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RESEARCH ARTICLE

# Tourist disturbance intentions toward giant pandas in Wolong National Nature Reserve, China: An application of extended theory of planned behavior

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## ABSTRACT

Giant panda tourism is famous for promoting tourists' travel to giant panda nature reserves. Different viewpoints have always existed regarding giant panda tourism, and the negative impact on the behavior and habitat of giant pandas has also been the subject of many researchers. A theoretical framework was proposed based on Extended Theory of Planned Behavior. SEM was used to test the hypotheses by AMOS28.0. The respondents of the study are tourists who travelled to Wolong National Nature Reserve aiming to watching giant pandas spanning from August 2023 to October 2023. 302 valid questionnaires were collected by face-to-face survey using a simple random sampling. All hypotheses were supported by testing. Cognition negative affects attitude of tourist disturbance toward giant pandas. Attitude positively affects tourist disturbance intentions toward giant pandas. Subjective norm positively affects tourist disturbance intentions toward giant pandas. Perceived behavioral control positively affects tourist disturbance intentions toward giant pandas. There exists a sequential relationship among cognition, attitude, and intention. Attitude, subjective norm, and perceived behavioral control have a significant positive influence on tourist disturbance intentions directly. The results of this study can provide new directions to take new measures for tourism managers, producing a positive role in promoting the development of giant panda tourism.

***Keywords:*** tourist disturbance intentions; giant panda tourism; extended theory of planned behavior; Wolong National Nature Reserve

## 1. Introduction

The giant panda (*Ailuropoda melanoleuca*), native to the mountainous regions of central China, is not only a national treasure but also a pivotal component of global wildlife conservation efforts. This iconic bear species is revered for its endearing appearance and has emerged as a cultural symbol of China. By sharing these magnificent creatures with other nations, China has effectively served as a conduit for cross-cultural exchanges, significantly increasing international awareness and engagement in giant panda conservation. Giant panda tourism has evolved to encompass the realms of both ecotourism and wildlife tourism, making substantial contributions to both the economy and society. Giant panda tourism is renowned for facilitating tourist visits to the natural habitats of giant pandas, and it has long been a subject of divergent perspectives.

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Concerns over the detrimental impacts on the behavior and habitat of giant pandas have attracted extensive research attention. A prevalent activity within the sphere of giant panda tourism is the observation of these captivating creatures, an expectation integral to the experience. Disturbingly, some reports have surfaced, depicting tourists engaging in deleterious actions to fulfill their desire for interaction with giant pandas.

The Chinese government has implemented a series of measures to address the issue of tourist disturbance behaviors concerning giant pandas. These measures are explicitly designed to safeguard the well-being of giant pandas and ensure the sustainability of the ecotourism experience. However, China grapples with several significant challenges in managing tourist disturbance behaviors related to giant pandas. Many tourists lack a comprehensive understanding of giant pandas and their conservation requirements. The immense popularity of giant pandas often culminates in overcrowded tourist sites, particularly during peak seasons. The heightened visitor numbers can foster a competitive atmosphere as individuals vie for a closer glimpse of the giant pandas. This may lead to disorderly situations and heightened stress levels for the animals. Unrealistic expectations held by certain tourists concerning their interactions with giant pandas can contribute to inappropriate conduct, as some may anticipate close encounters akin to those observed in traditional zoological settings. When these expectations remain unmet, tourists may resort to disruptive behaviors in their quest for a more intimate experience. It is crucial to research key factors that impact tourist disturbance behaviors. More actions are proposed to protect giant pandas based on the study.

Most studies focus on the behavioral changes of giant pandas under the influence of tourists' activities, and rarely pay attention to the psychological activities of tourists[1,2]. As a result, there exists a gap in the current body of knowledge regarding the factors influencing tourist disturbance intentions (TDI) in giant panda tourism. The theory of planned behavior (TPB) has been widely used to predict part of tourists' behaviors and can provide theoretical support to study tourists' psychology in special tourism fields. Therefore, there is an imperative need for a study that builds upon the existing, yet limited, research on the determinants of TDI toward giant pandas in Wolong National Nature Reserve (WNNR). It is innovative to conduct research on tourists' psychological factors towards giant pandas specifically in WNNR to gain deeper insights into their behavior in this unique setting based on the extended TPB model. Cognition (CO), attitude (AT), subjective norm (SN), and perceived behavioral control (PBC) are main factors predicting tourist disturbance intentions (TDI) based on the extended TPB model[3,4].

The purposes of this paper are (a) to assess the relationship between AT and TDI toward giant pandas, (b) to assess the relationship between SN and TDI toward giant pandas, (c) to assess the relationship between PBC and TDI toward giant pandas, and (d) to assess the relationship between CO and AT toward giant pandas.

This section begins with the development of hypotheses and the theoretical framework. Afterwards, we describe how data will be collected and measured. Next, we describe how the hypotheses were tested through data analysis. Finally, we discuss the study's results, implications, limitations, and future research.

# 2. Theoretical framework and hypotheses development

## 2.1. The extended theory of planned behavior model

The TPB was developed by Ajzen on the basis of rational behavior. It believes that behavioral intention plays a decisive role in personal behavioral decision-making. Individuals' behavioral attitude (AT), subjective norm (SN), and perceived behavioral control (PBC) affect their behavioral intention, which indirectly affects their behavior[5]. Social cognitive theory was gradually developed by Bandura based on social learning theory, and includes triadic interactive determinism, observational learning, self-efficacy, etc.[6]. In the process of social cognition, various decisions are made that determine individual behavior[7]. Ajzen believes that the TPB

is developed by adding PBC variable, and it is also acceptable to add new variables to expand the theoretical framework. Therefore, this article combines social cognitive theory to propose behavioral cognitive (CO) variable, and uses it to expand the TPB and construct a theoretical framework for tourist disturbance intentions (TDI) toward giant pandas, as shown in **Figure 1**.

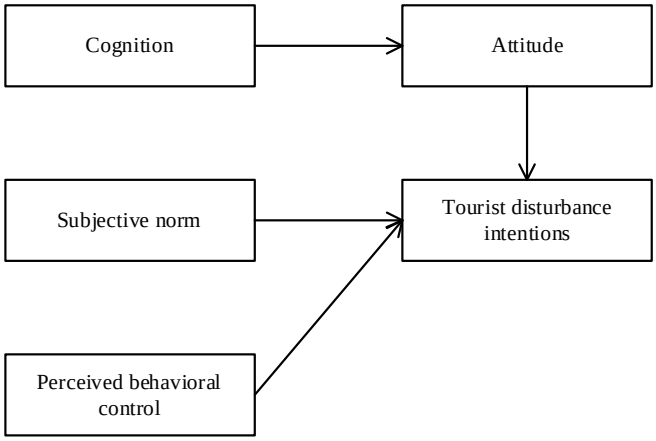


**Figure 1.** Theoretical framework for the study.

## 2.2. Hypotheses development

Social cognitive theory argues that individuals construct their cognitions by observing others' behaviors and reactions[8]. If individuals observe negative reactions from others towards tourists' presence or actions, they might form similar attitudes in their own cognition. This social cognitive influence could contribute to individuals developing a negative attitude toward tourists. Ma emphasized the impact of tourist behavior on the attitudes of destination community residents[9]. It suggests that when tourists' behavior is incongruent with local culture or social values, residents may feel discomfort, leading to negative attitudes. Rafa et al. focused on the impact of tourist behavior, particularly crowding and noise, on community residents' attitudes[10]. Findings indicate a significant correlation between these factors and residents' attitudes toward tourists. Chakraborty's research examined the relationship between tourists' cultural adaptation and destination residents' attitudes[11]. The study found that when tourists culturally integrate into the destination, residents were more likely to hold positive attitudes. Huang et al. explored the impact of tourism on communities, particularly on residents' quality of life[12]. The study suggests that when tourists' behavior negatively affects community residents, residents may develop negative attitudes towards tourists. Therefore, we proposed the first hypothesis.

*Hypothesis 1:Cognition negative affects attitude of tourist disturbance toward giant pandas.*

According to TPB, attitude refers to an individual's positive or negative evaluation of a behavior. If individuals possess a positive attitude toward tourist disturbance, it is likely to influence their intentions positively. Ajzen emphasized that attitudes significantly contribute to the formation of behavioral intentions[13]. Positive attitudes toward a behavior increase the likelihood of individuals forming intentions to engage in that behavior. Bamberg et al.'s work on the elaboration likelihood model supports the idea that attitudes play a pivotal role in shaping behavioral intentions[14]. Individuals are more likely to form intentions congruent with their attitudes. Therefore, we proposed the second hypothesis.

*Hypothesis 2:Attitude positively affects tourist disturbance intentions toward giant pandas.*

Subjective norm in TPB represents the perceived social pressure or approval from important others regarding a behavior. If individuals perceive a positive subjective norm regarding tourist disturbance, it is

likely to positively influence their intentions. Ajzen highlighted the importance of subjective norms in predicting intentions[15]. The perceived expectations and approval of significant others significantly contribute to individuals' intentions to engage in a behavior. Ajzen and Kruglanski emphasized the role of subjective norms in shaping behavioral intentions[16]. The influence of social factors on individual intentions is a key tenet of TPB. Therefore, we proposed the third hypothesis.

*Hypothesis 3:Subjective norm positively affects tourist disturbance intentions toward giant pandas.*

Perceived behavioral control refers to the individual's perception of the ease or difficulty of performing a behavior. In the context of TPB, if individuals believe they have control over engaging in tourist disturbance, it is likely to positively influence their intentions. Kumar and Nayak's research emphasizes the significance of perceived behavioral control in predicting intentions and behaviors[17]. Individuals are more likely to form intentions when they feel they have control over the behavior. Catai et al.'s work on TPB underscores the role of perceived behavioral control in the model[18]. The perceived ease or difficulty of performing a behavior directly influences individuals' intentions. Therefore, we proposed the forth hypothesis.

*Hypothesis 4:Perceived behavioral control positively affects tourist disturbance intentions toward giant pandas.*

# 3. Methods

## 3.1. Participants and procedure

Face-to-face surveys represent a widely employed data collection technique in a variety of domains, including market research, social sciences, and numerous other fields. In this method, trained collectors personally administer questionnaires to respondents, engaging in direct interaction. This personal touch fosters rapport and encourages higher participation rates when compared to alternative survey methods. The collectors play a crucial role in facilitating clear communication, as they can offer explanations or rephrase questions for respondents, ultimately enhancing comprehension and the accuracy of responses. Therefore, for the purpose of this study, a face-to-face survey was chosen as the data collection approach, employing a simple random sampling method.

To gather data for this study, the chosen participants were given instructions to autonomously complete the questionnaires. The cover letter, which accompanied the questionnaire, furnished comprehensive guidance on the completion process and how to submit the responses. Moreover, the researcher underscored the survey's commitment to maintaining anonymity and confidentiality in the letter. The data collection phase was commenced from August 2023 to October 2023. It is noteworthy that face-to-face surveys typically yield higher response rates and foster greater participant cooperation.

The study was carried out in a tourist destination where visitors often focus on appreciating the natural beauty of the surroundings. To guarantee the convenience of study participation for respondents, the questionnaire was intentionally designed to be brief, taking approximately five minutes to complete. The collectors were given specific instructions to distribute the questionnaires to the respondents and later retrieve them. In cases where respondents faced any challenges or required assistance, the collectors were trained to provide support. In order to streamline the data collection process, three local collectors were hired.

Sample size is also determined by the population. For reliable and trustworthy data, a large sample size is necessary. The G*Power test was conducted at 5% level of significance, and a sample size of 292 samples was found to be sufficient to ensure the validity of the findings.

In the data collection phase, a total of 330 questionnaires were distributed to the intended participants

using a simple random sampling method. Among these, 310 questionnaires were returned. Regrettably, 8 out of the 310 returned questionnaires contained either missing or incomplete data. Consequently, only 302 complete and valid questionnaires were included in the subsequent statistical analysis.

### 3.2. Measures

In this study, a booklet-style questionnaire was employed as an efficient data collection method. Each set of questionnaire booklets began with a cover letter, which served the purpose of motivating respondents to complete and return the questionnaire. This cover letter was utilized to convey essential information to the respondents, including the study's objectives, the voluntary nature of participation, an estimate of the time required to complete the survey, the assurance of the confidentiality of their responses, an explanation of how the collected data would be used, contact details for the research team, and an expression of gratitude for their participation. Furthermore, respondents were instructed to return their completed questionnaires to designated representatives.

To accommodate respondents with diverse racial and educational backgrounds, the questionnaire employed a bilingual approach, utilizing both English and Chinese languages. While all components of the questionnaire were initially composed in English, a back-translation process was executed to ensure the precision and accuracy of the translation. Back translation is a commonly employed method to validate the accuracy of translations, particularly in multi-country studies. To achieve this, an English teacher was enlisted to perform the translation from English to Chinese and subsequently back to English, thereby confirming the fidelity of the translation process. This meticulous bilingual approach not only aimed to accommodate respondents with diverse racial and educational backgrounds but also ensured the questionnaire's linguistic accuracy and equivalence, a critical step in preserving the integrity of data in cross-cultural and multi-country research studies. Respondents were instructed to provide their responses to the questionnaire items using a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).

#### 3.2.1. Cognition

A three-item scale developed by Ajzen was utilized to measure CO[19]. This items are: "The giant panda is an ordinary animal", "Tourism activities will not have any impact on giant pandas", and "Some disturbance behaviors are allowed in giant panda tourism".

#### 3.2.2. Attitude

A four-item scale developed by Ajzen was utilized to measure AT[20]. This items are: "It can bring short happiness", "It meets my curious needs", "It doesn't make me to be remorseful and ashamed", and "It is a good way to get the attention of giant pandas".

#### 3.2.3. Subjective norm

A five-item scale developed by Hrubes et al. was utilized to measure SN[21]. This items are: "My family members support for it", "My friends support for it", "Other tourists support for it", "The local communities support for it", and"The authority management institutions support for it".

#### 3.2.4. Perceived behavioral control

A four-item scale developed by Ajzen was utilized to measure PBC[22]. This items are: "I know the ways to disturb with giant pandas", "I have enough time to disturb with giant pandas", "I can get chances to disturb with giant pandas", and "I ignore the rules and regulations related to the conservation of the giant pandas in the reserve".

### 3.2.5. Tourist disturbance intentions

A five-item scale was utilized to measure TDI. This items are: "I am willing to to get more happy experience from disturbing with giant pandas", "I am willing to to break some rules and regulations to finish my experience", "I am willing to take time to prepare for disturbance behaviors", "I am willing to prepare some tools for helping disturb with giant pandas", and "I am willing to share my disturbance behaviors experience on personal social communication pages".

### 3.2.6. Control variables

We controlled for gender, age, marital status, education, income, and occupation. Prior research showed that these demographic variables affect the extent to TDI.

### 3.3. Statistical assumption, reliability, validity, and common methods issues

First, the data was checked for normality, linearity, and multicollinearity based on statistical assumptions. All absolute values for skewness and kurtosis fell below 3, indicating a normally distributed set of data. Due to elliptical scatter plots, any two variables exhibited a linear relationship. There were no issues with multicollinearity since all variance inflation factors (VIF) were less than 5.00. Then, reliability was checked. It was determined earlier that all Cronbach'α were between 0.721 and 0.832. The Cronbach'α should be greater than 0.70, as Cortina argued. Next, The measurement model was tested using confirmatory factor analysis (CFA). Results showed that the model fit the data well: CMIN/DF = 2.773 (< 3), RMSEA = 0.039 (< 0.05), CFI = 0.901 (> 0.9), TLI = 0.905 (> 0.9), RMR = 0.041 (< 0.05). As a result of Harman's single-factor test, we were able to identify how much contamination emerged due to common methods issues based on the fit indices. The variance of all variables was only explained by 17.23% by a single factor, much less than 50%, indicating the data had no major issues with common methods. Before estimating the model, the variance inflation factor was used to test for multicollinearity between variables. Compared to the empirical value of 10, the variance inflation factor (VIF) of each variable was between 1.23 and 2.36, thus multicollinearity did not affect the analysis.

## 4. Results

### 4.1. Descriptive statistics

A pre-test was conducted to test the internal consistency of questionnaires. 100 tourists were chosen as respondents. The sample consisted of 56 males and 44 females. Their age ranges from 26 to 56. The internal consistency of questionnaires meets the rule. Then, A formal test was carried out and 302 valid questionnaire were collected. The sample consisted of 160 males (52.98%) and 142 females (47.02%). Their age ranges from less than 30 (3.31%), 31–45 (33.77%), 46–60 (36.42%), and more than 60 (26.49%). 202 participants (66.89%) were married, whereas 100 participants (33.11%) as single. Their education level range from high school (37.09%), bachelor degree (56.29%), postgraduate (6.62%), and other (3.21%). Their month income range from less than 1000 dollar (3.31%), 1000–2000 dollar (33.11%), 2000–3000 dollar (33.11%), and more than 3000 dollar (30.46%). In addition, there were 30 students (9.93%), 50 government officer (16.56%), 60 professions (19.87%), 80 unemployed (3.31%), 60 retirees (19.87%), and other (3.97%).

### 4.2. Measurement model analysis

This study followed guidelines for evaluating the reliability and validity of constructs. All items in the study loaded above the suggested threshold level and the factor loading should be more than 0.70. Cronbach'α and composite reliability can be calculated to measure construct reliability. These measurements provide valuable insights into the internal consistency and overall dependability of the constructed variables,

reinforcing the robustness of the study's findings. **Table 1** shows the detail of the reliability values.

**Table 1.** Reliability values.

| Construct | Items | Factor loadings | Cronbach's α | CR | AVE |
|---|---|---|---|---|---|
| CO | CO1 | 0.832 | 0.721 | 0.876 | 0.702 |
| | CO2 | 0.881 | | | |
| | CO3 | 0.798 | | | |
| AT | AT1 | 0.725 | 0.749 | 0.758 | 0.511 |
| | AT2 | 0.748 | | | |
| | AT3 | 0.669 | | | |
| SN | SN1 | 0.651 | 0.753 | 0.768 | 0.526 |
| | SN2 | 0.805 | | | |
| | SN3 | 0.712 | | | |
| PBC | PBC1 | 0.698 | 0.832 | 0.842 | 0.641 |
| | PBC2 | 0.872 | | | |
| | PBC3 | 0.822 | | | |
| TDI | TDI1 | 0.707 | 0.754 | 0.754 | 0.505 |
| | TDI2 | 0.693 | | | |
| | TDI3 | 0.731 | | | |

Note: the allowed limit for composite reliability, Cronbach's α > 0.70, CR > 0.70, AVE > 0.50.

It is entirely different from the concept of reliability when it comes to construct validity. Instruments measure latent variables they theoretically intend to measure. The construct validity of a measurement is therefore determined by its accuracy. In addition to convergent validity, discriminant validity establishes its reliability. It is essential that items in the specific construct share a high standard deviation, or converge strongly, in order to demonstrate convergent validity. Although cognition did not converge as strongly as other constructs in this study, all values of AVE were higher than 0.50. There is a difference between a latent variable that is discriminantly valid and one that is not. When two constructs have the same squared correlation, the discriminant validity must be demonstrated when the squared correlation is less than the average value of the constructs. In order for latent variables to explain variance better than other variables, they must separately explain their own variance. The discriminant validity of squared AVE values is shown in **Table 2**.

**Table 2.** Squared AVE and correlation estimates.

| | CO | AT | SN | PBC | TDI |
|---|---|---|---|---|---|
| CO | 0.837 | | | | |
| AT | −0.774 | 0.715 | | | |
| SN | −0.794 | 0.693 | 0.725 | | |
| PBC | −0.712 | 0.622 | 0.570 | 0.801 | |
| TDI | −0.721 | 0.693 | 0.716 | 0.736 | 0.711 |

Note: the lower left corner of the diagonal line is the correlation coefficient matrix. The diagonal line is the square root of the average variance extraction value of each construct.

Additional, the correlation coefficients and significance of age, gender, marital status, education, income, and occupation with TDI are respectively 0.236 ($p$ = 0.06), 0.312 ($p$ < 0.001), 0.123($p$ = 0.072), 0.245($p$ < 0.01), 0.236 ($p$ = 0.168), and 0.334 ($p$ = 0.102). Therefore, gender and education have a significant impact on

TDI, age, marital status, income, and occupation have no significant impact on TDI.

### 4.3. Structural model testing

SEM is a statistical analysis method employed to examine the interrelationships within a set of variables. It blends elements of factor analysis and multiple regression analysis, enabling the investigation of how measured variables are interconnected with underlying constructs. **Figure 2** and **Table 3** show the results of our structural model analysis after obtaining a satisfactory measurement model.

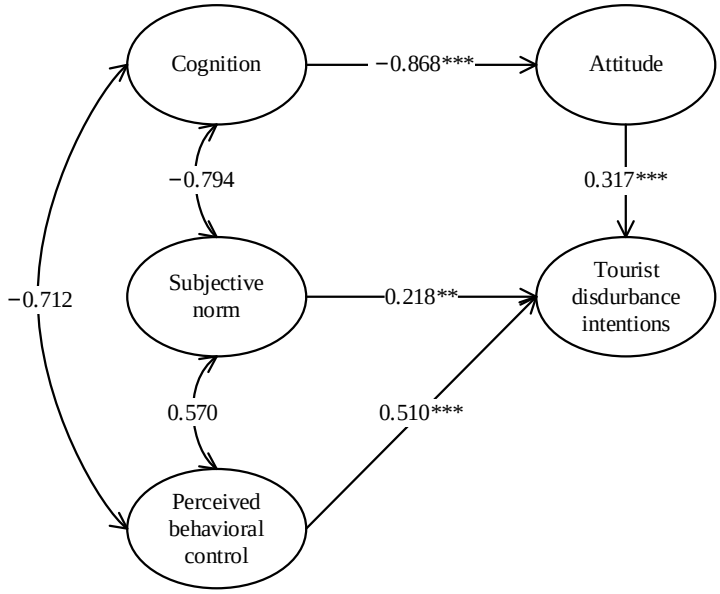


**Figure 2.** Results of the SEM testing.

**Table 3.** Hypotheses testing.

| Hypothesis | Path | Path coefficients | T-value | P-value | Result |
|---|---|---|---|---|---|
| 1 | CO → AT | −0.868 | −7.732 | *** | supported |
| 2 | AT → TDI | 0.317 | 3.449 | *** | supported |
| 3 | SN → TDI | 0.218 | 2.637 | ** | supported |
| 4 | PBC → TDI | 0.510 | 6.779 | *** | supported |

Note:** represents correlation is significant at 0.01 level. *** represent correlation is significant at 0.001 level.

**Table 3** presents the results of hypothesis testing, showcasing path coefficients and their associated T-values. Hypothesis 1, which posited a negative relationship between CO and AT, was supported with a significant path coefficient of −0.868 and a *T*-value of −7.732 ($P < 0.001$). Hypothesis 2, suggesting a positive link between AT and TDI, was supported, as evidenced by a path coefficient of 0.317 and a *T*-value of 3.449 ($P < 0.001$). Hypothesis 3, postulating a positive association between SN and TDI, also found support, with a path coefficient of 0.218 and a *T*-value of 2.637 ($P < 0.01$). Hypothesis 4, proposing a positive relationship between PBC and TDI, was supported, as indicated by a path coefficient of 0.510 and a *T*-value of 6.779 ($P < 0.001$).

## 5. Discussion

The standardized path coefficient for cognition to attitude is −0.868 ($p < 0.001$), indicating a significant negative influence of cognition on attitude, supporting the hypothesis 1. Additionally, the standardized path coefficient for attitude to intention is 0.317 ($p < 0.001$), demonstrating a significant positive impact of attitude

on intention, confirming hypothesis 2. There exists a sequential relationship among cognition, attitude, and intention. Hence, higher levels of cognitive awareness among visitors regarding intervention behaviors lead to lower intervention attitudes, subsequently resulting in lower intervention intentions. Tourists with a higher level of cognitive awareness are more likely to comprehend the negative impacts of their intervention behaviors on giant pandas. Conversely, tourists with lower cognitive awareness may lack a clear understanding of the consequences of their intervention behaviors.The standardized path coefficient for subjective norm to intention is 0.218 ($p < 0.01$), supporting hypothesis 3. This indicates that the behavioral norms of others can influence one's own behavior. The survey findings suggest that visitors tend to emulate the behavior of other tourists, with the actions of fellow tourists guiding their own behavior.Perceived behavioral control over interference behavior has a standardized path coefficient of 0.510 ($p < 0.001$) and significantly positively influences interference intention, supporting hypothesis 4. This implies that tourists' perceived control over their disturbance behavior has a notable impact on their intentions to engage in disturbance.

The analysis revealed a noteworthy association between tourists' gender and their disturbance intentions. Male and female tourists may exhibit distinct attitudes, perceptions, or behaviors regarding giant panda tourism. For instance, males might be more prone to engage in disturbance behavior due to a certain set of AT, SN, or PBC compared to females. Understanding these gender-based differences can be crucial for tailoring management strategies to mitigate negative impacts. The study identified a significant correlation between tourists' educational background and TDI. This suggests that individuals with varying levels of education might perceive and react differently to giant panda tourism. Higher levels of education could be linked to increased awareness and understanding of the potential negative impacts on giant pandas, leading to more responsible behavior. On the other hand, lower levels of education might be associated with a lack of awareness or a different set of attitudes that contribute to disruptive behavior.

## 6. Implications

The findings of this study, highlighting the sequential relationship among cognition, attitude, and intention, underscore the importance of raising conservation awareness among tourists visiting WNNR. Tourism managers can implement educational programs to inform tourists about the potential negative impacts of their behavior on giant pandas and their habitats. By fostering a deeper understanding of the consequences, tourists may develop more positive attitudes and intentions toward minimizing disturbance to these endangered species.

The positive influence of AT, SN, and PBC on tourist disturbance intentions suggests the need for tailored tourism management strategies. Managers can focus on shaping positive attitudes through guided tours, interpretive signage, and interactive experiences that emphasize responsible and respectful behavior. Strengthening subjective norms by promoting social responsibility and creating a supportive community of responsible tourists can further contribute to minimizing negative impacts.

The study's results imply that promoting positive attitudes and PBC can directly influence tourist disturbance intentions. Tourism managers should engage visitors actively in conservation efforts and responsible tourism practices. Encouraging tourists to perceive a sense of control over their actions, such as adhering to designated pathways and respecting wildlife viewing guidelines, can contribute to a more responsible and sustainable tourism experience.

Recognizing the significant impact of perceived behavioral control, policymakers and reserve authorities can consider implementing and enforcing policies that empower tourists to act responsibly. Clear guidelines, informative signage, and penalties for non-compliance can reinforce the perceived control tourists have over their behavior. Effective policies aligned with the Extended TPB can play a crucial role in ensuring the protection of giant pandas and their habitats.

The study's implications extend to the broader context of sustainable tourism development. By understanding and addressing the cognitive factors influencing TDI, tourism managers can contribute to the long-term conservation of giant pandas. This research provides a foundation for developing holistic approaches that balance the economic benefits of tourism with the imperative to safeguard the natural environment, fostering a model for sustainable tourism practices in other wildlife reserves globally.

## 7. Limitations and future research

The study's temporal scope, spanning from August 2023 to October 2023, may introduce limitations in capturing the potential seasonal variations in tourist behaviors and attitudes. Different seasons could influence both the influx of tourists and the behavior of giant pandas. Although a simple random sampling method was employed for data collection, there may be inherent biases in the sample composition. The reliance on face-to-face surveys might lead to the exclusion of certain demographics, impacting the generalizability of the findings. The study exclusively focuses on tourists visiting WNNR. While this specificity provides valuable insights into this particular context, it limits the generalizability of the findings to other giant panda reserves or wildlife tourism settings.

Future research should consider longitudinal studies that extend beyond a single tourism season. Examining variations in tourist behaviors and attitudes over an extended period can offer more robust insights into the sustainability of giant panda tourism and potential changes over time. Comparative studies across different cultural backgrounds and nationalities could provide a deeper understanding of how cultural factors influence tourist disturbance intentions. This approach would contribute to the development of more tailored and culturally sensitive management strategies. Complementing quantitative findings with qualitative methods, such as interviews or focus groups, can enrich the understanding of tourists' motivations, values, and perceptions. Qualitative insights can offer a nuanced perspective on the intricacies of tourist behavior that quantitative data may not fully capture. Future research could focus on the effectiveness of specific educational interventions in shaping tourists' attitudes and behaviors. Implementing and evaluating targeted initiatives to raise awareness and promote responsible tourism practices could provide actionable insights for tourism managers. Conducting comparative analyses across different giant panda reserves or wildlife destinations can unveil variations in tourist behaviors and perceptions. Identifying commonalities and differences can inform adaptive management strategies tailored to specific reserve contexts.

## 8. Conclusions

The findings of this study applied the Extended TPB to assess TDI toward giant pandas in the WNNR, China, shed light on the intricate dynamics that underlie visitors' behaviors and attitudes. The results provide valuable insights into how cognitive awareness, AT, SN, and PBC collectively shape TDI to engage in disturbance with these iconic animals. The results of this study can provide new directions to take new measures for tourism managers, producing a positive role in promoting the sustainable development of giant panda tourism.

## Author contributions

Conceptualization, YL; methodology, YL; software, YL; validation, YL; formal analysis, YL; investigation, YL; resources, YL; data curation, YL; writing—original draft preparation, YL; writing—review and editing, YL; visualization, YL; supervision, JABI and YSF. All authors have read and agreed to the published version of the manuscript.

## Conflict of interest

The authors declare no conflict of interest.

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