The antecedents of place attachment in the context of an Australian national park

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1. Introduction

Research on place attachment has occupied a prominent role in the environmental psychology literature for over 40 years. This work has illustrated that understanding people's bonds with the physical world and the processes that bind these ties has both theoretical and practical implications (Altman & Low, 1992; Scannell & Gifford, 2010; Stewart, Williams, & Kruger, 2013). Previous research has shown that the nature and intensity of people-place relationships is context specific (Stedman, 2016; Vorkinn & Riese, 2001), distinguished by scale (e.g., home vs. neighborhood), and a function of socio-cultural experience (Bailey, Devine-Wright, & Batel, 2016). Therefore, scholars have approached the study of place from a number of epistemological traditions (Raymond, Kyttä, & Stedman, 2017; White, Virden, & van Riper, 2008), highlighting a need to be open to the plurality of place concepts and their underpinning assumptions (Patterson & Williams, 2005; Williams, 2014). In the context of this investigation in an Australian national park, our approach to the conceptualization and measurement of place attachment involves affect, cognition, and behavior (Jorgensen & Stedman, 2001; Kyle, Mowen, & Tarrant, 2004, 2005).

Given the demonstrated utility of place research for providing insight on human and environmental wellbeing (for reviews, see Lewicka, 2011; Masterton et al., 2017; Scannell & Gifford, 2010), understanding the processes that drive humans' attachment to place across a range of spatial contexts is both important and emerging. Of particular interest are the relationships that people form with the natural world and factors that influence this (dis)association. Specifically, we evaluate the exogenous role of environmental worldviews that reflect basic patterns of belief and provide insight on preferences for conservation outcomes (Schultz et al., 2005; van Riper & Kyle, 2014). Our conceptualization of worldviews aligns with the New Ecological Paradigm (NEP) scale (Dunlap, Van Liere, Mertig, & Jones, 2000), which rejected the human exemptionalism paradigm in support of an emerging 'environmental' ethos in society. The two dimensional structure of this construct, encompassing human-based and nature-based concerns (Thompson & Barton, 1994), can provide insight on how a predominant worldview indicates whether people are more or less likely to act as resource stewards without being sanctioned or incentivized (Tarrant & Cordell, 2002; Vaske & Donnelly, 1999).

Environmental worldviews influence "place-based" motivations that we define as the perceived benefits that emerge from opportunities afforded by an environment (Driver, 1996). The role of motivations in mediating the relationship between worldviews and place attachment is also not well understood. Drawing on expectancy-valence theory (Lawler, 1973), we argue that nature-based worldviews positively influence an array of motivations that cause greater inclinations to bond with an outdoor setting. This hypothesis is based on the premise that people with predominant nature-based worldviews are more likely to experience the benefits of nature, both psychological and physiological (Lengen & Kistemann, 2012). Previous research has examined the relationships between worldviews and the reasons why people feel compelled to engage in outdoor activities independently. For example, Kyle et al. (2004) suggested that motivations facilitated the formation of attachment to a large urban park environment. Raymond, Brown,

and Robinson (2011) also found evidence for relationships among values, environmental worldviews, and place attachment among rural landholders in South Australia. However, we contend that environmental worldviews are a more psychologically stable orientation that underpins the motivation-attachment relationship. Given that empirical evidence in support of this proposition remains absent from the literature, the purpose of this investigation was to examine the influence of environmental worldviews on visitors' perceived benefits of places (i.e., motivation) and attachments to the land and seascapes of a protected area in Queensland, Australia.

2. Literature review

2.1. Place attachment

Place attachment is the bonding that occurs between people and meaningful environments. Scannell and Gifford (2010) provided a synthesis of the place literature and offered a tripartite framework for organizing the literature in terms of: a) the meanings individuals and collectives ascribe to the physical world; b) a psychological processes which include the cognitive, affective and behavioral aspects of individuals' attachment to place; and c) the physical elements that comprise the landscape. While our conceptualization is most firmly anchored within the psychological process dimension, elements of the person and place dimensions are also revealed in our operationalization of the place attachment construct. The dimensions of place measured in this study are considered abstract representations of meaning that respondents ascribe to the physical landscape. These meanings are, in large part, an artifact of the individual's past and present experiences. The place component is also the focal attitude object in our measures. While we make no reference to specific attributes that comprise the context in which this research was conducted, these attributes are fundamental to how people experience places and the subsequent meanings that emerge from those experiences.

One of the most widely adopted conceptualizations and measures of place attachment was developed by Williams, Patterson, Roggenbuck, and Watson (1992) in the area of natural resource management. These authors expressed concern with the philosophy of U.S. public land management policies that govern natural resources, and likened current efforts "to an engineering-like emphasis on the manipulation and control" of setting attributes to deterministically impact the human experience of nature (Williams et al., 1992, p. 30). This commodification of natural resources neglected the emotional and symbolic values that humans ascribe to the environment. Findings from their investigation of visitors to wilderness areas within the U.S. illustrated that the intensity of respondents' attachment was key in distinguishing variation in indicators related to personal characteristics, behavior, and management preferences for a setting. Since then, a large body of literature has been published illustrating the utility of place for natural resource managers (Kruger, Hall, & Stiefel, 2008; Stewart et al., 2013). This understanding–that people's interpretation and interaction with nature is not solely defined by the physical form–is becoming a prominent feature of protected area management across the globe (Gurney et al., 2017).

Much of the research on place attachment that has occurred in the context of what Patterson and Williams (2005) refer to as the psychometric tradition, has adopted indicators that provide insight on the extent to which the setting is important, are useful for achieving desired goals, and is supportive of one's sense of self. In this vein, Williams et al.'s (1992) conceptualization of place attachment was comprised solely of two dimensions; place identity and place dependence. While these authors were influenced by Proshansky, Fabian, and Kaminoff (1983) who suggested that place identity was a sub-structure of self-identity, their measure also included indicators of their respondents' emotional attachment to a landscape. For Williams et al., emotion and cognition were intertwined. For place dependence, these authors turned to the work of Stokols and Shumaker (1981) who suggested that

attachment to landscapes emerged from a perception that one setting would satisfy individual needs better than others.

While other dimensions of place attachment have been proposed (e.g., Kyle, Graefe, & Manning, 2005; Raymond et al., 2011; Trentelman, 2009), one that has garnered increasing support in the literature concerns the social ties that bind individuals to the landscape. In this context, attachment is girded by memories from meaningful experiences often shared with significant others (e.g., family and friends). While contextual, several authors have reported these phenomena to be key to understanding attachment to place (Fishwick & Vining, 1992; Kyle & Chick, 2007; Perkins & Long, 2002). Our study context and population–visitors to an island within the Great Barrier Reef Marine Park–is inclusive of a population experiencing nature principally with family and friends. Consequently, our conceptualization of place attachment was inclusive of this third dimension entitled, "social bonding."

2.2. Motivations

The psychological, social, and physiological outcomes (i.e., "motivations") of recreational experiences have been positioned as causal antecedents to place attachment (Anderson & Fulton, 2008; Kyle et al., 2004). Past work exploring the motivation-attachment relationship has drawn on expectancy-valence theory (Lawler, 1973; Vroom, 1982) to operationalize people's experience preferences. In this tradition, motivation is hypothesized to arise from an expectation of personal gain stemming from a behavior, such that the prospect of attaining valued outcomes from recreational experiences motivate participation and engagement (Manfredo, Driver, & Tarrant, 1996). Settings vary in the opportunities they afford recreationists given heterogeneity in physical attributes, human histories, and regulatory frameworks that govern human-environment interactions. Therefore, our conceptualization of motivation is place-based because settings provide different outcomes for people (Kyle et al., 2004). A desire to obtain psychological, social, and physiological benefits from an experience is the motivation for interaction with a given natural environment. The setting then becomes the backdrop for the realization of these goals through sustained interaction and affective associations.

Much of the work exploring place-based motivation in recreation contexts has operationalized this construct using Driver's (1996) Recreation Experience Preference (REP) scale. This metric was developed as a tool to characterize differences in users' preferred outcomes of recreation experiences–that is, the valued outcomes that compel participation through "push" (e.g., enjoying nature) and "pull" (e.g., escape) factors that are positively and negatively correlated with behavior, respectively (Moore & Driver, 2005). A growing body of work has demonstrated the importance of considering this scale in natural resource management contexts, and explored correlations between motivational domains and socio-demographic characteristics (O'Connell, 2010), specialization in specific recreational activities (Kuentzel & Heberlein, 2008), and satisfaction with experiences (Manfredo et al., 1996). Beyond the utilitarian foundations of the scale, however, little work has been done to explore the cognitive structures that underpin motivation. Given that previous research has indicated enduring beliefs about human-nature relationships shape subjective evaluations of resources and their conditions (Stern, 2000), there are potentially more stable processes that influence the perceived benefits afforded by recreational settings, and the attachments that stem from interactions with them (Kyle et al., 2004).

2.3. Environmental worldviews

Environmental worldviews are defined as a set of deeply held beliefs about the natural world and the normative role of people in environmental protection. A variety of measures have been developed (Bruni, Chance, & Schultz, 2012; Schultz et al., 2005), including the New

Ecological Paradigm (NEP) scale (Dunlap et al., 2000) that examines people's beliefs about living in harmony with (i.e., nature-based worldview) or having mastery over the environment (i.e., human-based worldview). The NEP includes 15 statements that relate to limits to growth, the position of humans in the environment, the fragility of nature, and the imminence of eco-crisis. The validity of NEP and its representation of different views have been tested, repeatedly (Dunlap, 2008). Despite ongoing debate on the dimensionality of this construct (Amburgey & Thoman, 2012; Hawcroft & Milfont, 2010), a large body of research has relied on two dimensions to reflect the underlying belief systems that predispose people to act in support or opposition of policy change (Milfont & Duckitt, 2004; Wynveen, Kyle, & Sutton, 2014). That is, people can be situated along a continuum anchored by nature-based and human-based worldviews.

Both full and abbreviated versions of the NEP have been used as explanatory variables across numerous contexts, because these ideas are psychologically stable (i.e., not easily changed) and their pyshcometric properties are well-established (Dunlap, 2008). Previous research has observed NEP's direct and indirect influence on nonuse motivations (Kotchen & Reiling, 2000), nature-based tourism motivations (Luo & Deng, 2008) and self-reported commitment to the environment (Davis, Green, & Reed, 2009). In the context of nature-based recreation, Kil, Holland, and Stein (2014) found that environmental worldviews mediated the relationship between motivations and pro-environmental behaviors. van Riper and Kyle (2014) also provided evidence of the role of NEP as a predictor of the attitude-behavior relationship. However, few studies have considered how environmental worldviews influence concepts of place despite previous research (e.g., Bonaiuto, Carrus, Martorella, & Bonnes, 2002) arguing that place-centered perspectives are needed to enhance environmental worldviews research.

2.4. Consumptive and non-consumptive use

The designation of consumptive and non-consumptive use refers to the broad activity types that characterize outdoor recreation. Consumptive users are people who engage in activities whereby something is taken or harvested from nature for commercial, sport, or subsistence purpose (Duffus & Dearden, 1990). Non-consumptive users engage in activities that do not result in resource extraction and cause minimal harm to the environment (Kyle, Norman, Jodice, Graefe, & Marsinko, 2007). This dichotomy has proven to be useful for capturing preference heterogeneity in multiple resource management contexts (Eisenhauer, Krannich, & Blahna, 2000; van Riper, Kyle, Sutton, Barnes, & Sherrouse, 2012). Results from previous research have indicated that consumptive orientations are associated with lesser degrees of place attachment (Kyle et al., 2007), whereas people engaged in non-consumptive activities tend to have stronger environmental concerns (Dunlap & Heffernan, 1975). Therefore, we contend that the valence and strength of relationships among worldviews, motivations, and place attachment may vary as a function of activities pursued while interacting with an environment.

2.5. Hypotheses

We hypothesized that human-based and nature-based worldviews would positively predict five dimensions of motivations to engage in outdoor recreation, respectively (Fig. 1). Based on past empirical evidence (Anderson & Fulton, 2008; Budruk & Wilhelm Stanis, 2013), we also hypothesized that "push" motivations would, in turn, positively influence three dimensions of place attachment whereas the "pull" motivation measuring escape would negatively predict place attachment. Additionally, we tested whether engagement in consumptive versus non-consumptive activities would moderate the worldview-motivation-attachment relationship.

3. Methods

3.1. Data collection

Survey data were collected June–September 2011 on Hinchinbrook Island National Park located in northeast Queensland, Australia. This biologically diverse and mountainous protected area sits within the Great Barrier Reef World Heritage Area and accommodates a range of consumptive (e.g., sport fishing,[1] prawning) and non-consumptive (e.g., hiking, camping) activities. Most activities occur on Hinchinbrook Island's 32-km Thorsborne Trail that includes few facilities and maintains a wilderness-like experience for visitors, as well as in the adjacent waters. Decisions about data collection were informed by a preliminary on-site visit in 2010 and made in consultation with an agency, Queensland Parks and Wildlife Service, which oversaw the terrestrial island system and Hinchinbrook Channel. Drawing from intercept survey methods (Flint et al., 2016), particularly in protected areas (Halpenny, 2010; van Riper & Kyle, 2014), the sampling frame was stratified by day of the week and time of day to obtain a representative sample during the study period. Potential respondents were approached by trained administrators and asked to reflect on their most recent visit. For groups, the individual with the most recent birthday who was over the age of 18 years was asked to participate to minimize selection bias (Battaglia, Link, Frankel, Osborn, & Mokdad, 2008). For people that refused to complete the on-site survey, a hard copy of the questionnaire was provided with a postage paid envelope enabling them to complete the questionnaire at their convenience. A total of 400 visitors were approached and 209 agreed to participate, which exceeded minimum standards for sample size and model identification (Kline, 2015; MacCallum, Browne, & Sugawara, 1996). All on-site encounters were recorded in a contact log and our final response rate was 52%.

3.2. Measures

Place attachment was measured using items adapted from the literature (Kyle et al., 2004, 2005), and included the dimensions of *Place Identity* (five items), *Place Dependence* (four items), and *Social Bonding* (three items). Motivations for engaging in recreation were measured using 19 survey items drawn from past research that reflected the perceived benefits of outdoor recreation (Moore & Driver, 2005). The types of motives that pushed or pulled respondents into activities included *Achievement* (three items), *Similar People* (four items), *Learning* (four items), *Enjoying Nature* (four items), and *Escape* (four items). Environmental worldview was operationalized using items from the New Ecological Paradigm scale (Dunlap et al., 2000) including the two dimensions of *Nature-based* (six items) and *Human-based* worldviews (six items). All items were measured on five-point bi-polar Likert scales ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree", with a mid-point of neutral. Finally, respondents were assigned to subgroups according to their reported activities in consumptive (e.g., sport fishing[1], prawning) and non-consumptive (e.g., hiking, camping) activities.

3.3. Analysis

Confirmatory factor analysis (CFA) was first conducted on the pooled sample to test the hypothesized factor structure of environmental worldviews, motivation, and place attachment. After conducting a CFA, nine survey items (three NEP and six place attachment items) were dropped from the model due to low and/or cross factor loading scores. The analyses illustrated the hypothesized factor

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[1] We assigned all anglers to the consumptive subgroup because the majority engaged in resource extraction, though some may have practiced catch-and-release.
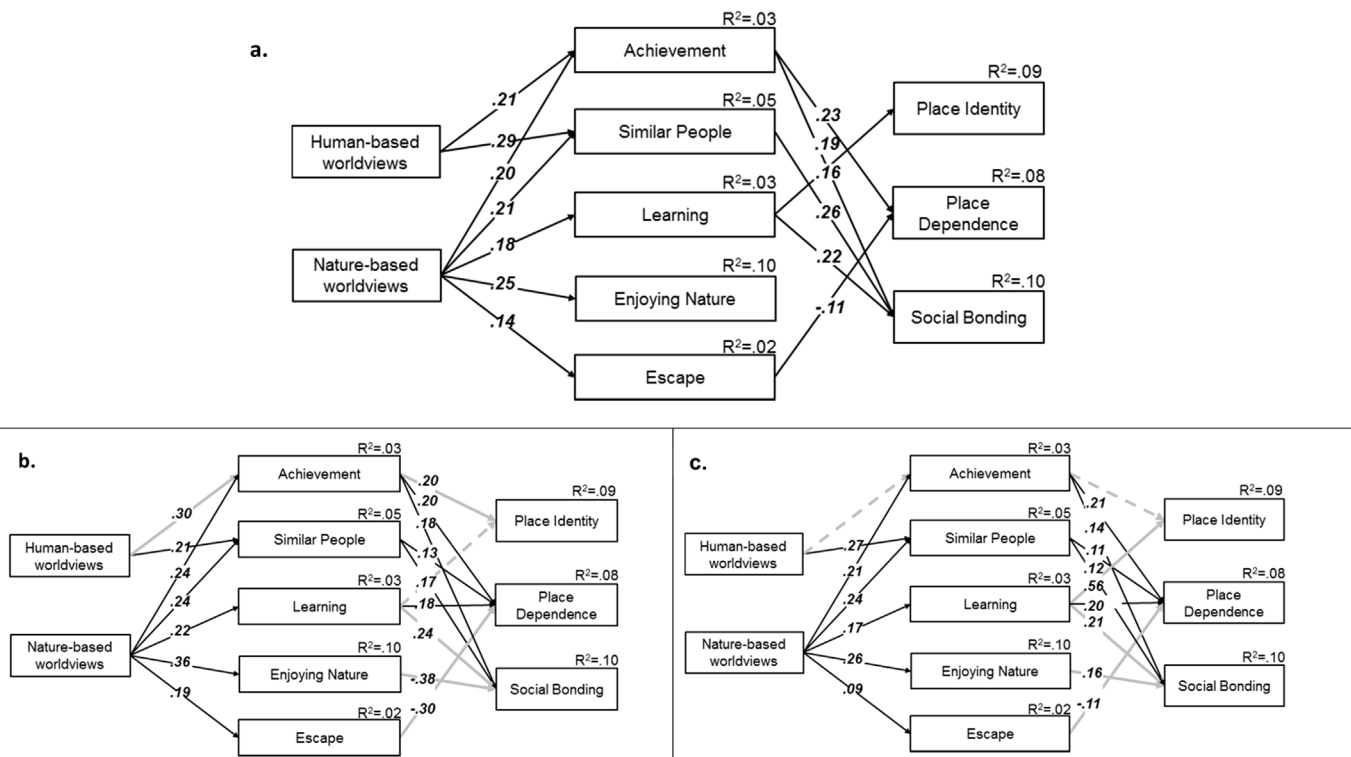
Fig. 1. Results of the structural model for (a) the pooled sample, (b) respondents who engaged in consumptive activities, and (c) respondents who engaged in non-consumptive activities. Invariance testing results for models b and c show all significant paths, including beta coefficients that were significantly different from each other (solid gray arrows) and relationships that were significant for only one subgroup (dashed gray arrows).

structure fit the data well. Construct reliability estimates were calculated for all scales in SPSS (version 22.0), and the internal consistency (Cronbach's alpha) of all factors was above Cortina's (1983) 0.60 threshold. Our estimate of composite reliability (CR) was adequate according to Bagozzi and Yi's (1988) threshold of 0.60, and our calculated average variance explained (AVE) exceeded Fornell and Larcker's (1981) 0.50 threshold. The pattern of missing data was shown to display missing completely at random and impacted less than 10 percent of responses. Consequently, we utilized full information maximum likelihood estimation in LISREL (Version 8.70) to accommodate incompletely observed indicators (Enders, 2010). Item parcels were constructed from factor item means (Little, Cunningham, Shahar, & Widaman, 2002). Given the complexity of our model, item parceling was performed to improve the ratio of sample size to the number of variables. The hypothesized structural relationships were tested using manifest variable regression, and the moderation hypothesis was tested using the invariance constraints procedure described by Bollen (1989).

4. Results

Our sample was comprised of mostly (98%) White respondents with an average age of 45 (Table 1). A total of 59% were men, which aligns with the demographic characteristics of visitors to Australian national parks (Roy Morgan Research, 2017). The annual household income for 60% of respondents was $100,000 or less, which was less than the median household income in 2011 of $64,168 (ABS, 2018). The majority (71%) were born in Australia, most (88%) resided in the area, and just over half (55%) reported at least some university training.

We observed partial support for the hypothesized relationships in the structural model (χ^2 = 23.37, df = 11, RMSEA = 0.07, NFI = 0.93, CFI = 0.98) (Tables 2–4). For the pooled sample, *Nature-based* worldviews positively predicted five dimensions of motivations (*Achievement*: γ = 0.20; *Similar People*: γ = 0.21; *Learning*: γ = 0.18; *Enjoying Nature*: γ = 0.25; *Escape*: γ = 0.14). *Human-based* worldviews on the other

Table 1
Socio-demographic characteristics of outdoor recreationists on Hinchinbrook Island National Park.

		Valid Percent
Gender	Male	59.8%
	Female	40.2%
Education	Finished primary school	1.6%
	Some secondary school	10.8%
	Finished secondary school	25.3%
	Some technical school	8.1%
	Finished technical school	14.0%
	Some university/college of advanced education training	5.9%
	University/college of advanced education training degree	20.4%
	Honors	3.8%
	Masters	17.7%
	Ph.D., J.D. or equivalent	4.8%
Income	< $50,000	27.4%
	$50,000 - $99,999	32.1%
	$100,000 - $149,999	19.6%
	≥ $150,000	20.3%
Ethnicity	Hispanic (yes)	2.5%
Race	White	98%
Use	Past Visitation (yes)	59.9%
Place of residence	Live in Australia (yes)	87.7%
Place of birth	Born in Australia (yes)	69.7%
Household size	Number of people in household (*M, SD*)	2.86 (2.29)
Age	Ages (*M, SD*)	44.32 (15.76)

hand positively predicted two dimensions of motivation to participate in outdoor recreation activities (*Achievement*: γ = 0.21; *Similar People*: γ = 0.29) despite our hypotheses to the contrary. We also found that *Place Identity* was positively predicted by *Learning* (β = 0.16), and as expected, *Place Dependence* was positively predicted by *Achievement* (β = 0.23) and negatively predicted by *Escape* (β = −0.11). *Social Bonding* was positively predicted by *Achievement* (β = 0.19), *Similar*

Table 2

Means, standard deviations, internal consistencies, t-stats, and factor loading scores for scale items measuring environmental worldviews for respondents in the pooled sample and two subgroups defined by activity engagement.

Survey items	Pooled Sample	Consumptive	Non-consumptive	t	λ
	Mean (SD)	Mean (SD)	Mean (SD)		
Nature-based worldviews (α = 0.854, CR = 0.975, AVE = 0.876)					
When humans interfere with nature it often produces disastrous consequences	3.78 (0.98)	3.70 (1.04)	3.84 (0.93)	14.96	0.71
Humans are severely abusing the environment	3.67 (1.16)	3.32 (1.18)	3.96 (1.08)	16.94	0.74
Plants and animals have as much right as humans to exist	3.99 (1.09)	3.96 (1.20)	4.01 (1.00)	15.40	0.71
The Earth is like a spaceship with very limited room and resources	3.43 (1.09)	3.33 (1.11)	3.54 (1.06)	10.32	0.59
The balance of nature is very delicate and easily upset	3.95 (0.95)	3.87 (0.98)	4.02 (0.92)	13.43	0.67
If things continue on their present course we will soon experience a major ecological catastrophe	3.51 (1.16)	3.30 (1.26)	3.68 (1.05)	13.82	0.68
Human-based worldviews (α = 0.802, CR = 0.969, AVE = 0.846)					
Human ingenuity will ensure that do not make the earth unlivable	2.94 (1.08)	3.05 (1.13)	2.83 (1.01)	6.13	0.43
The earth has plenty of resources if we just learn how to develop them	3.47 (1.09)	3.62 (1.14)	3.33 (1.04)	9.03	0.57
The balance of nature is strong enough to cope with the impacts of modern industrial nations	2.23 (1.00)	2.49 (1.11)	2.01 (0.84)	13.17	0.68
The so-called "ecological" crisis facing humankind has been greatly exaggerated	2.78 (1.17)	3.18 (1.16)	2.42 (1.07)	15.50	0.74
Humans were meant to rule over the rest of nature	2.26 (1.08)	2.45 (1.18)	2.07 (0.97)	16.07	0.74
Humans will eventually learn enough about how nature works to be able to control it	2.52 (1.12)	2.75 (1.22)	2.33 (1.01)	9.55	0.58

Note. Scales ranged from 1 (Strongly Disagree) to 5 (Strongly Agree).
Fit Statistics: X^2 = 108.124, df = 53, p ≤ 0.01; RMSEA = 0.070 (0.056–0.098); CFI = 0.917; SRMR = 0.059.

People (β = 0.26) and *Learning* (β = 0.22).

We compared the relationships tested in our structural model between two subgroups defined by engagement in consumptive (52.1%) and non-consumptive (46.4%) activities on Hinchinbrook (Table 5, Fig. 1). Invariance tests of the regression coefficients indicated that six paths were significantly different between the two subgroups ($\Delta\chi^2$ = 66.91, p ≤ 0.001, Δdf = 20) (Table 6). As shown, human-based worldviews were positively related to *Achievement* (β = 0.30), which was in turn instrumental in shaping respondents' *Place Identity* (β = 0.20). This finding was only observed for respondents engaged in consumptive activities such as angling and prawning. *Place Identity* was also shaped by *Learning* (β = 0.56), though only for respondents

engaged in non-consumptive recreation. *Place Dependence* was influenced by a variety of motivations and results from the invariance testing showed significant differences between the two subgroups. *Escape* was important for all respondents, though non-consumptive recreationists (β = −0.11) who sought escape were less likely than consumptive recreationists (β = 0.30) to be dependent on places in the protected area. *Social Bonding* was influenced by four motivations, two of which were variant across subgroups. Specifically, as *Enjoying Nature* increased, *Social Bonding* decreased for consumptive recreationists (β = −0.38) and increased for non-consumptive recreationists (β = 0.16). *Learning* also had differential effects on *Social Bonding*, in that a stronger positive relationship was found for respondents in the

Table 3

Means, standard deviations, internal consistencies, t-stats, and factor loading scores for scale items measuring motivations for respondents in the pooled sample and two subgroups defined by activity engagement.

Survey items	Pooled Sample	Consumptive	Non-consumptive	t	λ
	Mean (SD)	Mean (SD)	Mean (SD)		
Achievement (α = 0.731, CR = 0.877, AVE = 0.727)					
To be challenged	3.36 (1.20)	3.05 (1.22)	3.60 (1.12)	10.60	0.61
To feel my independence	3.12 (1.22)	2.93 (1.36)	3.31 (1.06)	15.39	0.75
To be on my own	2.53 (1.22)	2.48 (1.37)	2.55 (1.08)	11.76	0.65
Similar People (α = 0.852, CR = 0.932, AVE = 0.902)					
To be with members of my group	3.98 (1.06)	3.98 (1.03)	3.97 (1.10)	13.64	0.68
To be with my friends	3.85 (1.08)	3.92 (1.04)	3.78 (1.13)	13.82	0.69
To be with people having similar values	3.67 (1.56)	3.81 (1.21)	3.53 (1.10)	22.43	0.81
To be with people who have similar interests	3.88 (1.10)	4.01 (1.05)	3.77 (0.94)	23.93	0.84
Learning (α = 0.865, CR = 0.912, AVE = 0.865)					
To understand things better here	3.42 (1.07)	3.32 (1.14)	3.51 (1.02)	11.05	0.60
To develop personal, spiritual values	2.62 (1.08)	2.54 (1.17)	2.67 (1.00)	24.25	0.81
To think about my personal values	2.86 (1.12)	2.76 (1.17)	2.97 (1.20)	33.39	0.87
To learn more about myself	2.76 (1.22)	2.62 (1.26)	2.90 (1.17)	29.09	0.84
Enjoying Nature (α = 0.881, CR = 0.812, AVE = 0.779)					
To view the scenery	4.37 (0.87)	4.04 (0.99)	4.65 (0.61)	28.93	0.85
To view the scenic beauty	4.47 (0.80)	4.20 (0.86)	4.72 (0.66)	27.06	0.83
To be close to nature	4.01 (1.09)	3.63 (1.20)	4.32 (0.88)	20.58	0.77
To be in a natural setting	4.19 (0.88)	3.97 (0.94)	4.38 (0.78)	17.33	0.73
Escape (α = 0.746, CR = 0.793, AVE = 0.756)					
To give my mind a rest	3.90 (1.05)	3.81 (1.13)	3.97 (0.98)	13.63	0.67
To experience tranquility	3.97 (0.93)	3.78 (1.06)	4.13 (0.78)	20.59	0.79
To be away from crowds of people	3.76 (1.16)	3.55 (1.25)	3.93 (1.05)	8.86	0.54
To experience the open space	3.90 (0.91)	3.85 (0.98)	3.94 (0.84)	12.32	0.64

Note. Values are mean scores on a five point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).
Fit Statistics: X^2 = 273.910, df = 142, p ≤ 0.01; RMSEA = 0.072 (0.059–0.085); CFI = 0.918; SRMR = 0.063.

Table 4

Means, standard deviations, internal consistencies, t-stats, and factor loadings for scale items measuring place attachment among respondents in the pooled sample and two subgroups defined by activity engagement.

Survey items	Pooled Sample	Consumptive	Non-consumptive	t	λ
	Mean (SD)	*Mean (SD)*	*Mean (SD)*		
Place Identity (α = 0.917, CR = 0.854, AVE = 0.765)					
I feel this place is part of me	2.70 (1.10)	2.86 (1.16)	2.50 (0.99)	18.48	0.72
I identify strongly with this place	3.16 (1.13)	3.43 (1.22)	2.92 (1.00)	55.80	0.92
I am very attached to this place	3.28 (1.12)	3.53 (1.19)	3.05 (1.00)	44.08	0.83
Visiting this place says a lot about who I am	2.98 (1.14)	2.93 (1.16)	3.02 (1.12)	14.84	0.67
This place means a lot to me	3.37 (1.09)	3.56 (1.14)	3.18 (1.02)	46.20	0.89
Place Dependence (α = 0.901, CR = 0.897, AVE = 0.812)					
This place is the best place for what I like to do	3.35 (1.04)	3.56 (1.11)	3.14 (0.94)	22.32	0.78
No other place can compare to this place	2.93 (1.17)	3.12 (1.28)	2.68 (1.03)	31.40	0.85
I get more satisfaction out of visiting this place than any other	2.70 (1.07)	2.93 (1.17)	2.48 (0.94)	35.87	0.87
Doing what I do here is more important to me than doing it in any other place	2.68 (1.10)	2.95 (1.17)	2.43 (0.97)	28.14	0.83
Social Bonding (α = 0.707, CR = 0.801, AVE = 0.749)					
I have a lot of fond memories about this place	3.81 (1.08)	3.75 (1.19)	3.84 (0.99)	12.01	0.64
I have a special connection to this place and the people who use it	2.88 (1.09)	3.11 (1.16)	2.61 (0.95)	20.70	0.80
I will (do) bring my children to this place	3.72 (1.09)	3.86 (1.18)	3.61 (0.99)	10.62	0.59

Note. Values are mean scores on a scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Fit Statistics: X^2 = 118.708, df = 51, $p \leq 0.01$; RMSEA = 0.088 (0.067–0.108); CFI = 0.953; SRMR = 0.047.

*$p \leq 0.01$.

Table 5

Regression results.

Dependent variable	Predictor variable	β	B	SE	R^2
Achievement	Human-based Worldviews	0.21**	0.10	0.04	0.03
	Nature-based Worldviews	0.20*	0.12	0.04	
Similar People	Human-based Worldviews	0.29***	0.13	0.05	0.05
	Nature-based Worldviews	0.21*	0.20	0.06	
Learning	Human-based Worldviews	–	–	–	–
	Nature-based Worldviews	0.18**	0.09	0.05	0.03
Enjoying Nature	Human-based Worldviews	–	–	–	–
	Nature-based Worldviews	0.25***	0.10	0.05	0.10
Escape	Human-based Worldviews	–	–	–	–
	Nature-based Worldviews	0.14*	0.11	0.05	0.02
Place Identity	Achievement	–	–	–	–
	Similar People	–	–	–	–
	Learning	0.26***	0.59	0.11	0.09
	Enjoy Nature	–	–	–	–
	Escape	–	–	–	–
Place Dependence	Achievement	0.23**	0.15	0.14	0.08
	Similar People	–	–	–	–
	Learning	–	–	–	–
	Enjoy Nature	–	–	–	–
	Escape	−0.11*	0.09	0.06	
Social Bonding	Achievement	0.19**	0.26	0.10	0.10
	Similar People	0.16**	0.22	0.07	
	Learning	0.22*	0.33	0.14	
	Enjoy Nature	–	–	–	–
	Escape	–	–	–	–

*$p \leq 0.05$, **$p \leq 0.01$, ***$p \leq 0.001$.

Table 6

Summary of invariance testing between groups.

	SBχ²	df	Δχ²	Δdf	RMSEA (90% CI)	CFI	NNFI
H1: Form	43.04	22	–	–	0.081	0.895	0.974
H2: Structural Coefficients	109.961	42	66.92*	20	0.111	0.823	0.917
H2a: Final structural Coefficients	61.94	37	–	–	0.076	0.970	0.926

*$p \leq 0.001$.

consumptive (β = 0.24) versus non-consumptive (β = 0.21) subgroups, although this difference was small.

5. Discussion

The aim of this study was to examine the influence of survey respondents' environmental worldviews on their motivations to participate in outdoor recreation activities and attachment to the land and seascapes of a protected area in Queensland, Australia. Our results indicated that respondents drew on their underlying environmental worldviews to evaluate the benefits afforded by the land/seascape, and in turn, their motives for participation influenced the intensity and type of attachment formed with the setting. In line with previous research (Duffus & Dearden, 1990; van Riper et al., 2012), results from invariance testing revealed variation in the strength and valence of hypothesized relationships across two subgroups defined by engagement in consumptive and non-consumptive activities. That is, our findings illustrated that place attachment was a function of multiple psychological processes reported by individuals engaged in activities that characterized different interactions with the physical world.

Our conceptualization of motivation was anchored in expectancy valence theory (Lawler, 1973) because we assumed that motivation stemmed from expectations of personal gain and believed the setting was instrumental for goal attainment. Specifically, *Place Dependence* was positively predicted by *Achievement, Similar People,* and *Learning,* and negatively predicted by *Escape*, that as push factors increased, so too did motivations to engage with the landscape and ultimately develop attachment, whereas pull factors drew people from their everyday lives into nature-based experiences (Moore & Driver, 2005). Given the negative correlation between respondents' quest for escaping the pressures of everyday life and *Place Dependence,* particularly for the consumptive subgroup, the Hinchinbrook context did not appear

unique in its ability to afford opportunities for escape. Similar findings have been reported in U.S. natural resource management contexts where "veteran" anglers expressing strong ties to the setting also reported having a broader array of setting substitutes (Hammitt, Backlund, & Bixler, 2004). We also extend an emerging body of literature that has adopted a similar conceptual framework of place-based motivations (Anderson & Fulton, 2008; Budruk & Wilhelm Stanis, 2013; Halpenny, 2010) by offering a perspective on how motivations influence attachment to a coastal and marine protected area. While the salience of motives has differed across research contexts, their influence on place attachment is consistent with what we report here; recreation-related motives that prompt place interaction and experience foster attachment.

We found differential effects of the antecedent processes of place attachment in the pooled sample (Kyle et al., 2005; Ramkissoon & Mavondo, 2015); however, differences also emerged between two survey subgroups. Six regression paths were non-invariant, suggesting that segmenting respondents according to consumptive versus non-consumptive use accounted for preference heterogeneity (Thompson & Barton, 1994). Respondents whose worldviews were predominantly geared toward the environment were compelled by a more diverse array of motivations than respondents who adopted a *Human-based* worldview. This finding mirrors previous research that has found differences in the motivational profiles of respondents (Kyle et al., 2007). We observed that the relationship between worldviews and *Place Identity* was mediated by *Learning* for non-consumptive respondents and *Achievement* for consumptive respondents. One plausible explanation stemming from previous research suggests that intrinsic motivations stem from an internalization of behavioral regulation and are facilitated by the realization of basic psychological needs (Ryan & Deci, 2000). If places satisfy needs such as feeling competent, attachment may ensue, especially if the individual believes the place reflects a part of their identity (Proshansky et al., 1983). Moreover, we suggest the worldview-motivation-attachment relationship varies as a function of activity type. Given that worldviews serve as filters for selective attention (Postman, Bruner, & McGinnies, 1948), it stands to reason that recreationists engaged in different activities perceive unique benefits that influence the formation of attachment to places.

Respondents who were engaged in consumptive recreation exhibited a different pattern of relationships between motives for *Enjoying Nature* and *Social Bonding* than non-consumptive recreationists. For consumptive recreationists, *Enjoying Nature* had a relatively strong and negative influence on *Social Bonding*, indicating that for these individuals, attachment was less likely to emerge from social interaction. Alternately, for non-consumptive respondents, the enjoyment of nature was positively associated with the bonds they shared with friends and family. While the latter is consistent with findings reported by Kyle et al. (2004), their study did not include consumptive recreationists. For consumptively-oriented respondents on Hinchinbrook, attachment to place stemming from social interaction declined as they more intently sought nature and its scenery. Alternately, it could be that consumptive activities were more likely to be done in solitude. This finding aligns with work by Raymond et al. (2011) who reported different associations between two components of social bonding including family bonding and friend bonding. Given variation in the meanings tied to friends and relatives, there is also potential for variation in the nature and intensity of meanings that people ascribe to settings that accommodate these relationships. Therefore, future research is needed to better understand how different characteristics of social bonding are (in)directly or influenced by place-based motivations, environmental worldviews, and modes of engagement with place.

6. Future research and management options

Our findings provide support for the proposition that the meanings outdoor recreationists ascribe to a protected area landscape are shaped by different psychological processes. We provide evidence of multiple factors that play a role in attachment formation and identify options for environmental management agencies to foster stewardship by more effectively engaging with particular audiences. Here, we showed that worldviews existing independent of a particular place anteceded the motivation-attachment relationship established in previous research (Kyle et al., 2004), and that activity engagement accounted for preference heterogeneity (van Riper et al., 2012). However, we acknowledge that place attachment is a multi-faceted construct and the interactions of contextual variables are important to consider (Ramkissoon & Mavondo, 2017; Scannell & Gifford, 2010). Moreover, our hypothesized model reflects a cognitive hierarchy (Vaske & Donnelly, 1999) that situates value orientations and attitudes as drivers of intention, and ultimately, behavior. While these findings demonstrate the mediating role played by motivation on the worldview-place attachment relationship, other hierarchical and structural models of the psychological antecedents of behavior should include additional mediators that, depending on context, may help explain why individuals make decisions.

The utility of place for understanding and managing natural landscapes for conservation-based outcomes has been well documented (Kruger et al., 2008; Stewart et al., 2013). Much of this work has stressed the importance of co-creating policy outcomes and engaging stakeholders in planning and management of natural resources. In this vein, we provided empirical evidence for how phenomena could be targeted by managers to facilitate dialogue and strengthen connections to places. For instance, our results suggest setting density should be considered when managing for angling opportunities because consumptive recreationists preferred solitary interactions with nature, and these preferences negatively correlated with attachment. Alternately, fishing competitions that allow for sustained interactions with the resource could facilitate attachment given the importance of *Achievement* as a motive for interacting with the protected area that stimulates place dependence. Opportunities for facilitating attachment have real-world outcomes given that behaviors are linked to cognitive and affective bonds with places (Halpenny, 2010).

We investigated the processes driving the development of attachments to place in the context of nature-based leisure, which is distinct from much of the place research which has tended to focus on residential contexts (e.g., homes, second homes, neighborhood, community, city; for review, see Lewicka, 2011). Given that leisure behavior is intrinsically motivated and occurs in the context of perceived freedom (Kleiber, Walker, & Mannell, 2011), nature-based activities and settings reflect a "special" case of human-environment interaction (Kyle, 2016). First, unlike residential environs, attributes within a setting are seldom encountered on a daily basis and are often considered unique in their own right. For many, the experience of nature contains spiritual properties (Heintzman, 2009). Second, leisure experiences are often shared with significant others. The meanings of these experiences and the relationships shared with others become embedded in the landscape (Kyle & Chick, 2007). Consequently, the intensity and array of meanings associated with places of leisure are distinct from the meanings associated with places from everyday life. Thus, future research should examine different types of attachments that span (un)conventional locations.

Following the dominant framework in the environmental psychology literature (Lewicka, 2011), our conceptualization of place attachment included identity and dependence (Williams et al., 1992), along with social bonding (Kyle et al., 2005); however, other conceptualizations have been presented. For example, previous research (Jorgensen & Stedman, 2001; Kyle et al., 2004) has teased apart the affective and cognitive components of place that coalesced within Williams et al.'s (1992) indicators of place identity. Further, scholars have measured several other dimensions of place that reflect attachments shared with the environment (see Hammitt et al., 2004; Raymond et al., 2011). While these developments have potential for furthering our understanding of how and why people bond with places, the adoption of measures should be cautiously weighed against the

contextual nuance of the study context in which they will be applied. Beyond the array of ontological and epistemological research traditions that have spawned heterogeneity in place-related terminology, there are equally confounding ways that place attributes (e.g., natural vs. built environments), scale, and culture intertwine to shape the meaning and significance of place. That is, we encourage sensitivity to study context when adopting conceptualizations and measurement of place attachment.

Two limitations related to the data and analyses need to be acknowledged. First, these data are cross-sectional and address a single activity and spatial context. While our findings are consistent with work previously reported in the broader worldviews-motive-place literature, both the activity and setting are unique. As we noted, there was little empirical evidence available exploring these constructs in the context we have studied. Consequently, there is potential for the nature of the relationship we explored to vary in other activity contexts. Additionally, our cross-sectional data limit the extent to which we claim causality in the model tested. While the valence of our hypothesized associations were ground in past work, these data only allowed us to suggest the causal associations were plausible. Other designs (e.g., longitudinal, experimental) along with further evidence will begin to identify the bounds to which these associations can be generalized.

7. Conclusions

Motivations to engage in outdoor recreation have been viewed as predictors of place attachment yet there are even more stable and underpinning beliefs that antecede this relationship. Our findings suggest that environmental worldviews underpin and help to explain the linkage between motivation and place attachment. Given that empirical evidence in support of this hypothesis has remained absent from the literature, our study advances theoretical knowledge of these relationships. We also provide useful insights for public land management agencies that aim to foster appreciation of places by targeting the phenomena that shape connections formed between people and their environments. In settings such as Hinchinbrook Island National Park where consumptive and non-consumptive human uses occur, our findings are particularly informative for guiding efforts to accommodate multiple and at times competing forms of human use. Understanding the range of meanings ascribed to natural areas and the strength of connections between people and special places enables managers to anticipate and be better equipped to mitigate conflict as well as develop equitable policy options that reflect a diversity of stakeholder positions.

Acknowledgements

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2018.11.001.

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