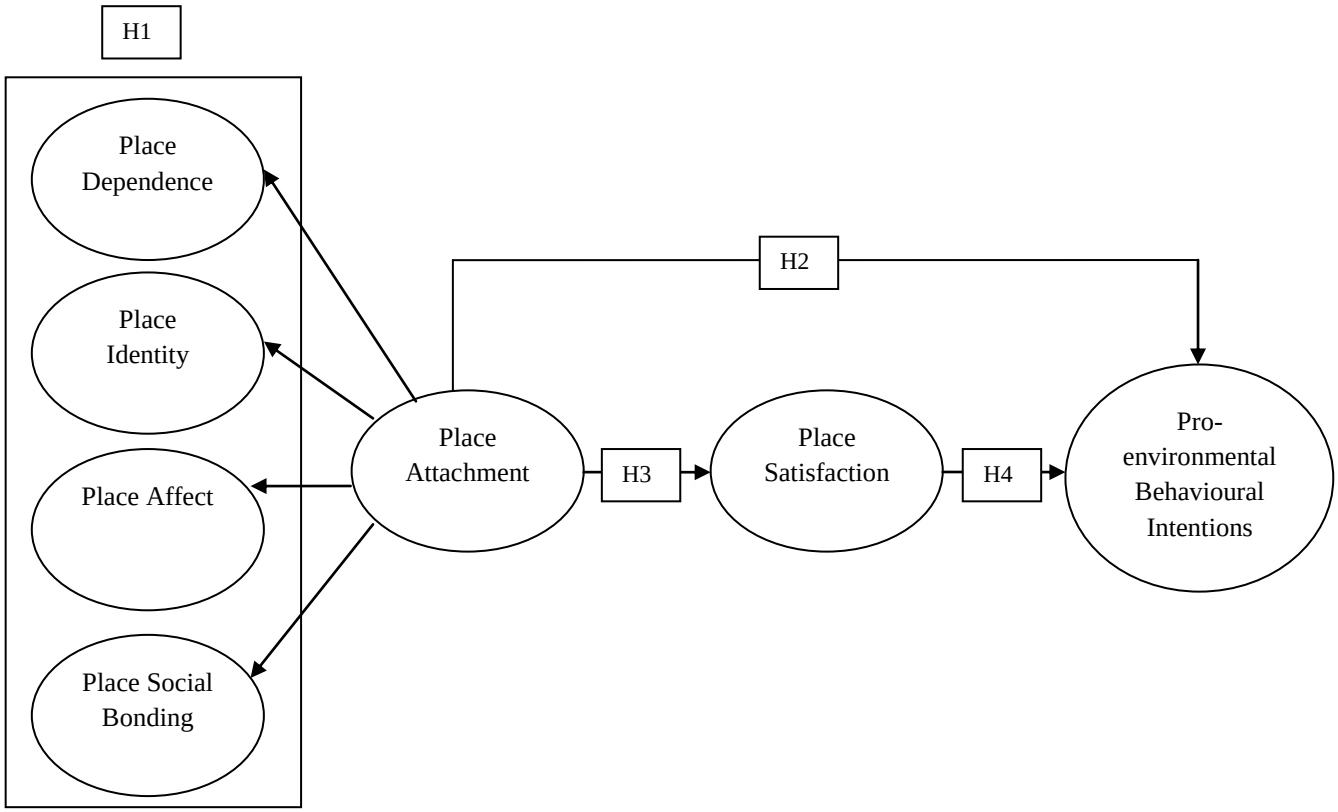

Figure 1. Proposed model

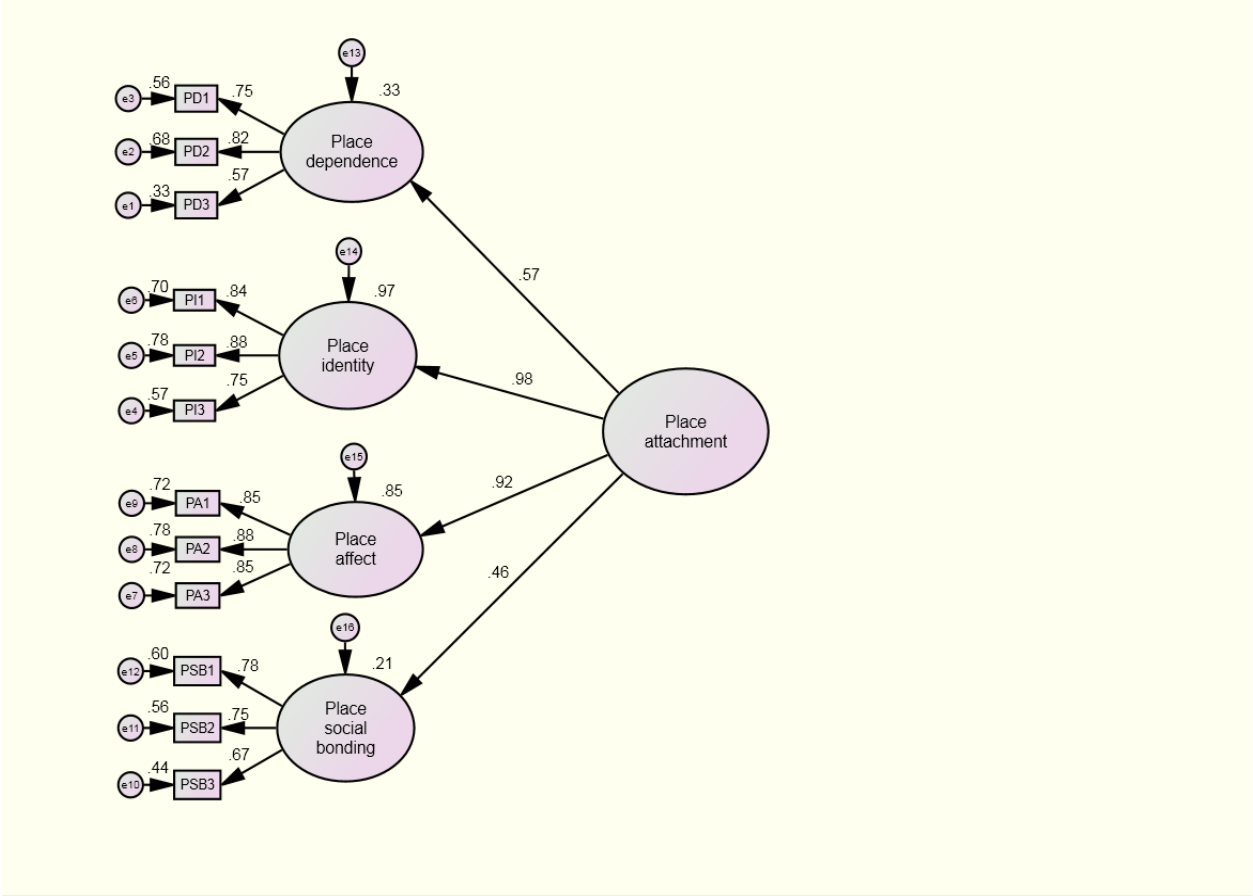

Figure 2. Second-order confirmatory factor analysis

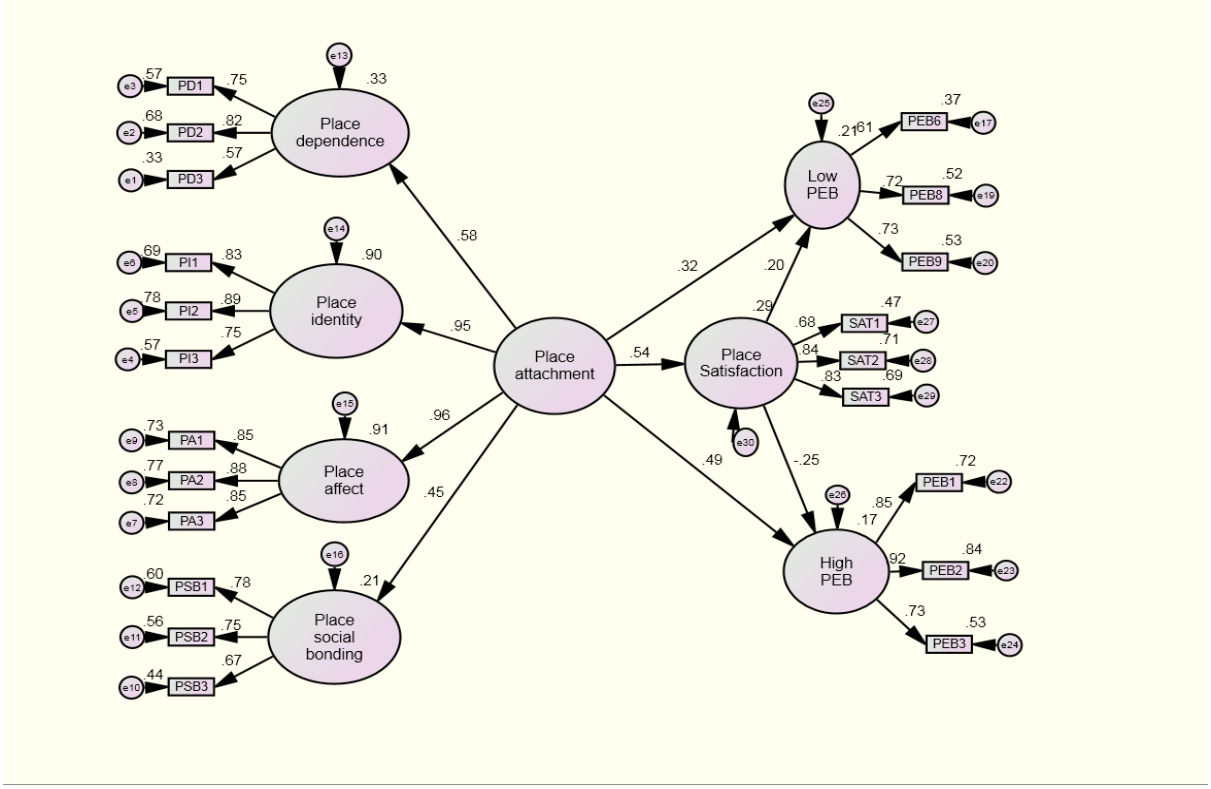

Figure 3. Structural model

Table 1 Overall measurement model indices for place attachment as a second-order factor

Model	Chi-square	RMSEA	GFI	CFI	IFI	PGFI	PNFI
OMM	178 (P=0.00)	0.07	0.94	0.93	0.96	0.61	0.71

Table 2 Overall measurement model indices

Model	Chi-square	RMSEA	GFI	CFI	IFI	PGFI	PNFI
OMM	531.9 (P=0.00)	0.067	0.90	0.93	0.93	0.70	0.76

Table 3 Psychometric properties of the confirmatory factor model

Constructs and Scale items	Factor loadings	Composite reliability	Average Variance extracted
Place Attachment		**0.86**	**0.61**
Place Dependence		0.76	0.53
PD1 For what I like to do, I could not imagine anything better than the settings and facilities provided by this National Park	0.75		
PD2 For the activities I enjoy the most, the settings and facilities provided by this National Park are the best	0.82		
PD3 I enjoy visiting this National Park and its environment more than any other parks	0.57		
Place Identity		0.86	0.68
PI1 I identify strongly with this park	0.83		
PI2 I feel this National Park is part of me	0.89		
PI3 Visiting this National Park says a lot about who I am	0.75		
Place Affect		0.90	0.74
PA1 I am very attached to this park	0.85		
PA2 I feel a strong sense of belonging to this National park and its settings/facilities	0.88		
PA3 This National Park means a lot to me	0.85		
Place Social Bonding		0.78	0.54
PSB1 Many of my friends/family prefer this National Park over many other parks	0.78		
PSB2 If I were to stop visiting this park, I would lose contact with a number of friends	0.75		
PSB3 My friends/family would be disappointed if I were to start visiting other settings and facilities	0.67		
Place Satisfaction		**0.83**	**0.62**
SAT1 I believe I did the right thing when I chose to visit this National Park	0.68		
SAT2 Overall, I am satisfied with my decision to visit this National Park	0.84		
SAT3 I am happy about my decision to visit this National Park	0.83		
Low effort pro-environmental behavioural intent (Factor 1)		**0.73**	**0.50**
PEB6 Volunteer to reduce my use of a favourite spot in this National Park if it needs to recover from environmental damage	0.61		
PEB8 Tell my friends not to feed animals in this National Park	0.72		
PEB9 Sign petitions in support of this National Park	0.73		
High effort pro-environmental behavioural intent (Factor 2)		**0.87**	**0.69**
PEB1 Participate in a public meeting about managing this National Park's programs	0.85		
PEB2 Volunteer my time to projects that help this National Park	0.92		
PEB3 Write letters in support of this National Park	0.73		

Table 4 Discriminant validity matrix

	Place attachment	Place Satisfaction	Low PEB	High PEB
Place attachment	**0.62**	0.54	0.42	0.35
Place satisfaction		**0.62**	0.38	0.02
Low PEB			**0.50**	0.23
High PEB				**0.69**

Table 5 Structural equation model indices

Model	Chi-square	RMSEA	GFI	CFI	IFI	PGFI	PNFI
SEM	540.7 (P=0.00)	0.067	0.90	0.93	0.93	0.70	0.77

Table 6 Regression paths

Hypothesis	Regression paths coefficients	Standard path	Critical ratio (t-value)	*p*	Results
H2a	Place attachment → Low PEB	0.317	4.089	***	Supported
H2b	Place attachment → High PEB	0.491	5.882	***	Supported
H3	Place attachment → Place satisfaction	0.542	6.670	***	Supported
H4a	Place satisfaction → Low PEB	0.201	3.164	**	Supported
H4b	Place satisfaction → High PEB	-0.248	-3.775	***	Not supported

**p<.01; ***p<.001