

Article

How to Drive Tourists' Pro-Environmental Behavior: Interactive Effect of Benefit Appeals and Goal Framing

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Abstract: The drive to foster tourists' pro-environmental behavior (TPEB) is a current research hotspot amidst the deteriorating ecological environment. However, existing studies have yet to reach definitive conclusions on how tourist destinations influence TPEB through different benefit appeals and goal framing. This paper investigates the interactive effects of these factors on TPEB, reporting on two experiments. Study 1 confirmed significant interactive effects of benefit appeals and goal framing on TPEB, wherein altruistic appeals and gain framing, as well as appeals to self-interest and loss framing, demonstrates matching effects. Furthermore, environmental awareness mediated these interactions. Study 2 established that tourists' environmental knowledge moderates the interactive effects of goal framing and benefit appeals on TPEB. The moderating effect of high-level environmental knowledge is more pronounced, and tourists with higher environmental knowledge are more inclined to engage in TPEB compared with those with lower levels of environmental knowledge. The conclusions of this study not only enrich the research on influencing factors and mechanisms of TPEB but also offer practical insights for environmental management in tourist destinations.

Keywords: message framing; benefit appeals; tourists' pro-environmental behavior; environmental awareness; environmental knowledge



Citation: Deng, P.; Zhou, X.; Xie, D.; Zheng, P. How to Drive Tourists' Pro-Environmental Behavior: Interactive Effect of Benefit Appeals and Goal Framing. *Sustainability* **2024**, *16*, 5600. <https://doi.org/10.3390/su16135600>

Academic Editor: Colin Michael Hall

Received: 13 May 2024

Revised: 13 June 2024

Accepted: 27 June 2024

Published: 29 June 2024



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1. Introduction

Among the most important issues in modern society, ecological and environmental issues have attracted widespread attention worldwide [1]. Due to damage to the ecological environment, such as excessive carbon emissions and widespread littering, tourism is regarded as a “polluting industry” [2]. In 2015, the United Nations Environment Program (UNEP) pointed out that if there is no substantial change in current policies and business practices, tourism is expected to consume 154% more energy and 152% more water, emit 131% more greenhouse gases, and generate 251% more solid waste by 2050. Therefore, it is necessary to take effective measures to reduce the negative impact of tourism on the ecological environment [3].

As the main subject of the tourism system [4], tourist behavior can have a direct impact on the ecological environment. Pro-environmental behaviors refer to the behavior in which individuals participate in green activities to promote the sustainable development of the environment [5]. Studies show that tourists' pro-environmental behavior (TPEB) is an important factor in the promotion of the sustainable development of tourism, which can also effectively reduce the damage to the environment [6]. How to drive TPEB is thus becoming a hot spot of tourism research [7].

Pro-environmental behavior, due to its positive impact on environmental protection, is considered to possess prosocial and altruistic characteristics [8]. However, this prosocial nature is predominantly evident in outwardly altruistic actions. From a behavioral motivation perspective, not all pro-environmental behaviors are altruistically driven. Some

individuals engage in pro-social environmental behavior out of altruism, while others do so out of self-interest. Consequently, benefit appeals can be categorized into personal benefit appeals and societal benefit appeals [9,10]. For instance, tourists adopting pro-environmental behaviors to enhance their own image represent personal benefit appeals, whereas engaging in pro-environmental behavior to prevent environmental pollution and promote sustainable development of tourist destinations is associated with societal benefit appeals. Given the relatively limited attention paid in the existing literature to benefit appeals to tourists, this paper attempts to explore their impact on TPEB.

Extant research focuses on the factors that influence TPEB. For example, the theory of planned behavior has been used to explore the psychological activity factor. However, under the theory of planned behavior, TPEB is a smooth process independently driven, where external factors are less considered as driving factors. In comparison, the goal-oriented behavior model (MGB) clarifies the mechanism of TPEB more appropriately by introducing extrinsic motivation [11]. Message, as a form of external motivator, can intervene in individual behavior by implying specific goal orientations [12]. Message framing is considered an effective method for influencing individual behavior [13], and goal framing represents one type of message framing [14] that impacts the persuasiveness of information via framing the positive or negative consequences of behavior [15]. However, the effects of different types of goal framing on tourists' behavior may be inconsistent, and the mechanism by which goal framing influences TPEB remains unclear. Examining the influence mechanism of goal framing on TPEB from the perspective of benefit appeals may provide a clearer and more intriguing insight into the issue.

Both benefit appeals and goal framing are intricately linked to behavioral objectives and exert influence on individual behavior. However, they diverge in focus: while benefit appeals intervene in determining whether the target content pertains to individual or societal benefits, goal framing intervenes in whether the target outcome entails gain or loss. Specifically, gain framing describes the benefits both to tourists and the environment that result from tourists engaging in pro-environmental behaviors; these benefits include an enhanced travel experience and the sustainable development of the destination. Loss framing describes the personal losses and environmental harm that occur when tourists do not engage in pro-environmental behaviors; these may include a diminished travel experience and negative impact on the ecological preservation of the destination. Therefore, do different benefit appeals and goal framing interactively influence individual behavior? This paper delves into the interactive effects of benefit appeals and goal framing on TPEB within the tourism context, aiming to elucidate their influence mechanisms and boundary conditions. By broadening the scope of research on influencing factors and mechanisms of TPEB, this study offers theoretical insights into interventions aimed at fostering TPEB among tourists in destination settings.

2. Literature Review and Hypotheses Development

2.1. Tourists' Pro-Environmental Behavior

As a research hotspot in environmental psychology, pro-environmental behavior refers to behavior that is considered to contribute or actually contributes to environmental protection [16]. TPEB refers to a series of behaviors carried out by tourists to protect the destination environment in order to reduce the negative impact on the environment [16]. These behaviors are the result of human interaction with the environment through tourism activities [17], which are crucial to the environmental sustainability of tourism destinations and the tourism industry [18].

The extant research on TPEB mainly focuses on influencing factors. Through meta-analysis, Lin et al. classified the factors influencing TPEB into five categories: "Self-efficacy", "Affect", "Norms and Values", "Environmental Mindset", and "Place Perception and Evaluation". Self-efficacy mainly involves perceptual behavior control and perceptual efficacy [19]. Affect is mainly studied in relation to expected positive emotions and expected negative emotions [20]. Norms and values mainly include personal and social norms [21].

Environmental mindset mainly consists of environmental attitudes [22], environmental awareness [23], etc. Place perception and evaluation mainly refer to tourist satisfaction, place attachment, destination attractiveness [24,25], and so on.

It is noted that scholars have primarily focused on individual factors, with relatively less research on external information. Existing studies on the influencing factors of external information mainly explore effects on TPEB from the perspectives of information attractiveness, information content, and other angles. Some scholars have preliminarily investigated the interactive effects of message framing and content on TPEB [26,27], yet the focus of message content lies in the subjective or objective construction of information. There has been little exploration of the influence of benefit appeals on TPEB. Therefore, seizing this opportunity, this paper combines goal framing with benefit appeals to explore their mechanisms of influence on TPEB.

2.2. Goal Framing and TPEB

Message framing essentially refers to differences in the expression of information, where the same content is conveyed through different expressions. Prospect theory posits that the framing of a problem determines people's reactions to it, a phenomenon known as the framing effect [28]. Based on differences in the effects of framing, Levin et al. categorized three types of message framing: risk-choice framing, attribute framing, and goal framing [29]. Prospect theory further explains the framing effect by suggesting that it reflects preferences for decision values as gain or loss. Goal framing, as a crucial factor influencing individual decisions, especially in the context of environmental behavior, refers to individuals' cognition and attitudes towards the consequences of their actions. It affects the persuasiveness of information transmission by presenting positive or negative outcome information [30].

Research indicates that within the tourism context, goal framing may exert a significant influence on TPEB [31]. However, existing research conclusions vary widely, with some scholars suggesting that gain framing has a greater influence on TPEB. When tourists perceive pro-environmental behavior as part of positive outcomes, goal framing plays a reinforcing role. Tourists may view their pro-environmental actions as contributing positively to environmental conservation. They may associate such behavior with social responsibility, environmental protection, and sustainability, thus being more motivated to act. Some scholars argue that loss framing has a greater impact on TPEB. Under the goal framing of negative outcomes, tourists may link not engaging in pro-environmental behavior with negative consequences. They may worry about the environmental damage caused by their travel behavior, leading to feelings of guilt. In this case, the goal framing may influence tourists' willingness through emphasizing the avoidance of negative consequences, prompting them to be more inclined to see pro-environmental behavior as a way to mitigate adverse effects. To further clarify which type of goal framing has a greater impact on TPEB, this paper introduces the concept of benefit appeals and attempts to respond to current inconsistent findings.

2.3. Benefit Appeals and TPEB

TPEB is primarily motivated by either self-interest or altruism, both of which serve as foundations for persuasive communication in tourism research [32]. However, the empirical effectiveness of these two approaches remains unclear. On one hand, Goldstein et al. [33] and Schultz et al. [34] demonstrated that moral appeals led to increased sustainable behavior among guests (e.g., towel reuse). On the other hand, Hardeman et al. [35] revealed that consumers responded more positively to self-interest appeals, exhibiting a greater intention for sustainability. Similarly, Dolnicar et al. [36] concluded that inducing TPEB may involve providing some form of benefit and triggering self-interested motives in doing so. Villarino and Font [37] suggested that there is still considerable untapped potential for enhancing the persuasiveness of TPEB. Hence, there is a need to refine existing models and explore new theoretical perspectives [38]. According to Batson's motivation theory,

self-interest and altruistic motives are two potential driving factors influencing individual pro-environmental behavior. Therefore, in response to the appeals made by Gao et al., this paper attempts to examine the influence of self-interest appeals and altruistic appeals as types of benefit appeals relating to TPEB [39].

Existing research primarily focuses on the influence of benefit appeals on the willingness to purchase green products, with varying effects on individual behavior across different research contexts. Some scholars contend that self-benefit appeals exert a stronger impact on individual behavior. For instance, Allen conducted one of the earliest direct comparisons between self-benefit appeals and appeals citing benefit to others in advertising, suggesting that consumers perceive “saving money” as synonymous with efficiency, leading to more favorable responses to advertisements emphasizing personal benefits over those emphasizing broader societal benefits [40]. Peattie also posited that consumers predominantly purchase green products (such as cleaning agents) to save costs and ease household burdens, with little consideration for the broader ecological impact of the product [41]. Moreover, altruistic appeals in green advertising may inadvertently convey a perception of lower product quality, resulting in higher evaluations of self-benefit appeals when viewed privately [42]. Conversely, other scholars argue that altruistic appeals have a greater impact on individual behavior. White et al. confirmed that altruistic appeals can be more effective than self-benefit appeals in promoting pro-social behavior [43]. Webb et al. argued that socially responsible consumption focuses on societal benefits rather than personal gains [44]. Although choosing green products may require sacrificing some personal benefits [45], products with environmental advantages are more likely to encourage green consumption [46]. Additionally, the increasing public preference for eco-friendly products indicates a shift from marketing strategies that emphasize short-term personal benefits to those that prioritize long-term social sustainability [47].

However, there is a distinction between tourists’ pro-environmental behavior and the purchase of green products. Purchasing green products is a subset of pro-environmental behavior, which also encompasses a series of cost-free activities undertaken to actively protect the environment. During travel, tourists are more likely to express their pro-environmental intentions through pro-environmental behavior rather than solely via purchasing green products. Therefore, the impact of benefit appeals on TPEB remains uncertain, as existing research has yet to provide a definitive answer. Through reviewing the relevant literature, this paper identifies that benefit appeals are inherently linked to goal framing, influencing individual behavior by altering the persuasiveness of information through the construction of message content. Hence, this paper seeks to further explore the influence of benefit appeals on TPEB from the perspective of goal framing.

2.4. The Interactive Effect of Goal Framing and Benefit Appeals on TPEB

According to consistency theory, value congruence is a decisive factor influencing individual evaluations. When benefit appeals align with individual values, the information content is more likely to be favorably received by individuals [48,49]. Under self-interest appeals, gain framing describes the gains brought to tourists by engaging in pro-environmental behavior [50], while loss framing describes the losses incurred by tourists through not participating in pro-environmental behavior. As self-interest appeals are highly relevant to tourists’ personal interests, tourists engage in central route processing to deeply process information, systematically and rigorously considering, analyzing, and summarizing information [51]. According to prospect theory, individuals are much more concerned about personal loss than personal gain, making them more likely to engage in deep processing of loss framing. Therefore, compared with gain framing, self-interest appeals matched with loss framing are more effective [52].

Attribution theory suggests that individuals prioritize understanding the motives behind behavior over its direct outcomes [53]. In the context of altruistic appeals, where environmental benefits are perceived as indirect gains, tourists find it challenging to deeply process such information through the central route. Instead, they tend to rely on peripheral

cues that evoke emotional resonance, driven by their subjective and emotionally driven states, favoring positive associations and emotional triggers [54]. Information processing theory further elucidates that individuals' cognitive and emotional experiences are pivotal in shaping their judgments and decisions when faced with stimuli [55]. In the case of loss framing, tourists may feel helpless in relation to environmental protection, potentially leading to a disregard for the information and a subsequent lack of environmental efforts [56]. Conversely, the portrayal of "environmental benefits" in gain framing aligns seamlessly with tourists' positive associations and emotions, encouraging active contribution to environmental improvement and eliciting a positive response [57]. Based on the above analysis, this study proposes the following research hypotheses:

H1. *Benefit appeals and goal framing have an interactive effect on TPEB.*

H1a. *In the context of altruistic appeals, compared with loss framing, matching gain framing with altruistic appeals is more effective in stimulating TPEB.*

H1b. *In the context of self-interest appeals, compared with gain framing, matching loss framing with self-interest appeals is more effective in stimulating TPEB.*

2.5. Mediating Effect of Environmental Awareness

Environmental awareness refers to individuals' beliefs, emotions, and behavioral tendencies towards environmental protection-related concepts and events. It is susceptible to external environmental influences [58], especially in the current information era, in which individuals are more likely to be influenced by external information. Therefore, information promoting TPEB may affect tourists' environmental awareness. Omoogun et al. confirmed through questionnaire surveys that environmental awareness influences TPEB [59]. Study by Yang and Xe revealed that awareness is the most significant factor influencing residents' sustainable consumption behavior [60]. Peng et al. found that consumers' environmental awareness is a crucial antecedent of low-carbon consumption intentions [61]. However, there has been limited research focusing on external environmental variables influencing environmental awareness, as environmental awareness is also susceptible to external environmental influences [62]. Benefit appeals and goal framing, as external information, may influence tourists' environmental awareness, thereby affecting TPEB. Therefore, this study posits the following hypothesis:

H2. *Environmental awareness mediates the interactive effect of benefit appeals and goal framing on TPEB.*

According to social identity theory [63], the environmental behavior of tourists can be molded and linked to social groups with environmental inclinations, thereby stimulating their desire to take environmental action, as this aligns with their desire for social recognition and respect [64]. Additionally, social norm theory provides guidance by emphasizing environmental protection at destinations as a social expectation or norm, prompting tourists to follow similar environmental behaviors to comply with social norms and gain recognition [65,66]. Therefore, when faced with altruistic appeals, tourists may associate tourism destinations with promoting sustainability at both the destination and societal levels, and gain framing further emphasizes the benefits of adopting pro-environmental behaviors. Altruistic appeals and gain framing may thus have a matching effect on tourists' environmental awareness.

On the other hand, loss aversion theory suggests that individuals are more sensitive to losses than gains of equal value [67], emphasizing the potential losses associated with not taking environmental protection measures. For instance, environmental degradation may affect the quality of future travel experiences, prompting tourists to take action to avoid losses [68]. Since both self-interest appeals and loss framing emphasize the close relationship between personal interest and losses, their alignment may better stimulate

individuals' environmental awareness to safeguard their own interests. Therefore, we hypothesize the following:

H2a. *In the context of altruistic appeals, compared with loss framing, matching gain framing with altruistic appeals is more effective in stimulating tourists' environmental awareness.*

H2b. *In the context of self-interest appeals, compared with gain framing, matching loss framing with self-interest appeals is more effective in stimulating tourists' environmental awareness.*

2.6. Moderating Effect of Environmental Knowledge

Environmental knowledge refers to “the ability of individuals to recognize signs, concepts, and behavioral patterns related to environmental protection” [69]. Bohlen et al. categorized environmental knowledge into two major domains: general environmental issue knowledge and specific environmental issue knowledge [70]. Previous research has shown that environmental knowledge can influence individuals' pro-environmental behavior. For example, Maloney et al. indicated that individuals need to have a certain level of environmental knowledge to influence their environmental protection behavior [71]. Liobikienė et al. found that consumers with extensive knowledge of green consumption were more likely to engage in green consumption behavior [72]. Under the influence of external environments, tourists with different levels of environmental knowledge may react differently to external information [73,74]. Tourists with high environmental knowledge have a greater understanding of environmental protection, while those with lower levels of environmental knowledge are less likely to engage in TPEB. Therefore, this study proposes the following research hypothesis:

H3. *Environmental knowledge moderates the interactive effects of benefit appeals and goal framing on TPEB.*

H3a. *Tourists with high levels of environmental knowledge are more willing to engage in pro-environmental behavior compared with those with low levels of environmental knowledge.*

In summary, this study constructs the following conceptual model (Figure 1):

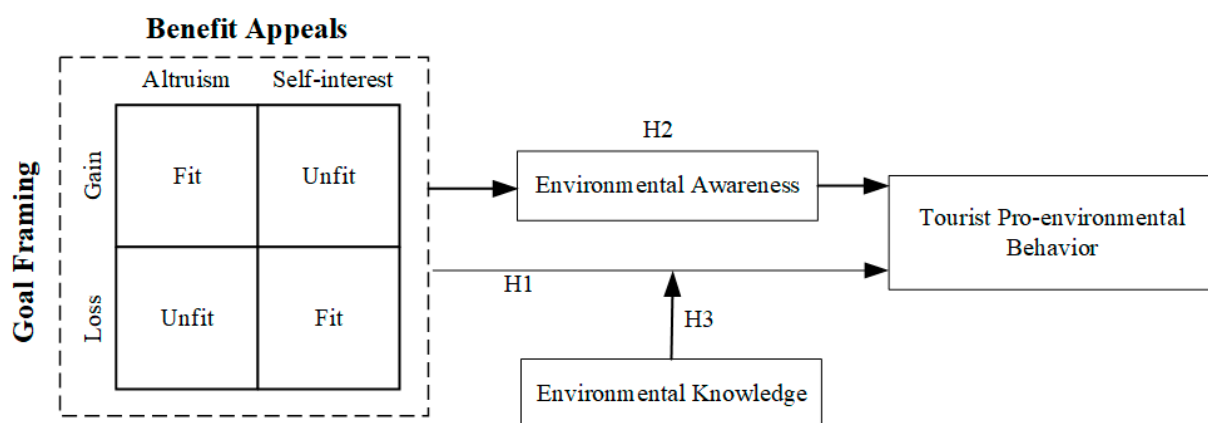


Figure 1. Theoretical Framework.

3. Study 1: The Interactive Effects of Benefit Appeals and Goal Framing on TPEB and the Mediating Role of Environmental Awareness

Study 1 adopted a 2×2 between-subjects design (benefit appeals: altruism vs. self-interest; goal-framing: gain vs. loss). The purpose of the experiment was to examine the interactive effects of benefit appeals and goal framing on TPEB, as well as the mediating role of tourists' environmental awareness. Additionally, the study aimed to rule out alternative explanations of material's attractiveness and interest and tourists' emotional responses.

3.1. Development of Stimulus Materials

This study selected Zhangjiajie National Forest Park as a representative natural tourist destination because of its unique quartz sandstone peaks, which have been listed in the UNESCO World Heritage List. The area has been designated as a World Geopark since 2004. Additionally, it is a level 5A national tourist attraction, making it a significant and representative natural tourist site.

Regarding the design of the goal-framing materials, this study refers to the experimental design by Chi et al. [28]. For the gain-framing materials, the benefits of environmental protection are emphasized, such as the preservation of the beautiful scenery of Zhangjiajie, one's own opportunity to enjoy the scenery in the future, and the promotion of sustainable development of the tourism industry. For the loss-framing materials, the negative impacts of environmental destruction are highlighted, such as the destruction of the beautiful scenery of Zhangjiajie, the potential inability to see natural beauty in the future, and the hindrance to the sustainable development of the tourism industry. Both pre-tests and expert opinions support these information-framing materials.

Previous research has shown that clarifying the beneficiaries and the content of benefits can distinguish between personal and social benefits. Firstly, before the experiment, interviews were conducted to determine the personal and social benefits of tourists' engagement in pro-environmental behavior. Among the 25 interviewees (12 male, 13 female, median age = 25.7), 18 mentioned personal benefits such as "gaining physical health" and "enhancing travel experience", while 16 mentioned social benefits such as "protecting the tourist environment" and "promoting high-quality development of our homeland". Combining these interview results with practical considerations, this study used the aforementioned interview results as the experimental materials for verification of the benefit appeals.

3.2. Pretest

To verify whether the experimental materials for study 1 achieved the purpose of manipulation and to measure the clarity, reliability, and comprehensibility of the experimental materials, subjects were randomly assigned to either the goal-framing or benefit-appeals judgment group. They were asked to carefully read the material content and answer questions after each piece of information. Explanations of the gains and losses were provided in the judgment questions relating to the goal-framing materials. A bipolar scale was used to measure the experimental materials (1 = loss, 7 = gain; 1 = self-interest, 7 = altruism). Each part of the material was designed with corresponding questions regarding clarity, comprehensibility, and reliability.

For the pretest, this study recruited 74 subjects through online recruitment on 15 September 2023. The subjects were randomly divided into two groups: the goal-framing (37 participants) and benefit-appeals judgment group (37 participants). Four sets of data did not meet the screening criteria and were excluded, resulting in 70 valid questionnaires, with 35 each for the benefit-appeals and goal-framing judgment groups. Regarding the benefit-appeals materials, participants perceived the altruistic appeals as more altruistic in nature and the self-interest appeals as more self-interested, with a significant difference between them ($M_{\text{altruism}} = 5.77$, $M_{\text{self-interest}} = 2.46$, $t(70) = 11.995$, $p = 0.04$). Regarding the goal-framing materials, participants perceived greater gains from the gain-framing information and greater losses from the loss-framing information, with a significant difference between the two ($M_{\text{gain}} = 6.00$, $M_{\text{loss}} = 2.54$, $t(70) = 14.604$, $p = 0.003$). Moreover, there were no significant differences between the goal-framing and benefit-appeals materials in terms of clarity ($p_{\text{goal}} = 0.843$, $p_{\text{benefit}} = 0.762$), comprehensibility ($p_{\text{goal}} = 0.212$, $p_{\text{benefit}} = 0.512$), and reliability ($p_{\text{goal}} = 0.643$; $p_{\text{benefit}} = 0.938$). In conclusion, the design of the experimental materials for Study 1, including the goal framing and benefit appeals, was reasonable and suitable for application in the formal experiment.

3.3. Methodology

Design and sample: Study 1 adopted a 2×2 between-subjects design (benefit appeals: altruism vs. self-interest; goal-framing: gain vs. loss). In October 2023, participants were recruited through online social platforms (WeChat, QQ, Weibo, and Baidu Tieba). Potential target tourists were initially screened by asking if they enjoyed traveling. Recruitment ceased after 320 participants were enlisted. The participants were then randomly assigned to four groups, and questionnaires were distributed via the Wenjuanxing platform. Invalid questionnaires, including those with excessively long or short response times or incomplete answers, were excluded, resulting in 296 valid questionnaires. The Cronbach's alpha for the environmental awareness scale and the TPEB scale for tourists were 0.825 and 0.833, respectively, indicating a high level of scale reliability. The specific demographic characteristics are presented in Table 1.

Table 1. Demographic information of participants of the two studies.

Demographic		Study 1 (n = 296)	Study 2 (n = 371)
Gender	Male	139 (47%)	182 (49.1%)
	Female	157 (53%)	189 (50.9%)
Age	Mean	26.41	26.65
	High school graduate or less	40 (13.5%)	50 (13.5%)
Education	Junior college	70 (23.6%)	88 (23.7%)
	Bachelor's degree	166 (56.1%)	198 (53.4%)
	Master's/Doctoral degree	20 (6.8%)	35 (9.4%)
Monthly income	Less than CNY 3000	29 (9.8%)	41 (38.3%)
	CNY 3000–4999	64 (21.5%)	44 (41.1%)
	CNY 5000–7999	158 (38.7%)	7 (6.5%)
	More than CNY 8000	45 (11%)	15 (14%)
Occupation	Government worker	40 (13.5%)	39 (10.5%)
	Farming	31 (10.5%)	28 (4.8%)
	Business	66 (22.3%)	89 (24%)
	Sales and office	48 (16.2%)	56 (15.1%)
	Student	85 (28.7%)	102 (27.5%)
	Others	26 (8.8%)	57 (15.4%)

Procedure and measures: Before the experiment began, participants were instructed to imagine themselves touring Zhangjiajie National Forest Park and suddenly encountering a signboard within the tourist area. Subsequently, participants were randomly presented with stimuli materials corresponding to a specific scenario. After reading the materials, participants underwent manipulation checks regarding the types of benefit appeals and goal framing presented in the stimuli (similar to the pretest items). Then participants were required to respond to items measuring environmental awareness, which were modified from Fransson and Gärling's scale [74]. These items comprised four statements: "I have the responsibility to protect the environment of tourist attractions", "I should abide by the environmental regulations of local tourist attractions", "I should comply with the environmental management measures of the local tourist attractions", and "I will not disturb the lives of local residents". Additionally, participants completed the TPEB scale, which was adapted and modified based on the studies by Bohlen et al. [70] and Grazzini et al. [73], to reflect the Chinese cultural context and real-life situations. The scale consisted of four items: "I will not litter during future travels", "I will not trample on grassy areas during future travels", "I will intervene when I see others damaging the environment", and "I will participate in environmental conservation volunteer activities organized by tourist destinations". Participants also provided ratings for the stimuli materials regarding their attractiveness and interest, as well as their current emotional state, using a scale ranging from −3 (sad) to 3 (happy), −3 (angry) to 3 (pleased), and −3 (depressed) to 3 (satisfied) [75]. Finally, demographic information was collected from the participants.

3.4. Results

Manipulation check. An independent samples T-test was conducted to assess the manipulation of the goal framing. The results indicated that participants perceived greater gains from the gain-framed information compared with the loss-framed information, with a significant difference observed between the two conditions ($M_{\text{gain}} = 5.39$, $M_{\text{loss}} = 2.70$, $t(296) = 19.716$, $p < 0.001$). Similarly, a manipulation check was performed for the benefit appeals. Participants perceived the altruistic appeals as more altruistic and the self-interest appeals as more self-interested, with a significant difference found between the two conditions ($M_{\text{altruism}} = 5.38$, $M_{\text{self-interest}} = 2.70$, $t(296) = 17.209$, $p < 0.001$). Therefore, the experiment successfully manipulated both the goal framing and benefit appeals.

Interactive effect analysis. Using TPEB as the dependent variable, goal framing (loss framing = 0, gain framing = 1) and benefit appeals (self-interest appeals = 0, altruistic appeals = 1) as independent variables, and demographic characteristics as control variables, a two-way analysis of variance (ANOVA) was conducted to test for interactive effects. The results revealed a significant interactive effect of benefit appeals and goal framing on TPEB ($F(1, 291) = 36.708$, $p < 0.001$), supporting hypothesis H1. Further main effects analysis showed that the main effects of benefit appeals and goal framing were not significant ($p_{\text{benefit}} = 0.719$, $p_{\text{goal}} = 0.148$). To further clarify the interactive effect of benefit appeals and goal framing on TPEB, simple effects analysis was conducted. As shown in Figure 2, the results indicated that under altruistic appeals, compared with the loss framing, the gain framing had a greater impact on TPEB ($F(1, 145) = 30.311$, $p < 0.001$), suggesting a matching effect between altruistic appeals and gain framing, supporting hypothesis H1a. Under self-interest appeals, compared with the gain framing, the loss framing had a greater impact on TPEB ($F(1, 147) = 58.177$, $p < 0.001$), indicating a matching effect between self-interest appeals and loss framing, supporting H1a and H1b.

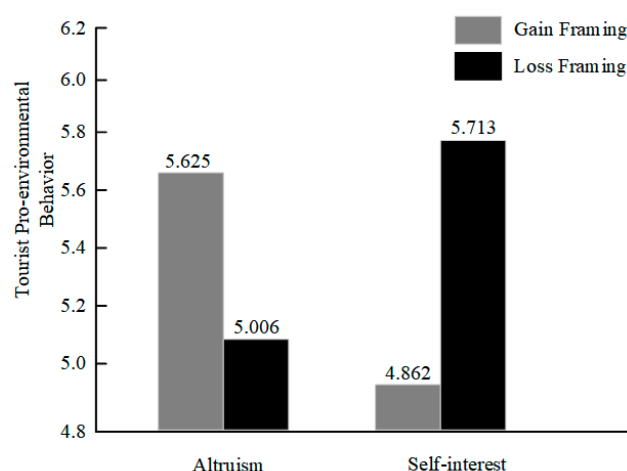


Figure 2. The interactive effects of benefit appeals and goal framing on TPEB.

Mediation effect analysis. Following the suggestions of Zhao et al. [76] and Hayes [77], this study employed a moderated mediation model to test the mediating role of environmental awareness. TPEB was set as the dependent variable, benefit appeals as the independent variable, environmental awareness as the mediating variable, goal framing as the moderating variable, and demographic characteristics as control variables. Model 7 from the PROCESS macro was used for analysis with 5000 bootstrap samples and a 95% confidence interval. The results revealed a mediation effect value of 0.48, with a bootstrap confidence interval of [0.2715, 0.6940], which did not include 0, indicating that environmental awareness mediated the influence of benefit appeals and goal framing on TPEB. After controlling for environmental awareness, the direct effect of the interaction between goal framing and benefit appeals on TPEB was not significant, with a confidence interval of [−0.1585, 0.1920],

including 0, suggesting that environmental awareness fully mediated the interactive effect between goal framing and benefit appeals, supporting H2.

Further simple effects analysis revealed that under altruistic appeals, compared with loss framing, the gain-framing information significantly enhanced tourists' environmental awareness ($F(1, 145) = 4.729, p = 0.03$), indicating a matching effect between altruistic appeals and gain framing on tourists' environmental awareness (Figure 3). Similarly, under self-interest appeals, compared with gain framing, the loss framing significantly heightened tourists' environmental awareness ($F(1, 147) = 5.962, p = 0.015$), demonstrating a matching effect between selfish appeals and loss framing on tourists' environmental awareness. Thus, H2a and H2b were supported.

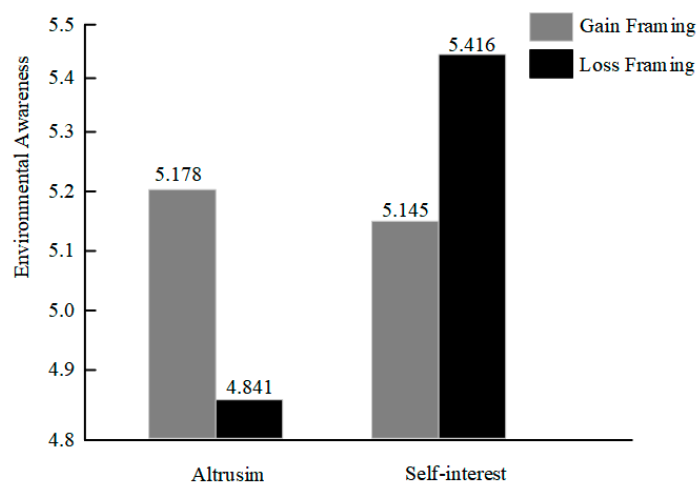


Figure 3. The interactive effects of benefit appeals and goal framing on tourists' environmental awareness.

Alternative Explanations. Ratings of attractiveness and interest in the experimental materials were used as dependent variables. A two-factor ANOVA revealed that the effects of goal framing ($F(1, 291) = 0.002, p = 0.962$), benefit appeals ($F(1, 291) = 0.079, p = 0.779$), and their interaction on attractiveness ratings were not significant ($F(1, 291) = 0.260, p = 0.611$). Similarly, the effects of goal framing ($F(1, 291) = 0.027, p = 0.869$), benefit appeals ($F(1, 291) = 0.110, p = 0.740$), and their interaction on interest ratings were also not significant ($F(1, 291) = 1.694, p = 0.194$). This rules out the alternative explanation of the attractiveness and interest of the materials.

Furthermore, there were no significant differences in emotion between the self-interest-gain group and the altruism-gain group for emotion 1 ($p = 0.141$), emotion 2 ($p = 0.298$), and emotion 3 ($p = 0.423$). Similarly, there were no significant differences between the altruism-gain group and the self-interest-loss group for emotion 1 ($p = 0.610$), emotion 2 ($p = 0.403$), and emotion 3 ($p = 0.870$). Additionally, there were no significant differences between the self-interest-loss group and the altruism-loss group for emotion 1 ($p = 0.407$), emotion 2 ($p = 0.584$), and emotion 3 ($p = 0.727$). Moreover, there were no significant differences between the altruism-loss group and the gain-self-interest group for emotion 1 ($p = 0.882$), emotion 2 ($p = 0.768$), and emotion 3 ($p = 0.762$). Therefore, there were no significant differences among the four groups of subjects, ruling out the alternative explanation of tourists' emotions.

4. Study 2: Moderating Effect of Environmental Knowledge

4.1. Development of Stimulus Materials

The Forbidden City (Palace Museum) was selected as the case study location for situational manipulation. The Forbidden City, a class 5A tourist attraction in China, epitomizes China's cultural tourism resources, making it a representative case study site. Following a similar approach to that taken in Study 1, stimulus materials were designed for the Forbidden City. Thirty participants were interviewed on 13 November 2023, and it was

found that there were no significant changes in the nature of the benefit appeals when the destination was changed. Therefore, the benefit-appeal materials from Study 1 were adjusted only slightly.

4.2. Pretest

The pretest procedure was consistent with Experiment 1. In this study, 80 participants were recruited online for the pretest on 27 November 2023. Participants were randomly assigned to two groups: the goal-framing group (40 participants) and the benefit-appeal judgment group (40 participants). Participants were required to complete relevant measurement items after reading the materials. Among the collected results, eight sets of data did not meet the screening criteria and were therefore excluded, leaving 72 valid questionnaires, with 36 in each of the benefit-appeal and goal-framing groups. Regarding the benefit-appeal materials, participants perceived altruistic appeals as more reflective of altruism, while self-interest appeals were perceived as more reflective of self-interest, with a significant difference between the two ($M_{\text{altruism}} = 5.03$, $M_{\text{self-interest}} = 2.78$, $t(72) = 9.466$, $p < 0.001$). Concerning the goal-framing materials, participants perceived greater gains from gain framing and greater losses from loss framing, with a significant difference between the two ($M_{\text{gain}} = 4.92$, $M_{\text{loss}} = 2.28$, $t(72) = 15.62$, $p < 0.001$). Additionally, there were no significant differences between the goal-framing and benefit-appeal materials in terms of clarity ($p_{\text{goal}} = 0.071$; $p_{\text{benefit}} = 0.292$), comprehensibility ($p_{\text{goal}} = 0.490$; $p_{\text{benefit}} = 0.805$), and reliability ($p_{\text{goal}} = 0.185$; $p_{\text{benefit}} = 0.121$). In conclusion, the design of the goal-framing and benefit-appeal materials for Study 2 was deemed reasonable and suitable for application in the formal experiment.

4.3. Methodology

Study 2 also adopted a three-factor between-subjects experimental design (benefit appeals: altruism vs. self-interest) $\times$ (goal framing: gain vs. loss) $\times$ (environmental knowledge: high vs. low), aiming to examine the moderating effect of environmental knowledge on the influence of goal framing and benefit appeals on TPEB. Initially, a total of 600 participants were recruited for this experiment in November 2023. Prior to the experiment, participants were invited to complete an environmental knowledge questionnaire. Drawing on Bohlen et al.'s scale with certain modifications [70], ten items were designed: "excessive use of fertilizers and pesticides can lead to environmental degradation"; "the use of phosphorus-containing laundry detergent does not cause water pollution"; "fluorine emissions from fluorine-containing refrigerators can contribute to the destruction of the atmospheric ozone layer"; and so on. A correct answer was assigned a value of 1, while an incorrect answer or a response of "I don't know" was assigned a value of 0. Subsequently, the scores of the respondents on these 10 questions were summed. Based on the reported level of environmental knowledge, the top and bottom thirds were selected as the high-environmental-knowledge group and low-environmental-knowledge group, respectively, resulting in 396 participants entering the second round of the experiment.

Participants with high and low environmental knowledge were randomly assigned to groups with different benefits appeals and loss framing. Participants were asked to imagine touring the Forbidden City and suddenly seeing a billboard with the content material written on it. Participants completed operational questions and environmental awareness and TPEB scales. They also responded to measurements of the perceived attractiveness and interest of experimental material images, as well as tourists' emotions. Finally, participants provided demographic information. After excluding 25 invalid questionnaires, 371 valid questionnaires were obtained. The specific demographic characteristics are presented in Table 1.

4.4. Results

Manipulation check. An independent samples *t*-test was conducted to examine the manipulation of the goal framing. Results indicated that participants perceived greater

benefits from the gain framing compared with the loss framing, with a significant difference observed ($M_{\text{gain}} = 4.88$, $M_{\text{loss}} = 2.47$, $t(371) = 26.404$, $p < 0.001$). Similarly, a manipulation check was performed for the benefit appeals. Participants considered altruistic appeals to be more altruistic in nature compared with appeals to self-interest, with a significant difference found between the two conditions ($M_{\text{altruism}} = 4.35$, $M_{\text{self-interest}} = 2.98$, $t(371) = 8.846$, $p < 0.001$). Therefore, the manipulation of both the goal framing and the benefit appeals was successful in this experiment.

Interactive effect analysis. A two-way analysis of variance (ANOVA) was conducted with goal framing and benefit appeals as independent variables and TPEB as the dependent variable, while controlling for demographic characteristics. Results revealed a significant interactive effect of benefit appeals and goal framing on TPEB ($F(1, 363) = 5.626$, $p = 0.018$), confirming H1 once again. Further simple effects analysis was conducted. As illustrated in the Figure 4, under altruistic appeals, compared with the loss framing, the gain framing had a greater impact on tourists' pro-environmental behavior ($F(1, 183) = 79.245$, $p < 0.001$), indicating a matching effect between altruistic appeal and gain framing. Under self-interested appeals, compared with the gain framing, the loss framing had a greater impact on TPEB ($F(1, 184) = 17.641$, $p < 0.001$), suggesting a matching effect between appeals to self-interest and loss framing (Figure 4). Thus, hypotheses H1a and H1b were further supported.

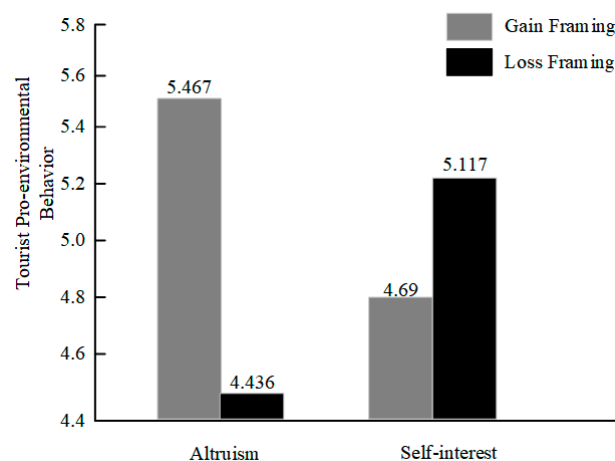


Figure 4. The Interactive effects of benefit appeals and goal framing on TPEB in Study 2.

Moderation effect analysis. A three-way analysis of variance (ANOVA) was conducted with goal framing, benefit appeals, and environmental knowledge as independent variables, demographic characteristics as control variables, and tourist pro-environmental behavior as the dependent variable. The results revealed a significant interactive effect of the three factors on TPEB ($F(1, 359) = 24.333$, $p < 0.001$), confirming hypothesis H3, indicating that environmental knowledge moderates the relationship between goal framing and benefit appeals' effects on TPEB. Further simple effects analysis revealed that under high levels of environmental knowledge, tourists' pro-environmental behavior induced by different types of goal framing and benefit appeals was higher compared with those under low levels of environmental knowledge (Figure 5). Additionally, regardless of the level of environmental knowledge, altruistic appeals paired with gain framing and self-interested appeals paired with loss framing both exhibited matching effects on tourists' pro-environmental behavior, further validating hypotheses H1a and H1b.

Mediation effect analysis. Following the methodology of Study 1, further examination of the mediating role of environmental awareness was conducted. The results further confirmed that environmental awareness mediated the interactive effect of goal framing and benefit appeals on TPEB. The mediation effect value was 0.12, with a bootstrap confidence interval of [0.2341, 0.3452], excluding 0, indicating the presence of a significant mediation effect and thereby reaffirming the validity of hypothesis H2.

Alternative explanations. The ratings for attractiveness and interest of the experimental materials were used as dependent variables. A three-factor ANOVA showed that the effects of goal framing ($F(1, 359) = 0.649, p = 0.421$), benefit appeals ($F(1, 359) = 0.060, p = 0.867$), environmental knowledge ($F(1, 359) = 1.789, p = 0.182$), and their interactions on attractiveness ratings were not significant ($F(1, 359) = 1.800, p = 0.147$). Similarly, the effects of goal framing ($F(1, 359) = 0.186, p = 0.667$), benefit appeals ($F(1, 359) = 0.194, p = 0.660$), environmental knowledge ($F(1, 359) = 0.203, p = 0.653$), and their interactions on interest ratings were also not significant ($F(1, 359) = 0.123, p = 0.947$). This ruled out the alternative explanation of the attractiveness and interest of the materials.

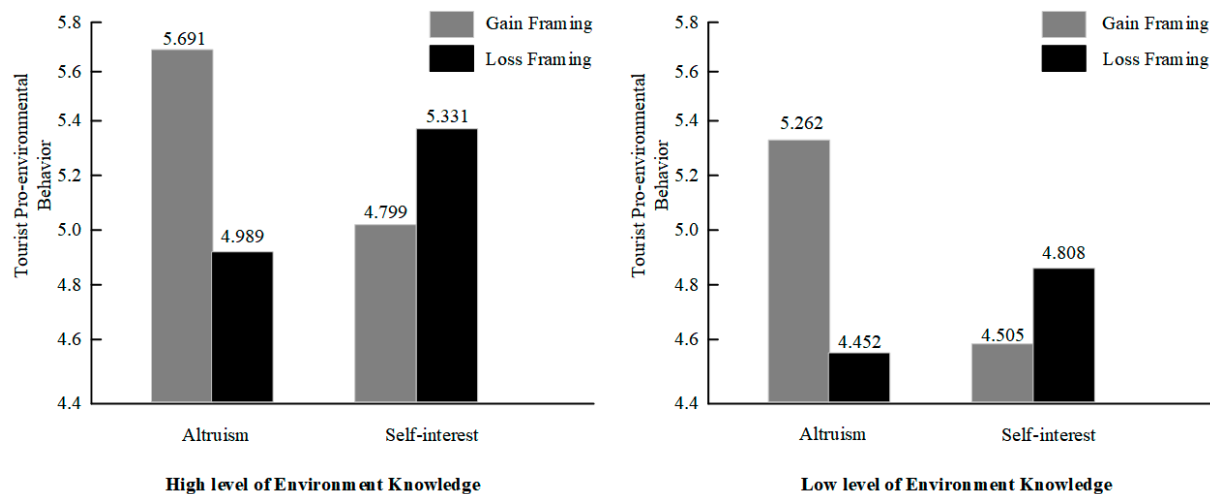


Figure 5. The moderating effect of environmental knowledge on TPEB.

Furthermore, there were no significant differences observed in eight groups of participants in relation to emotions 1, 2, and 3. This indicates that there were no significant differences in emotions among the eight groups of participants as shown in Table 2, thereby ruling out the alternative explanations of tourists' emotions.

Table 2. The result of alternative explanation of tourists' emotions.

Group Classification	Pemotion 1	Pemotion 2	Pemotion 3
Low environmental knowledge			
Self-interest–gain group—altruism–gain group	0.770	0.765	0.345
Altruism–gain group—self-interest–loss group	0.716	0.857	0.886
Self-interest–loss group—altruism–loss group	0.829	0.837	0.561
Self-interest–gain group—altruism–loss group	0.885	0.672	0.631
High environmental knowledge			
Self-interest–gain group—altruism–gain group	0.525	0.453	0.213
Altruism–gain group—self-interest–loss group	0.370	0.145	0.324
Self-interest–loss group—altruism–loss group	0.516	0.135	0.651
Self-interest–gain group—altruism–loss group	0.772	0.765	0.467

5. Discussion

This study conducted two experiments to examine the interactive effects of goal framing and benefit appeals on TPEB, as well as their underlying mechanisms and boundary conditions. Specifically, Study 1 found significant interactive effects of goal framing and benefit appeals on TPEB, with altruistic appeals and gain framing, as well as self-interest appeals and loss framing, having matching effects. This is consistent with the findings of Sheng et al. who confirmed the matching effects of green advertising appeals and message framing on consumer responses, although their focus was on consumer responses rather than TPEB [51]. Additionally, while previous research has predominantly examined the influence of benefit appeals or framing effects on TPEB from a single perspective, and

some studies have explored the interactive effects of message framing from perspectives such as social distance [78] and environmental attitudes [79], this study verified the interactive effects of benefit appeals and goal framing on TPEB, providing new insights into the drivers of TPEB. Moreover, this study expanded the scope of investigation from focusing on individual tourists to exploring the impact of external information on TPEB [80], thus responding to the call issued by Gao et al. [39]. Moreover, it further extends the theoretical framework of benefit appeals and framing effects.

Study 1 also found that tourists' environmental awareness played a mediating role in the interactive effects of goal framing and benefit appeals on TPEB, and further revealed that altruistic appeals matched with gain framing and self-interest appeals matched with loss framing were more effective in stimulating tourists' environmental awareness. The conclusions of this study are consistent with the findings of Yang et al. [60] and Peng et al. [61], who emphasized the significant role of environmental awareness in driving individuals' pro-environmental behavior. Furthermore, this study extends the work of Aman et al. [81] and Zhou et al. [82], who highlighted the importance of connecting environmental issues with personal values to foster pro-environmental behavior. Moreover, this research builds on the foundations laid by Li et al. [83], who argued for the importance of integrating motivational factors in promoting environmental behavior. Through identifying the specific conditions under which environmental awareness is heightened, our study provides practical implications for designing more effective environmental campaigns. This interactive effect underscores the necessity of a more targeted approach, as suggested by McKenzie-Mohr [84], in fostering sustainable behaviors through tailored communication strategies.

Study 2 found that tourists' environmental knowledge moderated the interactive effects of goal framing and benefit appeals on TPEB, a conclusion consistent with the findings of Liu et al. [85] and Kollmuss and Agyeman [86], who highlighted the pivotal role of environmental knowledge in shaping environmental behavior. This study extends their work by demonstrating how high and low levels of environmental knowledge distinctly influence the effectiveness of goal framing and benefit appeals. The evidence that tourists with high-level environmental knowledge are more willing to engage in pro-environmental behaviors underscores the need for tailored educational interventions, as suggested by Wang et al. [87]. Moreover, through categorizing environmental knowledge into high and low levels, this research provides a more nuanced understanding of its moderating role, filling a gap in the literature noted by Gifford and Nilsson [88]. Additionally, our findings have practical implications for destination managers and policy makers, echoing the recommendations of Li et al. [83] on the importance of integrating environmental knowledge into strategic communication and educational programs. Through recognizing and leveraging the differentiated impacts of environmental knowledge levels, destination managers can design more effective interventions that enhance TPEB, ultimately contributing to sustainable tourism practices.

6. Conclusions and Future Directions

6.1. Conclusions

This study derives the following research conclusions from the two experiments: (1) the interactive effect between the benefit appeals and goal framing significantly influences TPEB. Additionally, there is a matching effect between appeals to altruism and gain framing, as well as between appeals to self-interest and loss framing on TPEB; (2) tourists' environmental awareness plays a mediating role in the interactive effect. Furthermore, it was found that altruistic appeals paired with gain framing and appeals to self-interest paired with loss framing were more effective in stimulating tourists' environmental awareness; (3) tourists' environmental knowledge moderates the interactive effect. The moderating effect of high-level environmental knowledge is more significant, and tourists with high-level environmental knowledge are more willing to engage in TPEB than those with low-level environmental knowledge (Figure 6).

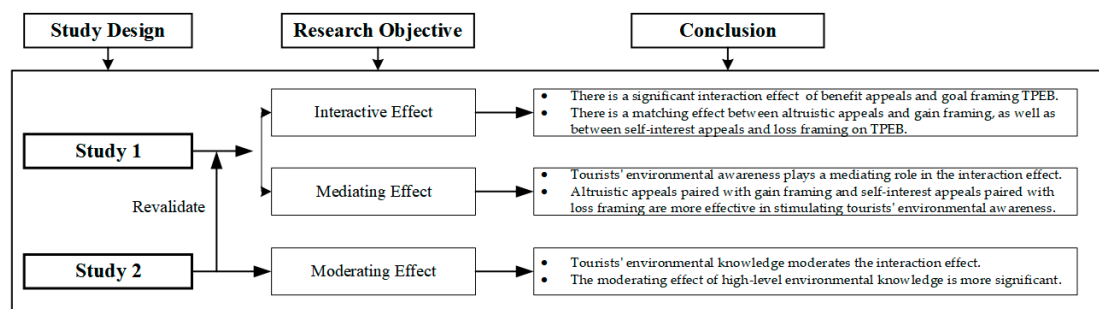


Figure 6. Summary diagram.

6.2. Theoretical Implications

Firstly, this paper validates the interactive effects of benefit appeals and goal framing on tourists' pro-environmental behavior, distinguishing itself from previous studies that only explored their influence from a single perspective. Studying a combination of benefit appeals and goal framing, this paper verifies their matching effect on TPEB, thereby enriching the research on the influencing factors of pro-environmental behavior. Moreover, this paper extends the application of benefit appeals in the tourism domain and further refines the theory of framing effects.

Secondly, this paper further validates the mediating role of environmental awareness and the moderating role of environmental knowledge, enriching the research on the driving mechanisms of TPEB. From an interaction perspective, this paper confirms the mediating role of environmental awareness and the moderating role of environmental knowledge, providing an effective supplement to existing studies that focused on single-factor mechanisms influencing tourists' pro-environmental behavior [81]. This reaffirmation of the importance of environmental awareness and environmental knowledge in driving TPEB offers practical insights for tourist destinations.

Thirdly, the paper further expands the application boundaries of benefit appeals. Previous research on benefit appeals primarily focused on driving consumer behavior such as purchasing green products. This paper extends the concept of benefit appeals to the context of TPEB. Using specific tourist destinations as stimulus factors, this paper provides theoretical reference for the practical application of benefit appeals in tourist destinations.

6.3. Practical Suggestion

The findings of this study provide valuable insights for destination managers. Firstly, destination managers should pay attention to the design of signage and related information boards. It was found that aligning message framing with goal framing had a greater impact on TPEB. Therefore, destinations should focus on the design of textual content on signage, ensuring alignment between altruistic appeals and gain framing, as well as between self-interest appeals and loss framing. For example, placing a sign next to a lawn in a scenic area that reads, "Step on me, and your trip will be less perfect, and you will feel guilty", aligns with loss framing and self-interest appeals. Similarly, placing a sign next to a trash bin that reads, "Throw your trash in me, and not only will the beautiful scenery remain, but you'll also have a perfect trip", aligns with gain framing and appeals to altruism.

Secondly, destinations can improve tourists' environmental awareness by providing educational materials and interactive displays that highlight the importance and benefits of pro-environmental behavior. Combining altruistic appeals with gain framing and self-interest appeals with loss framing in these materials can further enhance their effectiveness in raising awareness. Brochures can be distributed to explain local environmental issues and the positive impact of pro-environmental behavior. For example, a brochure at a coastal destination might detail how protecting coral reefs benefits marine life and enhances snorkeling experiences.

Thirdly, destinations should consider the varying levels of environmental knowledge among tourists and tailor their promotional strategies accordingly. For tourists with high

environmental knowledge, providing detailed information and specific action guidelines can encourage deeper engagement in pro-environmental behaviors. For those with lower environmental knowledge, starting with basic education and gradually introducing more complex information can effectively build their awareness and participation.

6.4. Future Directions

This study still has some limitations. On one hand, regarding experimental materials, the design of the experimental materials carries a degree of subjectivity. On the other hand, this study did not further explore the influence of control factors beyond demographic characteristics. Future research could seek to identify and control for additional factors to ensure the rigor of the conclusions.

Future research could also further explore the mediating mechanisms of the impact of goal framing and message framing on tourists' pro-environmental behavior, seeking to identify new variables to enhance the understanding of these mechanisms. Additionally, future studies could investigate other exogenous variables that may influence tourists' pro-environmental behavior, such as policies, environmental regulations, and information dissemination factors. Finally, it would also be interesting to look for correlations between level of education and the other variables.

Author Contributions: P.D. conceived and designed the research, launched the investigation, performed analysis, and wrote the manuscript. X.Z. co-conceived and designed the research and wrote the discussion, introduction, and literature review. D.X. co-conceived and designed the research. P.Z. launched the investigation, performed analysis, and discussed the findings and implications. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study due to the fact that our experimental procedures were conducted within the bounds permitted by law and ethical regulations.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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