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Walking Off-Trail in National Parks: Monkey See Monkey Do

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ABSTRACT

This study extended the theory of planned behavior (TPB) to embrace the pro-environmental construct in predicting visitor off-trail behavioral intentions at national parks. Quantitative questionnaire items were developed through an elicitation study and empirically tested among 325 respondents. Empirical results revealed overall predictive variance of 21.7 percent (R^2) in predicting visitor off-trail intentions. Behavioral beliefs predicted most of behavioral intentions followed by normative beliefs. The contribution of control beliefs and pro-environmental values had the weakest predictive power. Among the behavioral beliefs, visitors had the strongest belief that walking off the trails would lead to a shorter route. Friends as a reference group were the strongest normative belief that influenced off-trail intentions. Implications for future research and practice are discussed.

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national parks; off-trail walking; pro-environmental values; theory of planned behavior

Introduction

National parks have been a significant fabric in tourism contributing both economic and social benefits for visitors to enjoy nature and partake in outdoor recreation activities. This is noted in the significant number of 6555 National Parks located around the world (The International Union for Conservation of Nature, 2018).

However, the depreciative behavior of walking off-trail is a key compliance problem faced by park management as visitors place themselves and other people at risk (Goh, 2019; Goh, Ritchie & Wang, 2017; Saunders et al., 2019), and damage park vegetation (Leung et al., 2011; Park et al., 2008). This risky conduct is usually a state of naiveté rather than malicious motivations and presents opportunities for potential accidents and fatal misadventures. Although not all park related deaths are a result of off-trail walking, the death toll and injuries of visitors at national parks is evident across countries around the world.

For example, over 300 visitors have died at Yellowstone National Park, USA (Nelsen, 2015), which sees on average, 150 visitor deaths in America National Parks annually (Nelsen, 2015). According to the Director of National Parks Australia (2017) - covering

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Australia's government's terrestrial and marine protected areas, there have been a total of 316 visitor incidents reported, which includes 22 major injuries and 11 deaths between 2012-2017. It is important to note that statistics of misadventures are rarely reported by National Parks as they do not wish to alarm the public caused by media sensationalism and would like to portray a safe image for visitors.

Despite knowing the potential danger, visitors still choose to walk the forbidden path in national parks. What factors influence visitors' off-trail intentions? This research question is crucial in understanding visitor noncompliance in national parks. Research in this space is limited, where a paucity of previous studies have investigated non-compliant motivational behaviors (such as Goh 2019; Parkin & Morris, 2005; Saunders et al., 2019). These studies tend to be observational and qualitative in nature, which may indeed provide reasons behind visitors' noncompliance behavior. However, majority of non-compliant studies fail to adopt a theoretical framework to determine non-compliant motivational items (Brown et al., 2010; Curtis et al., 2010; Ham et al., 2008). This omission of theoretical frameworks can neglect significant connotations in trying to comprehend behavioral goals (Goh et al., 2017).

One of the established behavioral theories used in understanding human decisions is the theory of planned behavior (TPB; Ajzen, 1991). The TPB consists of three key determinants useful in understanding non-compliant behavioral intentions. An individual's positive attitude toward park noncompliance should lead to less compliance. The role of social pressure from other people important to the visitors could support their judgment to engage in off-trail walking. Although, the action of off-trail walking is dangerous, if visitors see others venturing off-trail, this might significantly influence visitors' intentions to non-comply (Goh et al., 2017; Rickard & Newman, 2014). In addition, not all non-compliant behaviors are volitional and could be triggered by external factors such as perceived overcrowding (Sim et al., 2018), lack of signage (Bradford & McIntyre, 2007) or misinterpretation of signage (Sever & Verbic, 2018). More importantly, the TPB (Ajzen, 1991) has demonstrated to be valuable in understanding earlier compliant studies such as walking dogs off-leash in parks (Bowes et al., 2017), hunting intentions in parks (Castilho, Vleeschouwer, Milner-Gulland & Schiavetti, 2018), and staying on marked tracks (Kidd et al., 2015; Schwartz et al., 2018).

The role of pro-environmental values has been shown to increase behavioral intentions toward environmental behavior (Hu et al., 2018) but not empirically tested to examine off-trail walking behavior at National Parks. Thus, this study attempts to fill the research gap by proposing and testing an extended TPB model to: 1) investigate the important antecedents of behavioral intentions toward off-trail walking by combining pro-environmental values (NEP as a measurement of environmental values) and TPB variables; and 2) investigate the additional predictive power of pro-environmental values (NEP) on intentions to engage in off-trail behavior at national parks. This research aims to make a key contribution to the development of visitor non-compliant behavior by enhancing the efficacy of an established human behavior framework. This study will also deliver practical implications for the tourism industry especially national parks with marketing and management strategies.

Literature review

Reasons for noncompliance

The best way to define non-compliant behavior is the violation of protective regulations through deliberate engagements performed in anticipation of some consequence linked with the deviance, where “*other visitors are observed failing to comply with no apparent consequences*” (Saunders et al., 2019, p.136, line 67). For example, visitors choose to ignore safety warnings and get injured in adventurous activities due to relaxed attitudes about compliance (Brady & McIntyre, 2007; Saunders et al., 2019). Visitors non-comply due to various reasons such as overcrowding (Sim et al., 2018), unrealistic goals (Chamarro et al., 2019), and seeking sensation (Marengo, Monaci & Miceli, 2017).

Literature on non-compliant motivations can be grouped into four categories: 1) how visitors interpret the situation; 2) how visitors retrieve information; 3) how visitors form judgments; and 4) the behavioral response of visitors (Harding et al., 2000). Prevailing circumstances, hazard consciousness, relaxed nature of leisure, and the presence of authority administration can have an impact on how visitors interpret the non-compliant situation. For instance, a higher tendency to litter in places already littered (Esfandiar, Dowling, Pearce & Goh, 2020) or participate in unauthorized swimming when other visitors are seen in restricted pool areas (Girasek, Marschall & Pope, 2016).

The next category of non-compliant reasons looks at how visitors retrieve information provided by park authorities (Dangi & Gribb, 2018; Rickard & Newman, 2014). Visitors tend to seek out shortcuts to retrieve information that are convenient and easily available. If park signage is not decoded correctly, visitors will be motivated to non-comply as they have not understood the intended message. For example, park authorities had to modify existing signage after finding out that a majority of visitors (baby boomers) at Kings Canyon National Park enjoyed somewhat risky outdoor activities but had little or no training and experience (Wilson, Hallo, Sharp, Mainella & McGuire, 2017). It is also important to note that in some instances, visitors simply fail to notice park signage. Past research reported this figure between 21% (Parkin & Morris, 2005) to 50% (Brannstrom, Brown, Houser, Trimble & Santos, 2015) due to reasons such as signage being too small and poor visibility. It is also important to note that sometimes it is better to have signage than no signage at all. This was reported in a study by Bradford and McIntyre (2007) that 88% of visitors ventured off-trail when no signs were present at the site.

This is significant because if people are unable to decode the signs; it diminishes the usefulness of persuasive tactics in national parks. Other researchers have adopted the use of illustrated photos in their signage to provide a visual explanation to influence the retrieval of information to curb non-compliant behaviors such as rock diving, off-trail hiking and littering (Parkin & Morris, 2005; Saunders et al., 2018). To avoid non-compliance due to signage ambiguity, other researchers have recommended a more direct management technique of using fences (Girasek et al., 2016), rangers (Dangi & Gribb, 2018), and park fees (Steckenreuter & Wolf, 2013) to restrict non-compliant activities.

Personal judgments and shortcuts such as obliviousness of concerns, social rationalization and the cost of complying may influence compliant behavior (Goh et al., 2017).

For example, letting dogs off-leash at national parks is a form of noncompliance but dog owners often perceived this as a ‘minor issue’ (Bowes et al., 2017). Non-compliant motivations can also be framed through social justification and influence. For instance, vandalism in parks is often seen related to social factors (Bhati & Pearce, 2016).

In sum, the paucity of collected works on noncompliance revealed numerous motives that can be classified into the TPB model of attitudinal factors for instance relaxed mindset for park authority (Moreto & Lemieux, 2015), social dynamics from other visitors (Bhati & Pearce, 2016; Parkin & Morris, 2005), and perceived constraints to conform due to peripheral reasons such as privation of signage understanding (Sever & Verbic, 2018; Wilson et al., 2017) and overcrowding (Sim et al., 2018).

Antecedents of non-compliant behavior

According to past meta-analysis studies (Armitage & Conner, 2001), most behaviors are attitudinal driven. Attitudes can be measured indirectly (Ajzen, 1991) through the multiplication of respective behavioral beliefs (BBi) with respective evaluation outcomes (OEi) and adding up the behavioral beliefs (i) to determine the attitude factor (Ajzen, 1991, 2005). The equation used to compute indirect measure of attitude (Att) is $Att \approx \sum (Bbi \times OEi)$ (Ajzen, 1991, 2005). Thus, individuals who hold positive attitudes toward off-trail walking are more likely to non-comply. This has been shown in non-compliant studies such as staying on marked tracks (Kidd et al., 2015; Schwartz et al., 2018), off-leash dog walking (Bowes et al., 2017), littering (Al-mosa et al., 2017; Brown et al., 2010), and hunting (Castilho et al., 2018), where visitors had a positive attitude toward noncompliance and therefore enacted their intentions. Thus, it is hypothesized that:

H1: There is a positive relationship between visitors’ behavioral beliefs ($\sum BBiOEi$) to walk off-trail and behavioral intentions to walk off-trail.

The second TPB variable refers to subjective norms, a form of approval pressure to comply with the expectations of the important social groups (Ajzen, 1991). Subjective norms measure a person’s normative prominent beliefs (NBj) multiplied by the motivation to comply (MCj), and added across reference groups (j) (Ajzen, 1991, 2005). The equation used to calculate subjective norms (SN) is $SN \approx \sum (NBj \times MCj)$ (Ajzen, 1991, 2005). Past studies have reported certain social groups such as other visitors (Bhati & Pearce, 2016; Girasek et al., 2016; Ham et al., 2008; Schwartz et al., 2018), and friends (Hu et al., 2018), and park enforcement officers (Dangi & Gribb, 2018) to be useful in understanding non-compliant behaviors. Thus, it is posited that:

H2: There is a positive relationship between visitors’ normative beliefs ($\sum NBjMCj$) to walk off-trail and behavioral intentions to walk off-trail.

Next, perceived behavioral control focuses on constraints toward carrying out a specific activity under volitional control (Ajzen, 1991). Having a high level of perceived control reinforces an individual’s behavioral intention and increases the determination to act on the behavior. Perceived behavioral control is measured through the anticipated possibility of the control belief (CBk) happening multiplied by the perceived power (PFk) and added across the control dimensions (k) (Ajzen, 1991; 2005). The equation

used to compute the perceived behavioral control (PBC) is $PBC \approx \sum(CB_k \times PF_k)$ (Ajzen, 1991, 2005).

In this study, visitors' non-compliant decisions could be influenced by various perceived constraints as reported in past studies such as lack of litter bins (Brown et al., 2010; Hu et al., 2018), lack of signage (Bradford & McIntyre, 2007; Wilson et al., 2017), lack of barriers (Girasek et al., 2016; Park et al., 2008), and lack of uniformed officers (Moreto & Lemieux, 2015). Past meta-studies (Ajzen, 1991 – 19 cases; Armitage & Conner, 2001 – 185 cases; Godin & Kok, 1996 – 57 cases) have reported PBC to be a significant predictor of intentions and behaviors. Thus, it is hypothesized that:

H3: There is a positive relationship between visitors' control beliefs ($\sum CB_k PF_k$) to walk off-trail and behavioral intentions to walk off-trail.

Extending the TPB model

As can be seen, the TPB can be used to understand non-compliant behaviors with better-targeted insights to noncompliance. Across 87 TPB studies, medium correlations effect size of 0.53 was reported between intentions and behavior (Sheppard et al., 1988). This is further supported by other meta-analyses reporting medium coefficients between intentions and behavior: Armitage and Conner (2001; 0.47, 185 cases); Sutton (1998; 0.49, 7 cases); Sheeran and Orbell (1999; 0.44, 28 cases); Godin and Kok (1996; 0.46, 35 cases); and Randall and Wolf (1994; 0.45, 98 cases). In terms of predictive power, Sheeran et al. (2001) reported predictive regression variances of 20% to 40% for intentions and behavior. Armitage and Conner (2001) reported 27% of variance for behavior across 185 studies, and Sandberg and Conner (2008) reported 27% variance for intentions across 19 studies. Given the empirical evidence, the TPB has demonstrated strong predictive efficacy of numerous behaviors.

Although the TPB model has been successful in predicting various behaviors, researchers have been adhering to the call for future research to extend the TPB model to strengthen the predictive value of the TPB model (Ajzen, 2015, 2005). For example, the impact of additional background variables in TPB studies such as past behavior (Cronan et al., 2018) and anticipated emotions (Londono et al., 2017; Sandberg & Conner, 2008) recorded an increase in the predictive value of intention and behavior (Armitage & Conner, 2001). It is vital to note that not all additional TPB variables add value to the predictive power. Therefore, certain new variables simply act as background factors such as demographics and do not provide any significant predictive variance (Ajzen, 2015, 2005). Nevertheless, background variables could play a mediating role through the three founding TPB variables to influence intentions and behavior. Employing this idea to pro-environmental values, we examined whether having pro-environmental values increases an individual's intention to comply with park regulations and stay on-trail. Hence, the below hypothesis is proposed:

H4: There is a positive association between visitors' pro-environmental values (NEP) and behavioral beliefs ($\sum BB_i OE_i$) to walk off-trail.

Pro-environmental values

Environmental values are critical influencers of environmental related behaviors (Kiatkawsin & Han, 2017). According to Stern (2000), individuals refer to their environmental values in situations or behaviors that relate to their environmental matter of concern. Looking through an environmental psychological lens, environmental values are “*intrinsic, instrumental, held and assigned values used to determine environmental beliefs, norms and behaviours*” (Lockwood, 1999, p.382). These values stem from values research by Rokeach (1973) who describes intrinsic values similar to terminal values as something meaningful toward life, which in the case of environmental values is to value nature for itself. Instrumental values refer to the value in terms of achieving the end object, such as being responsible in order to receive recognition from others. Held values refer to the concept of enduring belief toward a specific mode of conduct or end-state of existence that is personally or socially preferable. Lastly, assigned values could correspond to attitudes, which could correspond to specific situations or behaviors. For example, Gurluk (2013) reported leisure users who possessed strong ecological principles to be in favor of congestion pricing to reduce bottleneck at leisure areas.

One widely used method to measure environmental values is the established New Ecological Paradigm (NEP) Scale (Dunlap et al., 2000). The NEP is grounded on five fundamental environmental values. First, balance of nature captures humans’ perspectives on the importance of co-existence with nature. Second, limits to growth examine how humans assess the growth of civilization and its effect on nature. Third, anti-anthropocentrism examines just how people position oneself as the dominant and most vital living being on planet. Fourth, anti-exemptionalism refers to whether humans perceive their exemption from the nature’s limitations and constraints. Lastly, eco-crisis examines the possibility of hypothetical disastrous ecological deviations disrupting the population (Dunlap et al., 2000).

The NEP scale consists of 15 items and it is proposed that all 15 items be used to examine pro-environmental views (Dunlap et al., 2000). The NEP is an established theory and published extensively to examine environmental values and beliefs about ecological worldviews. For instance, Kiatkawsin and Han (2017) employed the NEP to successfully measure young travelers’ intention to behave pro-environmentally. In a study on protected areas, Imran et al. (2014) found positive relationships between pro-environmental tourism stakeholders and pro-environmental behaviors. Lastly, the degree of place attachment toward a national park is also associated with visitors’ pro-environmental attitudes. As reported by Ramkissoon et al. (2013), visitors with stronger place attachment are more likely to perform pro-environmental behavior.

As can be seen, the NEP scale is a valuable instrument to measure pro-environmental orientation on perceptions about the environment, guiding their behavior. For example, visitors with stronger pro-environmental beliefs to display more environmentally friendly actions during their vacations such as using litterbins in national parks and staying on-trail (Goh et al., 2017; Hu et al., 2018;). Researchers (Bramwell & Lane, 2013; Fatima, Khan & Goh, 2016; Hu et al., 2018) have also called for future research to revisit the roles of values and in particular environmental values in tourism studies as it may influence visitor behaviors at National Parks. In summary, Figure 1 exhibits the extended TPB model using indirect measures to explain off-trail walking behavioral

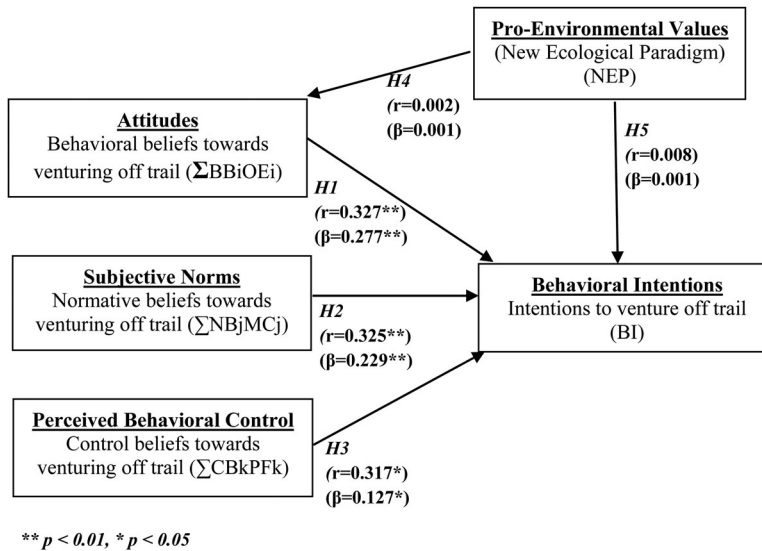


Figure 1. Extended TPB model and summary of research hypotheses.

intention. Thus, the additional independent variable of pro-environmental value is proposed as the fifth hypothesis to extend the TPB model:

H5: There is a positive relationship between visitors' NEP values and off-trail behavioral intentions.

Methods

Stage 1 – elicitation study

An elicitation study was conducted with visitors to elicit their salient beliefs (behavioral, normative and control) toward venturing off-trail at The Blue Mountains National Park (BMNP) in Australia. This step was necessary and is commonly used in TPB studies to elicit salient beliefs to create survey items for a quantitative study (Goh & Jie, 2019; Goh & Kong, 2018; Goh & Lee, 2018; Goh & Scerri, 2016). Visitors ($n = 22$) who were visiting BMNP and experts ($n = 7$) working at BMNP participated in the elicitation study. Using two sample compositions strengthened the identification of important items through triangulation and increased the reliability of the results (Xin et al., 2013).

Based on a convenience sample, personal interviews were conducted at the Echo Point Trailhead entrance at BMNP. Respondents were identified, approached and invited to a café for a short interview lasting approximately 20 minutes. Three interview questions about their beliefs (behavioral, normative and control) set the frame of the interview session. Data saturation was observed during the interview process to identify recurring responses and themes, which signify the need to stop further data collections. The seven identified experts were emailed an invitation to participate in the research with a set of three similar questions.

Stage 2 – quantitative study

A pilot study was conducted using a convenience sample of 25 visitors at BMNP to check for questionnaire validity and clarity of questionnaire items. Based on the feedback, a few items were rephrased and ambiguous terminologies were replaced with non-technical terms.

A convenience sampling approach was adopted to empirically test the research hypotheses. To solicit a pool of respondents who would closely represent the general population of National Park visitors, the questionnaire was administered at BMNP, 100 km from Sydney, Australia. The BMNP is one of the most visited national parks in Australia with an estimated 2.8 million international and domestic visitors yearly (NSW National Parks and Wildlife Service, 2018). More importantly, Police reports have documented 53 Police Search and Rescue Operations executed in 2010 to save park visitors who faced critical incidents in the course of their recreation events (Howden, 2010).

As part of the data collection process, researchers positioned themselves at the Echo Point Trailhead, a main entrance of BMNP. The Echo Point Trailhead was chosen as it is one of the major entrances that lead to several popular lookout points known for going off-trail such as climbing the fence at sublime point lookout to sit on cliff edges. Given that it is a major trail entrance, the Echo Point Trailhead also had visible signage at the entrance about strictly keeping to the designated walking trails to prevent injuries and warnings that penalties are applicable for non-compliant activities.

The decision to station at a single trail entrance was to ensure consistency and be able to carefully monitor the visitor traffic in and out of the trail. Respondents were approached before they started their walk to ensure objectivity in their responses, and not altered after witnessing other visitors' behaviors. Visitors (both individual and in groups) were recruited on a random convenience sampling approach. This study adopted a face-to-face handout of the surveys as it helps to improve respondent survey completion. Once participation was consented, they were invited to complete the survey in our research booth. The response rate was 54% where 325 out of 625 respondents completed the surveys. This sample size meets the recommended needed for data reliability [$n = z^2 (pq)/e^2 = 1.95^2 (0.5 \times 0.5)/0.05^2$] (Burns & Bush, 2016), statistical analysis using factor analysis ($n \geq 100$; Hair et al., 2018) and regression analysis ($n \geq 136$; Cohen, 1992). See Table 1 for a summary of the sample demographics.

The demographics in this study reflected similar demographic compositions of higher tertiary qualifications and social economic status visitors among both young and old demographics as reported in past studies (Berg & Koole, 2006). In sum, the demographics of the sample group resembled a comparable profile and coverage of demographics similar to past studies of national park visitors.

Measurement of constructs

This study employed indirect measures of the TPB constructs elicited from the qualitative study. The decision to use indirect measures of beliefs over direct measures of TPB to understand intentions is due to past research recommending indirect measures as more targeted to a specific behavior and leads to better predictive power (Goh, 2011).

Table 1. Demographic results (n = 325).

Characteristic	Number (n)	Percentage
Gender		
Male	165	51
Female	158	49
Marital Status		
Single	117	36
Married	82	25.2
Married with children	91	28
Divorced	21	6.5
Others	11	3.1
Age		
18–20	23	7.1
21–30	98	30.2
31–40	73	22.5
41–50	39	12
51–60	60	18.5
61 and above	30	9.2
Highest Education Qualification		
Primary	3	0.9
Secondary	34	10.5
Tafe / Diploma	62	19.1
Bachelor	138	42.5
Masters	62	19.1
Doctorate	23	7.1
Job (occupation) Classification		
Professional	97	29.8
Managerial	72	22.1
Administrative	112	34.5
Technical	26	8
Others	18	5.6
Income (AU\$ per year)		
\$0	35	10.8
Below \$6000	19	5.8
\$6001 to \$30000	34	10.8
\$30001 to \$75000	108	33.2
\$75000 to \$150000	89	27.4
Above \$150000	23	7.1
Declined to answer	17	5.2
Number of times to BMNP in the last 5 years		
None	19	5.8
Once	80	24.6
2 to 10 times	81	24.9
More than 10 times	145	44.6

Attitude

The sum of behavioral beliefs ($\sum \text{BBiOEi}$) was used to measure attitude. Five behavioral beliefs (BBi) were used to calculate the power of their beliefs concerning walking off-trail. A Likert measurement from 1 to 7 (strongly disagree to strongly agree) was adopted for BBi items. Likewise, visitors evaluated five matching evaluation outcomes (OEi) from 1 to 7 (extremely unimportant to extremely important). In order to compute the indirect attitudinal factor ($\sum \text{BBiOEi}$), individual respective BBi items were multiplied with the corresponding OEi items and summed up. The five behavioral belief items measured attitudes toward off-trail behavioral intentions to: be more adventurous, have more freedom, have a different walking experience, use a shorter route, and have a closer view of nature. An example of the behavioral belief item was If I ventured off-

trail at BMNP, it will enable me to have a closer view of nature. The respective evaluation outcome item was Venturing off-trail at BMNP that enables me to have a closer view of nature is _____.

Subjective norm

The sum of normative beliefs ($\sum \text{NBjMCj}$) measured the subjective norm construct. Six normative beliefs (NBj) were used to capture the various reference groups against parallel motivation to comply (MCj) items. All NBj items were measured on a seven-point Likert scale of 1 to 7 (strongly disagree to strongly agree) and all MCj items were measured on 1 to 7 (not at all to very much). Normative beliefs (NBj) and parallel motivation to comply (MCj) items were multiplied and computed as the belief based normative beliefs ($\sum \text{NBjMCj}$). The six normative belief items were other visitors, my friends, my family, tour guides, park rangers and celebrities. An example of the normative belief item was Other visitors to BMNP think I should venture off-trail at BMNP. The respective motivation to comply item was How much do you care what other visitors think you should do with regards to venturing off-trail at BMNP?

Perceived behavioral control

The perceived behavioral control construct was measured through control beliefs ($\sum \text{CBkPFk}$). Six control beliefs (CBk) were multiplied with parallel perceived power of likelihood (PFk). CBk items measured from 1 to 7 - strongly disagree to strongly agree and PFk items measured on 1 to 7 (very rarely to very frequently). Individual control beliefs (CBk) were computed with their parallel perceived power (PFk) and summed up to represent the control construct ($\sum \text{CBkPFk}$). The six control beliefs were lack of signage, damaged walking trails, limited access to park facilities, overcrowded pathways, lack of food and water, and challenging terrains. An example of the control belief item was If I feel that there is a lack/no signage to visitors at BMNP, it would make it more difficult for me to stay on the designated walking trail. The respective perceived power of likelihood item was How often do you feel that there is a lack/no signage to visitors at BMNP?

Pro-environmental value

The pro-environmental value construct (balance of nature; limits to growth; anti-anthropocentrism; anti-exemptionalism and eco-crisis) was measured with the established NEP 15 items designed by Dunlap et al. (2000). A seven-point Likert scale (1 = strongly disagree to 7 = strongly agree) was adopted to measure all NEP items.

Behavioral intention

Behavioral intention was measured by examining visitors' willingness to comply due to the sensitive topic of engaging in behavior that is not permitted (walking off-trail). To assist respondents in acknowledging their off-trail walking behavior, this study measured behavioral intentions through their willingness on a seven-point scale (1 = Strongly disagree to 7 = strongly agree). Intentions to walk off-trail was measured using six

willingness items: if the trail was very crowded, to take some nice pictures, if the sign-age was missing, to avoid challenging terrains, to access park facilities, and to access food and water.

Data analysis

Data screening was performed to verify data entry values were confined within permissible stated ranges (Tabachnick & Fidell, 2018). Six uncompleted questionnaires were discarded due to having more than 50% uncompleted sections. Outliers and extreme values were identified through boxplot analysis using SPSS and substituted with the average parallel data within the identical value groups (Tabachnick & Fidell, 2018). The data was further assessed for normality distribution by examining the skewness and kurtosis of data. All absolute values resembled a normal distribution with skewness below 3 and kurtosis values below 8 (Kline, 2016). Construct reliability and validity of TPB and NEP variables were tested for reliability using Cronbach's alpha. All TPB and NEP constructs reported robust reliability of Cronbach alpha between 0.769 and 0.904 (Nunnally & Bernstein, 1994; See Table 2).

Factor analysis through Principal Component Analysis extraction method was conducted with Varimax rotation to check for dimensionality of the TPB constructs. The Pearson correlation coefficient r was used to examine the associated power among TPB variables and intentions (Ajzen, 1991). In hypotheses testing, multiple regression analysis was used to examine the associations between TPB variables, NEP, and behavioral intentions (Hair et al., 2018).

In order to examine the relationship between NEP, behavioral beliefs and behavioral intentions toward off-trail walking, a mediation pathway analysis was conducted. The intervening element was identified as the mediator to mediate the association among the predictor and dependent factor. Attitudes was treated as the mediator, and NEP was entered as the predictor of behavioral intentions (BI). A four-step mediation pathway analysis was conducted as recommended by Baron and Kenny (1986):

- Step 1 – Use regression analysis to establish evidence of positive significant associations between predictor (NEP) and dependent variable (BI).
- Step 2 – Use regression analysis to establish evidence of positive significant associations between predictor (NEP) and mediator ($\sum BbiOEi$).
- Step 3 – Use regression analysis to establish evidence of positive significant associations between mediator ($\sum BbiOEi$) and dependent variable (BI).
- Step 4 – Use multiple regression analysis to establish evidence of positive significant associations between dependent variable (BI) with predictor (NEP) and mediator ($\sum BbiOEi$).

If there are zero order relationships in any of the steps, this shows the non-significant associations between variables in steps 1 to 3. Hence, step 4 testing will not be necessary (Baron & Kenny, 1986).

Table 2. Principal component analysis of TPB beliefs and intentions.

Items	Factor Loadings						
	1	2	3	4	5	6	7
BBi 1 - Closer view of nature	.745	–	–	–	–	–	–
BBi 2 - More adventurous	.850	–	–	–	–	–	–
BBi 3 - Different walking experience	.796	–	–	–	–	–	–
BBi 4 - Shorter route	.431	–	–	–	–	–	–
BBi 5 - More freedom	.811	–	–	–	–	–	–
OEi 1 - Closer view of nature	.760	–	–	–	–	–	–
OEi 2 - More adventurous	.809	–	–	–	–	–	–
OEi 3 - Different walking experience	.791	–	–	–	–	–	–
OEi 4 - Shorter route	.419	–	–	–	–	–	–
OEi 5- More freedom	.813	–	–	–	–	–	–
NBj 1 - Other visitors	–	.824	–	–	–	–	–
NBj 2 - My friends	–	.783	–	–	–	–	–
NBj 3 - My family	–	.841	–	–	–	–	–
NBj 4 - Tour guides	–	.839	–	–	–	–	–
NBj 5 - Park rangers	–	.834	–	–	–	–	–
NBj 6 – Celebrities	–	.821	–	–	–	–	–
MCj 1 - Other visitors	–	–	.753	–	–	–	–
MCj 2- My friends	–	–	.853	–	–	–	–
MCj 3 - My family	–	–	.863	–	–	–	–
MCj 4 - Tour guides	–	–	.832	–	–	–	–
MCj 5 - Park rangers	–	–	.668	–	–	–	–
MCj 6 – Celebrities	–	–	.594	–	–	–	–
CBk 1 - Lack / no signage	–	–	–	–	–	.799	–
CBk 2 - Walking paths are damaged / unclear	–	–	–	–	–	.847	–
CBk 3 - Lack access to park facilities	–	–	–	–	–	.639	–
CBk 4 - pathways are overcrowded	–	–	–	–	–	–	.627
CBk 5 - Lack food and water	–	–	–	–	–	–	.733
CBk 6 - Terrains are too challenging	–	–	–	–	–	–	.759
PFk 1 - Lack / no signage	–	–	–	–	.785	–	–
PFk 2 - Walking paths are damaged / unclear	–	–	–	–	.809	–	–
PFk 3 - Lack access to park facilities	–	–	–	–	.619	–	–
PFk 4 - pathways are overcrowded	–	–	–	–	.532	–	–
PFk 5 - Lack food and water	–	–	–	–	.561	–	–
PFk 6 - Terrains are too challenging	–	–	–	–	.507	–	–
BI 1 - Likely to stay off-trail if overcrowded	–	–	–	.663	–	–	–
BI 2 - Likely to stay off-trail to take nice pictures	–	–	–	.682	–	–	–
BI 3 - Likely to stay off-trail to avoid challenging terrains	–	–	–	.745	–	–	–
BI 4 - Likely to stay off-trail to gain access to toilets and other non-park facilities	–	–	–	.779	–	–	–
BI 5 - Likely to stay off-trail to access food and water	–	–	–	.704	–	–	–
BI 6 - Likely to stay off-trail signage was missing or confusing	–	–	–	.728	–	–	–

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Results

Principal component analysis

TPB summed belief measures ($\sum \text{BBiOEi}$, $\sum \text{NBjMCj}$; and $\sum \text{CBkPFk}$) were analyzed to check for component loadings. The patterns of correlations among behavioral, normative, and control beliefs were comparatively compact with reliable factor components of 0.880, $p < 0.01$ using Bartlett’s test of sphericity (Kaiser, 1974). Second, all belief items reported correlations of ≤ 0.85 between items, which indicated the absence of multicollinearity. Lastly, all TPB beliefs had acceptable reliable alpha values above the recommended 0.70 (Nunnally & Bernstein, 1994; See Table 2).

Factor analysis results in Table 2 revealed that all TPB beliefs ($\sum \text{BBiOEi}$, $\sum \text{NBjMCj}$, and $\sum \text{CBkPFk}$) funneled into designated factors with significant loadings of ≥ 0.4 .

Table 3. Correlations between TPB beliefs and intentions.

	BI	$\sum \text{BBI} \text{OEi}$	$\sum \text{NBj} \text{MCj}$	$\sum \text{CBk} \text{PFk}$
BI	1	–	–	–
$\sum \text{BBI} \text{OEi}$	0.327**	1	–	–
$\sum \text{NBj} \text{MCj}$	0.325**	0.447**	1	–
$\sum \text{CBk} \text{PFk}$	0.317**	0.168**	0.324**	1

**Correlation is significant at the 0.01 level (two-tailed).

*Correlation is significant at the 0.05 level (two-tailed).

Factor 1 contained all behavioral beliefs (BBI) and evaluation outcomes (OEi) items. There could have been a possibility that visitors perceived behavioral beliefs and evaluation outcomes alike with equal importance. Factor 2 loadings encompassed all items from normative beliefs (NBj), and all items measuring motivation to comply (MCj) channeled into factor 3.

The factor loadings of control beliefs (CBk) items funneled onto two factors -CBk1-3 landed upon factor 6, and CBk4-6 funneled onto factor 7. This presents the possibility that certain control items were seen as perceived self-efficacy, which refers to confidence in handling a situation. This is not surprising as past research (such as Lee & Kim, 2018) has suggested that perceived behavioral control is closely related to self-efficacy, and ought to be assigned as a common control pillar of PBC (Ajzen, 2005). Therefore, control beliefs loaded onto factors 6 and 7 were merged.

Factor 5 encompassed the loading of all perceived power (PFk) items. Factor 4 reported factor loadings of 0.6 to 0.7 for all behavioral intention (BI) items, which indicated a consistent relationship between the questionnaire design and the TPB framework. Therefore, the component loadings for TPB measures and BI indicated the PCA confirmed relationships with component loadings ≥ 0.4 (Hair et al., 2018).

Correlations between TPB constructs

Results in Table 3 revealed that all three independent TPB beliefs ($\sum \text{BBI} \text{OEi}$, $\sum \text{NBj} \text{MCj}$, and $\sum \text{CBk} \text{PFk}$) significantly correlated with BI. Behavioral beliefs ($\sum \text{BBI} \text{OEi}$) revealed the highest significant correlation ($r = 0.327$, $p < 0.01$) with BI, subsequently with normative beliefs ($\sum \text{NBj} \text{MCj}$) ($r = 0.325$, $p < 0.01$), and control beliefs ($\sum \text{CBk} \text{PFk}$) ($r = 0.317$, $p < 0.01$). The three TPB independent factors reported correlations effect sizes of ≥ 0.3 as recommended by Ajzen (1991) for TPB studies. This suggested that the postulation of TPB measures are functions of the fundamental prominent beliefs explicit to the off-trail walking behavior research study.

Regression analysis

With regards to predicting walking off-trail intentions, all three indirect beliefs explained R^2 of 21.7 percent ($p < 0.01$) in BI pertaining to off-trail walking behavior (See Table 4). In terms of predictive power contribution, all three TPB beliefs revealed significant β scores: ($\sum \text{BBI} \text{OEi} = 0.277$, $p < 0.01$); ($\sum \text{NBj} \text{MCj} = 0.229$, $p < 0.01$), and ($\sum \text{CBk} \text{PFk} = 0.127$, $p < 0.05$). The control beliefs variable had the weakest predictive power, and behavioral beliefs was the strongest contributor toward off-trail walking

Table 4. Multiple regression: TPB variables and NEP construct on Off-trail walking.

Variables	R	β	R	R ²	Tolerance	VIF	Condition Index
	–	–	0.466**	0.217**	–	–	–
\sum BBiOEi	0.327**	0.277**	–	–	0.799	1.251	3.292
\sum NBjMCj	0.325**	0.229**	–	–	0.736	1.358	3.750
\sum CBkPFk	0.317**	0.127*	–	–	0.894	1.118	5.195
NEP	0.002	0.001			0.997	1.003	13.320

** $p < 0.01$, * $p < 0.05$.

intentions. There were no signs of multicollinearity with VIF score of less than 10, and condition index less than 30 (Hair et al., 2018).

Results from the regression analysis supported H1, H2 and H3 in predicting off-trail walking intentions. This advocated off-trail walking contained by the volition of park goers. Hence, do not reject H1, H2, and H3. In relation to H5, the augmented TPB extension model using NEP was not significant in contributing addition predictive efficacy ($\beta = 0.001$; See Table 4). This implied that visitors did not see off-trail walking as a desecration of their NEP values even though they had strong pro-environmental values. Therefore, reject H5 (There is a positive relationship between visitors' NEP values and off-trail behavioral intentions).

To inspect the strength of respective indirect belief items toward off-trail walking, multiple regression analysis was conducted with individual belief items as independent variables and the dependent variable being behavioral intentions. The regression weights (β) was used to analyze the contribution of individual belief items (See Table 5).

Results in Table 5 revealed a total of seven significant TPB beliefs in predicting off-trail walking behavior. Within behavioral beliefs, behavioral belief item 4 - shorter route - \sum (BBi4OEi4) was the strongest predictor ($\beta = 0.297$, $p < 0.01$), next with behavioral belief item 1 - Closer view of nature - \sum (BBi1OEi1) ($\beta = 0.192$, $p < 0.05$). This inferred that a strong association of off-trail walking with the opinion of a shorter walking route and closer look of nature.

In relation to normative beliefs, the role of friends - \sum (NBj2MCj2) ($\beta = 0.187$, $p < 0.05$) was the strongest normative contributor of off-trail walking, followed by other visitors ($\beta = 0.124$, $p < 0.05$) - \sum (NBj1MCj1). This implied a “monkey see monkey do” approach where there was a stronger likelihood to walk off-trail if visitors saw others walking the forbidden path. Another explanation can be the strong dependence on friends in a wilderness environment where there is no one else to depend on except for friends as a locus.

In terms of control beliefs, item 3 - lack of access to park facilities - \sum (CBk3PFk3) ($\beta = 0.133$, $p < 0.05$) had the strongest influence on off-trail walking. This meant that visitors were somewhat forced to go off-trail in search of needed facilities during their walk. For example, the need to relief themselves during bushwalking. Another significant control belief was the challenging terrains - \sum (CBk6PFk6) ($\beta = 0.129$, $p < 0.05$), where they perceived walking off-trail was easier than staying on the designated path. Lastly, the lack/no signage - \sum (CBk1PFk1) ($\beta = 0.129$, $p < 0.05$) also influenced their off-trail behavior. This suggests that visitors sensed the need for clear and available signage as an information source and bearings to help them stay on the designated trail.

Table 5. Regression Analysis of TPB beliefs on off-trail walking.

Indirect Belief Items	β	Tolerance	VIF	Condition Index
Indirect measures of Attitude				
\sum (BBi1 x OEi1) - Closer view of nature	0.192*	0.335	2.989	3.122
\sum (BBi2 x OEi2) - More adventurous	-0.149	0.196	5.104	3.332
\sum (BBi3 x OEi3) - Different walking experience	0.037	0.206	4.862	4.787
\sum (BBi4 x OEi4) - Shorter route	0.297**	0.641	1.561	6.107
\sum (BBi5 x OEi5) - More freedom	0.069	0.214	4.671	6.368
Indirect measures of Subjective Norm				
\sum (NBj1 x MCj1) - Other visitors	0.124*	0.322	3.109	6.532
\sum (NBj2 x MCj2) - My friends	0.187*	0.243	4.120	7.029
\sum (NBj3 x MCj3) - My family	-0.117	0.275	3.643	7.608
\sum (NBj4 x MCj4) - Tour guides	-0.043	0.317	3.153	8.164
\sum (NBj5 x MCj5) - Park rangers	0.097	0.420	2.382	8.794
\sum (NBj6 x MCj6) - Celebrities	-0.041	0.507	1.974	9.591
Indirect measures of Perceived Behavioral Control				
\sum (CBk1 x PFk1) - Lack / no signage	0.129*	0.419	2.388	10.357
\sum (CBk2 x PFk2) - Walking paths are damaged / unclear	0.012	0.395	2.531	10.413
\sum (CBk3 x PFk3) - Lack access to park facilities	0.133*	0.619	1.616	11.445
\sum (CBk4 x PFk4) - pathways are overcrowded	0.068	0.632	1.582	12.520
\sum (CBk5 x PFk5) - Lack food and water	0.096	0.530	1.886	14.018
\sum (CBk6 x PFk6) - Terrains are too challenging	0.129*	0.547	1.829	15.197

** $p < 0.01$, * $p < 0.05$.

Mediation pathway analysis

To address hypothesis 4 and further understand the limited predictive power of NEP toward off-trail walking, a mediation pathway analysis was employed to examine mediation pathway associations to determine if pro-environmental values influences behavioral beliefs, which consecutively impacts off-trail intentions.

Based on the results in Table 6, the relationship pathway between NEP with BI and \sum BBiOEi were not significant. Therefore, the mediation relationship is non-existent between the variables. This suggests that the role of values is seen as universally geared and will only be triggered if the particular behavior is pertinent to the individual. This adds new dimensions to the seminal research on values by Rokeach (1973) and Schwartz (1992) that values are derived from beliefs of desirable conduct as a compass to behaviours. However, our research shows that not all behaviors are triggered and influenced by values such as deciding to walk off-trail in national parks. Therefore, H4 [There is a positive association between visitors' pro-environmental values (NEP) and behavioral beliefs (\sum BBiOEi) to walk off-trail] is rejected on the basis that there is no mediation relationship between values, behavioral beliefs and behavior intention.

Discussion and conclusion

This research confirmed the efficacy ($R^2=0.217$, $p < 0.01$) of the Theory of Planned Behavior in elucidating 21.7% of variance regarding visitors' behavioral intentions regarding off-trail walking behavior. Among all the independent factors, behavioral belief was the strongest contributor of beta weights ($\beta = 0.277$, $p < 0.01$) to predicting

Table 6. Regression Analysis: Assessing mediation relationship between NEP, Attitudes, and Off-trail walking behavior.

Mediation Test	Relationship Pathway	R	R ²	Comments
Step 1	NEP → BI	0.008	−0.000	Relationship Not Significant
Step 2	NEP → ∑BBiOEi	0.083	0.007	Relationship Not Significant
Step 3	∑BBiOEi → BI	0.372	0.138**	Relationship Significant
Step 4	NEP + ∑BBiOEi → BI	0.374	0.140**	Not required as Steps 1 and 2 were not significant

** $p < 0.01$, * $p < 0.05$.
In the above pathways, A is seen as the predictor (NEP), B is seen as the mediator (∑BBiOEi), and C is seen as the dependent variable (BI).

walking off-trail, followed by normative beliefs ($\beta = 0.229$, $p < 0.01$) and control beliefs ($\beta = 0.127$, $p < 0.05$). This study supported H1 about behavioral beliefs on walking off-trail, which is similar to past TPB non-compliant research in national parks. Previous research on permitting dogs off-leash (Bowes et al., 2017) and staying on marked tracks (Kidd et al., 2015) have verified the efficacy of attitudes in illuminating deviant acts. The impact of normative beliefs was evident in shaping expectations and encouraged visitors to walk off-trail. This finding adds consistency and resonates with previous research, where the reference group of “other visitors” has been a key influential social group in motivating off-trail acts such as going beyond safety barriers (Girasek et al., 2016; Hayes, 2008; Schwartz et al., 2018); permitting pets off-leash (Bowes et al., 2017); and swimming in restricted water catchments (Girasek et al., 2016; Parkin & Morris, 2005). This copying behavior is seen as norms rationalization, where other visitors’ behaviors are used to justify off-trail walking behavior.

This study proposed that off-trail walking is more likely a non-volitional behavior as control beliefs was the weakest predictor of off-trail walking intentions. This implies that walking off-trail is easy and visitors are confident about walking off-trail. In deviant behaviors, the readings of surrounding situational conditions can lead to noncompliance. For instance, due to the lack or unclear signage (Sever & Verbic, 2018; Wilson et al., 2017), visitors sense limited barriers to restrict them from walking off-trail. Thus, when faced in a fresh setting or unacquainted situation, it is tranquil for visitors to breach park regulations, particularly with limited noticeable signage as a reference compass. This is similar to past TPB studies that reported the role of perceived behavioral control as not significant on non-compliant intentions to swim in restricted pools in national parks, where visitors feel it is easy to non-comply (Reigner & Lawson, 2009).

This research uncovered a key discovery in values research, where the pro-environmental values of visitors had no influence over off-trail walking behavior. This is despite the relatively high NEP score (76.39 out of 105) as related to previous NEP studies of between 54 to 58 (Dunlap et al., 2000). This novel finding demonstrates that even though values are the stem and core of human behavior, it only has influence when visitors resonate the pertinence and importance of those values in specific behaviors. Hence, visitors who possess strong environmental values do not necessarily view this as a desecration of their ecological principles and sees nothing wrong with walking off-trail.

Although this study failed to establish a significant positive association between NEP, behavioral beliefs and behavioral intentions, nor a mediating pathway, it has contributed to new findings to the body of knowledge by dismissing the mediation pathways

between these variables as advocated by Fulton et al. (1996). This geared a critical position that the single dependence on attitudinal factors or values is challenging as the dimension of the association may simply be more suitable at the universal tier and may not be applicable to particular behaviors. This was conceptualized by Dunlap et al. (2000) that pro-environmental values comprise of general worldwide views about the environment. This fortifies the debate that some additional variables such as NEP may purely play the role of background factors but have limited unique explanatory power in the TPB model (Ajzen, 2005). This authenticates seminal studies (Rokeach, 1973) that positioned the usefulness of values in explaining universal behavior, while beliefs and attitudes to have more predictive associations in the context of specific behavior.

Results from this research generated some meaningful theoretical and practical implications. From a theoretical viewpoint, this study extends the TPB model by adding the NEP variable to predict behavioral intentions. The present study also addressed the call for future research by Ajzen (2015, 2005) into the investigation of additional TPB variables. The major theoretical contribution of this research revealed the trajectory of NEP values to act as background elements in the traditional TPB framework and have limited predictive power of behavioral intentions. This key finding contributed to the knowledge literature gap on behavioral beliefs, attitudes, and NEP values, where past studies have debated about the actual predictive power of NEP values in behavioral research. Even though scholars have experimented with pro-environmental values in exploring various ecological customer groups (Kiatkawsin and Han (2017), environmental reasons for traveling (Imran et al., 2014), binning behavior (Esfandiar et al., 2020) and perceptions of environmental resources (Ramkissoon et al., 2013), no study tested the predictive power of NEP toward off-trail behavior.

Although results in this present study reported the non-significant relationship between NEP and behavioral intentions, this is a key contribution to noncompliance research. This clearly suggest that NEP values are not linked to visitors' off-trail behavior as pro-environmental values are not triggered significantly enough and people do not link environmental issues as a result of walking off-trail. Therefore, this paper's empirical evidence demonstrated that pro-environmental NEP items are more beneficial in exploring general environmental profiles, while attitudinal factors are more suitable in understanding particular activities such as off-trail ventures.

Secondly, this research engaged the Theory of Planned Behavior as a theoretical pillar to critically elucidate off-trail behavior at BMNP. It is important to note that the lack of theoretical frameworks in past studies may present many difficulties in the future to develop intervention programs (Brown et al., 2010; Goh et al., 2017; Ham et al., 2008). Therefore, the present study's findings based on the TPB framework will allow future researchers and park authorities to ensure improved recreation layout, and enhanced prognostic strategies to avert and encourage park goers to stick to designated pathways.

Thirdly, park authorities can use a mixture of tactics to reduce off-trail walking at national parks. For example, authorities can use direct management techniques such as zoning orders to permit or limit certain events to control capacity. These restrictions can be further noticeable by using ropes along the walking trail perimeters as tangible barriers or by means of low railings to prevent visitors from walking off-trail. Alternatively, park authorities can use fines and penalty as a direct management

technique if the persuasive messages fail to reduce noncompliance as recommended by previous studies (Johnson & Swearingen, 1992; Winter, 2006; Winter et al., 2000).

From a social marketing point of view, primary attention must be given to visitor attitudes and subjective norms. Since subjective norms were the second strongest predictor, park managers should target the reference groups of friends as well as other park visitors to influence socially acceptable behaviors in national parks. Safety campaigns can focus on important social groups such as “*A true mate sticks to the trail*” or “*Be safe and stay on the trail with your mates*”. Park establishments should concentrate on vital attitudes for example showing the itemization of interval periods at beginning of walking trails and the opportunities for lookout points to better manage expectations. Prescriptive messages should focus on the benefits of staying on-trail rather than listing the disadvantages of off-trail walking so that visitors can identify and reflect upon these impacts (Bradford & McIntyre, 2007). In relation to perceived difficulties, park managers must make certain that sufficient signage is exhibited upon entry and at appropriate intervals along the trail, especially at critical crossings. In most cases, the views of difficult trails are due to exhaustion and rest deficiency. Perhaps, senior visitors or visitors with disabilities are more helpless in this situation given their physical health conditions (Tao, Goh & Huang, 2019; Wen, Huang & Goh, 2020; Wen, Yu, Huang & Goh, 2020). Therefore, walkers may grow into desperation and choose to accelerate their outdoor expedition by swaying from the designated pathways in pursuit of unconventional ‘*easier*’ trails.

Limitations and future research

Although this research is important to the sustainable tourism management field, three limitations must be acknowledged. First, actual off-trail behavior was not measured. This was due to the fear of future criminal charges and thus respondents were hesitant to provide their personal communication details. The second limitation was overlapping possibility of values, beliefs and attitudes, which then presents a possibility that respondents treated values, beliefs and attitudes in the same context.

This study suggests future research be conducted on the role of perceived behavioral control with perceived efficacy as the present study’s principal component analysis revealed control beliefs loadings across two separate factor loadings. Second, the subjective norms construct, which heavily relies on injunctive norms; be further examined with descriptive norms to include the actual performance of important social groups.

Next, the likelihood of other supplementary TPB variables such as anticipated emotional regret and guilt, and past behavior need to be included in the predictive equation to gauge the increased prediction of off-trail behavior. Future research should measure actual off-trail behavior to close the intentions-behavior gap. Finally, the contribution of pro-environmental values needs to be investigated in other non-compliant settings such as illegal camping, binning, illegal campfires, wildlife feeding, and other actions, which could potentially impact the national parks in a negative way.

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