A rebound in nature-based tourism intentions during the COVID-19 era

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Abstract
Nature-based tourism (NBT) intentions that changed due to the COVID-19 pandemic are different from those not only before the COVID-19 but also during the COVID-19 period. We recruited 558 American participants over two time periods in 2020 and 2021 and compared their NBT intentions by adopting the health belief model (HBM). The results for 2020 indicated that intrapersonal barriers negatively influence attitudes and NBT intentions; however, they did not exert significant effects on the attitudes of the 2021 batch, partially confirming changes in the relationship between study variables. Moreover, NBT intentions increased in 2021 compared to those in 2020, but the extent of the increase differed by demographic variables. NBT intentions were higher among those who were under 40 years of age, married, and highly educated. This study is novel as it used HBM to elucidate NBT intentions as a protective behaviour during the ongoing pandemic and offered valuable contributions to the implementation of expeditious marketing strategies to promote NBT to potential tourists.

Keywords
Health belief model, COVID-19, nature-based tourism, perceived risk, attitude

Introduction
The COVID-19 pandemic has resulted in paradigmatic shifts in tourism and leisure activities. The government policies for physical distancing (U.S. News, 2020) require people to maintain a safe distance from one another; as a result, most tourist attractions that were once crowded with travellers have been locked down. Meanwhile, the demand for nature-based tourism (NBT) is increasing as a balloon effect of traditional tourism. For example, Rice et al. (2020) documented an increased preference for outdoor recreation due to the COVID-19 pandemic. Craig (2021) also noted the impact of COVID-19 on camping and glamping. In addition, Wachyuni and Kusumaningrum (2020) found that 66% of people chose nature areas as their preferred tourist destinations due to the COVID-19, and Seraphin and Dosquet (2020) revealed that COVID-19 has led Parisians to favour seaside and countryside destinations.

As tourists’ interest and demand for NBT increase, recent research has actively investigated tourist behaviours in response to COVID-19. However, why and how COVID-19 threats increase NBT intentions are still not fully explored. More importantly, the duration of COVID-19 pandemic has been long, and therefore, the demand and perceptions around NBT have evolved. Nevertheless, there is limited...
study on the differences in tourists’ NBT behaviours and perceptions during the COVID-19 pandemic. For example, Gossling et al. (2020) noted that NBT is rebounding more quickly than other leisure or tourism activities during the COVID-19 era, but it is only a discursive study and does not provide an empirical analysis of the change in perception. Furthermore, the literature has not considered the influence of demographic variables, even though they are regarded as one of the critical factors influencing COVID-19 relevant behaviours.

To address this gap in the literature, this study explores the relationships between perceptions of COVID-19 and NBT intentions, and their differences by time and demographic variables. Specifically, the purpose of this study is, first, to understand decision-making processes of NBT. This study applies the health belief model (HBM) to the context of decision-making processes in tourism, assuming that NBT is a tourist behaviour aimed at preventing COVID-19. Second, it focuses on the changes in perception and behavioural intentions during the ongoing risk of the COVID-19 pandemic by comparing the COVID-19 responses in 2020 and 2021. Most studies of tourism and leisure in the context of COVID-19 have focused on pre- and current (or post-pandemic) comparisons rather than on changes during the pandemic. Furthermore, they are in the form of an interview-based discourse, so it is difficult to quantify the results (e.g. Zhang et al., 2021). Third, this study analyses the differences in NBT intentions by subdividing participants according to demographic factors. The findings present managerial implications for the sustainability of tourism and hospitality businesses by identifying the most effective target market for NBT. This research will serve as a reference for effective policies to revitalize the tourism industry during the current unprecedented situation and offer insights to predict future tourism paradigms.

**Literature review**

**Health belief model**

HBM is one of the best-known sociopsychological models for predicting and explaining health-related behaviours. It posits that health perceptions and beliefs—such as perceived susceptibility, severity, benefits, and barriers—promote illness-prevention behaviours. It was originally developed to explain the causes of failure of diseases prevention programmes in the medical field (Rosenstock, 1974). Since then, HBM has been applied to various academic fields that are multidisciplinary, and its effectiveness has been verified. In the tourism field, HBM has been used to explain tourists’ behaviours from the perspective of health tourism because tourism is perceived to offer various health benefits. For example, Ban and Kim (2020) and Chaulagain et al. (2021) used HBM in the context of medical tourism and concluded that travel decisions depend on the perception of health benefits and barriers. Huang et al. (2020) identified the relationships between health beliefs, self-efficacy, attitudes, preventative behaviour, and satisfaction of tourists during travel to high-altitude destinations in China’s Tibet region. They found that health beliefs and self-efficacy positively influenced attitudes toward preventative behaviours and tourism intentions. In the context of COVID-19, Yuen, Saidi, Bai, and Wang (2021) proved that HBM is effective to predict perceived value toward cruise transport service and its effects on cruise intentions post COVID-19. In addition, Bae and Chang (2021) proposed a model in which HBM was integrated with the theory of planned behaviour and argued that perceived risk of COVID-19 has a significant effect on untact tourism intention. Naseer et al. (2021) combined HBM with the theory of situational awareness and confirmed that situational awareness about COVID-19 was related to the acceptance of health protection behaviours such as postponing travel.

The current study identifies NBT as a health-protective behaviour and, through HBM, investigates the factors influencing NBT intentions. Although health tourism typically refers to medical and wellness tourism (Stancioiu et al., 2013), NBT is also recognized as a type of health tourism, as it offers mental and physical benefits to visitors. For example, Curtin (2009) asserted that NBT provides psychological benefits, such as spiritual fulfilment and a feeling of well-being. Furthermore, people perceive NBT as a preventative behaviour to avoid COVID-19 and remain healthy (NACR, 2020; UNWTO, 2020).

**Perceived risk of COVID-19**

Perceived risk is defined in negative terms, such as the anticipation of unfavourable consequences, uncertain outcomes, or expected losses due to decision-making processes (Dowling and Staelin, 1994). Traditionally, perceived risk is
explained as reason-based logic that comprises cognitive responses to the fear of uncertain outcomes, which leads to a rational and systematic decision-making process (Shaflir et al., 1993; Yang and Nair, 2014). Several scholars have argued that risk perception is associated with the calculation of possible risk outcomes and is predictive of risk-protection behaviours (Brewer et al., 2007; Sheeran et al., 2014).

In the tourism context, perceived risk is identified as a critical factor that leads to negative impacts on travel intentions. For example, Fuchs and Reichel (2006) argued that safety and health threats deter tourists from travelling. The question of whether to travel is significantly associated with perceived risk. In other words, tourists are likely to avoid travelling to destinations they perceive as risky (Boakye, 2010). However, the perceived risk of COVID-19 seemingly increases people’s intentions to pursue NBT. With governments recommending social distancing—and both the UNWTO (2020) and NACR (2020) announcing that NBT is good for physical and mental health, people have come to view NBT as an alternative health-protective leisure activity during the COVID-19 era. In other words, people who perceive risk are more likely to perceive NBT as beneficial.

**Perceived severity**

Perceived severity refers to an individual’s beliefs about the seriousness of a disease, such that it differs from perceived risk, which refers to the possibility of contracting a disease (Rosenstock, 1974). Numerous studies across various settings have identified the perceived severity of illness as a critical factor for explaining engagement with medical or health services (Cerkoney and Hart, 1980; Turkington et al., 2018). For example, Mehta et al. (2014) predicted the acceptance of the vaccine against human papillomavirus on the basis of perceived severity. In the tourism context, the perceived severity of an illness increases tourists’ motivation to take care of themselves and their intentions to engage in medical tourism for treatment (Chaulagain et al., 2021; Reddy et al., 2010).

Studies have confirmed that self-protective decision-making processes are influenced by perceived risk as well as perceived severity (Mullens et al., 2004). According to several meta-analyses (e.g. Rosenstock, 1974), perceived risk exerts only a modest predictive validity for behavioural intentions; hence, perceived severity can complement perceived risk when decision-making is explained (Brewer et al., 2007; Sheeran et al., 2014). Furthermore, Chaulagain et al. (2021) confirmed the significant effect of perceived severity on attitudes in the context of medical tourism. Kim and Zane (2016) found both perceived severity and risk motivated engagement in protective behaviours. This suggests that perceived risk and severity are closely related to perceived benefits of specific behaviours.

**Perceived benefits and barriers related to NBT attitudes and intentions**

The term “perceived benefits” refers to individuals’ beliefs about the benefits of a particular behaviour. Perceived benefits are related to the expected positive outcomes of specific behaviours (Rogers et al., 2010). Hence, the perceived benefits of NBT from HBM perspective may be related to the reduced threat of COVID-19 infection. NBT travellers are currently paying increased attention to the health-related factors of NBT in response to perceived risk and severity of COVID-19, while initially they were more interested in natural phenomena or their attributes (Craig, 2021; Gössling et al., 2020). Thus, we hypothesized that individuals who perceive the risk and severity of COVID-19 are more likely to perceive the benefits of NBT as a protective behaviour.

**H1.** Perceived risk of COVID-19 is positively related to the perceived benefits of NBT.

**H2.** Perceived severity of COVID-19 is positively related to the perceived benefits of NBT.

The term “perceived barriers” denotes the negative external effects of behaviours that may impair behavioural performance (Champion and Skinner, 2008). In the tourism context, perceived barriers are defined as factors that constrain visitors from engaging in specific tourism-related activities (Huang and Hsu, 2009). Three dimensions of perceived barriers have been identified: interpersonal, structural, and intrapersonal (Chaulagain et al., 2021; Crawford and Godbey, 1987). Interpersonal barriers are constraints on social relationships or interactions, such as the unavailability of family and friends for travel. Structural barriers constitute constraints due to external factors, such as time limitations, lack of budget, and inconvenient facilities at a destination (Zhang et al., 2012). The term
“intrapersonal barriers” refers to individual psychological constraints, such as worry, anxiety, and lack of interest.

Literature has confirmed that attitudes are closely related to tourists’ beliefs about benefits and barriers (Chaulagain et al., 2021; Wang et al., 2018), which are based on the expected outcomes of a specific behaviour. The findings of studies indicate that perceived benefits are likely to lead to positive attitudes toward certain behaviours, whereas perceived barriers may result in negative attitudes toward such behaviours (Um and Crompton, 1992; Woodside and Lyonski, 1989). Thus, we hypothesized that perceived benefits and barriers influence attitudes toward NBT.

H3. Perceived benefits are positively related to attitudes toward NBT.
H4. Interpersonal barriers are negatively related to attitudes toward NBT.
H5. Structural barriers are negatively related to attitudes toward NBT intentions.
H6. Intrapersonal barriers are negatively related to attitudes toward NBT intentions.

Moutinho (1987) defined attitudes as favourable or unfavourable dispositions based on learning and experience. Ajzen and Fishbein (1977) considered attitudes as a central element for predicting behavioural intentions. In the tourism context, scholars found that attitudes lead to behavioural intentions to participate in tourism activities (Huang and Hsu, 2009). For example, Li et al. (2015) found that international tourists’ intentions to travel to Beijing were influenced by attitudes toward the destination. Additionally, Chaulagain et al. (2021) demonstrated that tourists’ decisions to pursue medical tourism depend on attitudes based on the perceived benefits of and barriers to travel. Therefore, we propose the following hypothesis.

H7. Attitudes are positively related to NBT intentions.

Roles of period and demographic variables

The COVID-19 pandemic appears to be one of the longest pandemics. Accordingly, perception and relevant behaviours in response to COVID-19 are evolving. For example, concerns are increasing over the recent emergence of mutant viruses. Simultaneously, however, reports that people are experiencing pandemic fatigue are increasing (Reicher and Drury, 2021). Cheval et al. (2021) conducted a longitudinal study for two weeks during COVID-19 and revealed significant differences in engagement in physical activities and behaviours. In addition, Vahratian et al. (2021) found that the proportion of adults with symptoms of anxiety or depressive disorder increased significantly from August 2020 to February 2021, especially among adults aged 18–29 years and those with less than high school education. Based on research results, the following hypothesis was established.

H8. Relationships between perceived risk, severity, benefits, and barriers; attitudes; and NBT intentions differ between 2020 and 2021.

Tourists’ behaviour and perception were segmented by age (Lepp and Gibson, 2003), level of education (Chauvin et al., 2007), social status (Schweer, 1986), and gender (Yang et al., 2017). Interestingly, existing studies indicated that demographic sensitivity to perceived risk is not always the same as sensitivity to behaviour. For example, Barber and Kim (2021) revealed that older adults perceive COVID-19 as a greater risk than younger adults in the United States. Nonetheless, older adults are less concerned about COVID-19; consequently, they display fewer behavioural changes than younger adults. It suggests that considering the direct effects of demographic variables on behavioural intentions rather than indirect effects through perception or attitude may be more meaningful in predicting future behaviours.

HBM posits that demographic variables influence study variables, leading to individual differences in preventative behaviours. Since NBT is recognized as a preventative behaviour against COVID-19, it may also differ according to demographic factors. Given the findings of the literature, we hypothesized as follows.

H9. NBT intentions differ by demographic variables, such as age, gender, income, marital status, and level of education.

Methods

Research model

Based on various studies (Ajzen and Fishbein, 1980; Chaulagain et al., 2021; Davis et al., 1992; Ferrer et al., 2018; Fleischer and Pizam, 1980; Chaulagain et al., 2021; Ferrer et al., 1992; Fleischer and Pizam,
2002; Nyaupane and Andereck, 2008), this study proposes a research model to analyse the relationships between perceived risk, severity, benefits, and barriers; attitudes; and NBT intentions (Figure 1).

**Sample**

Data were collected over two periods, from July 26 to August 5, 2020, and from March 5 to 12, 2021. Tourism intentions and perceptions related to COVID-19 in 2021 were expected to differ from those in 2020, primarily because the United States presidency changed hands, vaccinations began in earnest, and a mutated delta virus appeared in 2021. A sample of online users from the United States was obtained through Amazon Mechanical Turk (MTurk), the most popular crowdsourcing platform. MTurk has been used for sampling by more than 15,000 published papers in the past decade, and its data reported a similar level of reliability as compared to other data collected from other methods (Goodman and Paolacci, 2017; Hauser, Paolacci, and Chandler, 2019). Each respondent participated in the survey only once according to their IP address. To ensure the suitability of the participants, we specified, as an additional qualification, that participants must be citizens of the United States only. In 2020, 306 questionnaires were collected; however, only 260 were used for analyses after excluding 46 questionnaires with missing data. Similarly, a sample of 298 out of 321 respondents was used for 2021. Thus, 558 questionnaires were included for further analyses.

**Measurement development**

We adapted validated measurement items from prior studies to measure the following latent factors:

- Four items for perceived risk were adapted from Ferrer et al. (2018).
- Four items for perceived severity were adapted from Ferrer et al. (2018).
- Three items were adopted from Chaulagain et al. (2021) to measure the perceived benefits of NBT.
- The perceived barriers to NBT were measured using nine items adapted from Chaulagain et al. (2021), Nyaupane and Andereck (2008), and Fleischer and Pizam (2002).
- Attitudes toward NBT were measured using the three-item scale developed by Ajzen and Fishbein (1980).
- Three items were adapted from Davis et al. (1992) to measure NBT intentions.

All latent variables were rated using a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Three academic experts reviewed the questionnaire, where the initial survey items were partially modified to target the relationships between NBT and COVID-19. Data on demographic variables (i.e. gender, age, marital status, level of education, annual household income, and ethnicity) were collected at the end of the questionnaire. A pilot test was conducted with 30 respondents for validating the questionnaire via an online survey, after which the questionnaire was revised for the last time (Creswell and Creswell, 2017).

**Data analysis procedure**

The descriptive statistics were first analysed, and confirmatory factor analysis (CFA) was conducted to determine the validity of the latent variables. Cronbach’s alpha was used to verify the internal consistency of the derived factors. Structural equation modelling (SEM) was performed to examine the relationships between perceived risk, perceived severity, perceived benefits, perceived barriers, attitudes, and NBT intentions. In addition, analysis of covariance (ANCOVA) was used to explore the influences of demographic variables on the differences in NBT intentions between 2020 and 2021.

**Results**

**Profile of the sample**

Table 1 displays the demographic profiles of the participants (men = 60.4%, women = 39.6%). Participants aged 30–39 years accounted for the largest proportion (43.5%), followed by those aged 20–29 years (19.2%), 40–49 years (16.1%), and 50–59 years (13.4%). In terms of marital status, 61.8% of the respondents were married, and 36.6% were single. Annual household incomes ranged from $55,000 to $69,999 (21.0%) had the highest percentage, followed by those earning from $70,000 to $84,999 (17.0%), and from $40,000 to $54,999 (16.1%). Furthermore, 59.5% had completed a bachelor’s degree, and 15.6% had completed a graduate degree. Approximately 66.5% of the respondents
were Caucasian. The frequency of travel before COVID-19 for 2020 and 2021 was 4.74 and 4.87, respectively, which confirmed the homogeneity of travel tendencies between the two period groups before the pandemic.

Confirmatory factor analysis

CFA was performed to verify whether the items were loaded on the anticipated domains. Table 2 indicates that the proposed measurement model fits the data well ($\chi^2 = 870.523; df = 271; p < .001$; NFI = .903; IFI = .931; CFI = .931; TLI = .917; RMSEA = .063) and confirms that the data met the requirement of normality (Byrne, 1998). The factor loadings were equal to or greater than .625 at the $p < .001$ level. All values for Cronbach’s alpha were greater than .7, which meets the criteria.

As recommended by the literature (e.g., Anderson and Gerbing, 1988), we verified the discriminant and convergent validity of the scales. Table 3 depicts the average variance extracted (AVE) for each construct. It was higher than the adequacy criterion of .5 or close to .5, and the composite reliability coefficients are higher than .7 (Hair et al., 2006). The high factor loadings of the intended items and AVE estimates confirmed the convergent validity of the items. All squared correlations ($R^2$) between pairs of items were lower than the AVE for the latent variables.

Structural equational model analysis

The proposed 8-construct model was analysed using SEM. The model fit index was deemed acceptable ($\chi^2 = 960.007; df = 282; p < .001$; NFI = .894; IFI = .922; CFI = .922; TLI = .910; RMSEA = .066; Table 4). All values were consistent with the statistical criteria; therefore, the dimensionality of the measured items was adequate. Variances explained by perceived benefits, attitudes, and NBT intentions were 29.0%, 61.0%, and 64.5%, respectively.

Perceived risk had a positive effect on perceived benefits ($\beta = .550; p < .001$), supporting H1. The influence of perceived severity on perceived benefits was unsupported at a 95% confidence level, hence rejecting H2. Perceived benefits had positive effects on attitudes ($\beta = .824, p < .001$), which supported H3. The results failed to support H4 and H5 in terms of the impact of interpersonal and structural barriers on attitudes toward NBT. However, the relationship between intrapersonal barriers and attitudes was significantly negative ($\beta = -.210; p < .01$), thereby supporting H6. Lastly, a positive relationship was observed between attitudes and NBT intentions ($\beta = .803; p < .001$), confirming H7.

Structural invariance tests of period

Structural invariance tests were conducted to explore the moderating effects of period. The
The difference in chi-square values between the baseline model (freely estimated model) and the nested model (fully constrained model) was significant ($\Delta \chi^2 = 44.652; \Delta df = 7, p < .001$). It indicated a difference in at least one of the paths in the model between groups (Table 5). Therefore, each path in the nested model was compared with that of the baseline model. The results confirmed that the relationships between perceived severity and perceived benefits ($\Delta \chi^2 = 4.303; p = .038$), and between intrapersonal barriers and attitudes ($\Delta \chi^2 = 5.073; p = .024$) significantly differed between groups, which partially supported H8. This finding suggested that positive perception and attitudes were reinforced in 2021.

Furthermore, variances explained by perceived benefits, attitudes, and NBT intentions were higher for 2021 (43.0%, 62.6%, and 73.3%, respectively) than for 2020 (9.3%, 58.7%, and 51.7%, respectively).

### Analysis of covariance of demographic factors

ANCOVA was used to confirm differences in NBT intentions between 2020 and 2021 while other demographic variables, such as gender, age, income, marital status, and level of education were controlled.

### Table 1. Demographics of the sample.

| Variable                              | Total     | July 2020 | March 2021 |
|---------------------------------------|-----------|-----------|------------|
|                                       | N = 558   | N = 260   | N = 298    |
| Age                                   |           |           |            |
| 20–29 years                           | 107       | 19.2      | 52         |
| 30–39 years                           | 243       | 43.5      | 154        |
| 40–49 years                           | 90        | 16.1      | 40         |
| 50–59 years                           | 75        | 13.4      | 30         |
| 60–69 years                           | 37        | 6.6       | 17         |
| ≥70 years                             | 6         | 1.1       | 5          |
| Gender                                |           |           |            |
| Male                                  | 337       | 60.4      | 202        |
| Female                                | 221       | 39.6      | 96         |
| Annual household income               |           |           |            |
| Under $25,000                         | 49        | 8.8       | 17         |
| $25,000–$39,999                       | 82        | 14.7      | 30         |
| $40,000–$54,999                       | 90        | 16.1      | 46         |
| $55,000–$69,999                       | 117       | 21.0      | 69         |
| $70,000–$84,999                       | 95        | 17.0      | 72         |
| $85,000–$99,999                       | 51        | 9.1       | 35         |
| $100,000–$149,999                     | 45        | 8.1       | 21         |
| ≥$150,000                             | 29        | 5.2       | 8          |
| Marital status                        |           |           |            |
| Single                                | 204       | 36.6      | 78         |
| Married                               | 345       | 61.8      | 216        |
| Other                                 | 9         | 1.6       | 4          |
| Level of education                    |           |           |            |
| Less than high school diploma         | 2         | .4        | 0          |
| High school diploma                   | 31        | 5.6       | 13         |
| College courses but no degree         | 52        | 9.3       | 23         |
| Associate's degree                    | 54        | 9.7       | 28         |
| Bachelor’s degree                     | 332       | 59.5      | 199        |
| Graduate degree                       | 87        | 15.6      | 34         |
| Ethnicity                             |           |           |            |
| African American                      | 58        | 10.4      | 34         |
| Asian                                 | 95        | 17.0      | 48         |
| Hispanic                              | 30        | 5.4       | 18         |
| Caucasian                             | 371       | 66.5      | 194        |
| Others                                | 4         | .7        | 4          |
| Frequency of travel before COVID-19   | 4.81      | 4.74      | 4.87       |
| (per year)                            |           |           |            |
Table 2. Confirmatory factor analysis of the health belief model: scale items and factor loadings.

| Constructs and scale items | Standardized loading | Cronbach’s alpha |
|----------------------------|----------------------|------------------|
| **Perceived risk**<sup>a</sup> |                      | .869             |
| 1. I am likely to contract COVID-19 in the future. | .844 | |
| 2. Given my usual lifestyle, it does seem possible that I could contract COVID-19. | .707 | |
| 3. From a doctor’s viewpoint, I realize that my usual conduct places me at risk of contracting COVID-19. | .764 | |
| 4. I believe there is a substantial possibility that I will contract COVID-19 in the future. | .846 | |
| **Perceived severity**<sup>b</sup> |                      | .861             |
| 1. How serious would the physical conditions (e.g. symptoms and pain) associated with contracting COVID-19 be in your opinion? | .836 | |
| 2. How serious would the medical circumstances (e.g. treatment and hospitalization) associated with contracting COVID-19 be in your opinion? | .835 | |
| 3. How serious do you feel the conditions associated with COVID-19 would be? | .802 | |
| 4. How serious would the conditions associated with COVID-19 be as regards your relationship with others? | .661 | |
| **Perceived benefits**<sup>a</sup> |                      | .771             |
| 1. Traveling to a nature-based area will help prevent COVID-19 contagion. | .792 | |
| 2. Traveling to a nature-based area will help me recover from mental stress caused by COVID-19. | .625 | |
| 3. Nature-based tourism will be beneficial to physical treatments for damage caused by COVID-19. | .794 | |
| **Interpersonal barriers**<sup>a</sup> |                      | .847             |
| 1. I have no one to travel with me to a nature-based area. | .839 | |
| 2. My friends or family are not able to travel with me to a nature-based area. | .819 | |
| 3. My friends or family would not approve of me travelling to a nature-based area. | .773 | |
| **Structural barriers**<sup>a</sup> |                      | .782             |
| 1. I have no time to travel to a nature-based area. | .791 | |
| 2. I have no information about nature-based tourism places. | .762 | |
| 3. Family or job commitments would keep me from traveling to a nature-based area. | .662 | |
| **Intrapersonal barriers**<sup>a</sup> |                      | .847             |
| 1. I have concerns about my personal security if I travel to a nature-based area. | .780 | |
| 2. The idea of traveling to a nature-based area makes me feel anxious as it involves too much risk. | .861 | |
| 3. I do not know what to expect from traveling to a nature-based area. | .785 | |
| **Attitudes**<sup>a</sup> |                      | .796             |
| 1. Traveling to a nature-based area would be a good idea. | .801 | |
| 2. I like the idea of traveling to a nature-based area. | .751 | |
| 3. Traveling to a nature-based area would be a pleasant experience. | .682 | |
| **Nature-based tourism intentions**<sup>a</sup> |                      | .896             |
| 1. I think that I should travel to a nature-based area in the near future. | .835 | |
| 2. I plan to travel to a nature-based area in the near future. | .881 | |
| 3. I intend to travel to a nature-based area in the near future. | .871 | |
| Goodness-of-fit statistics: $\chi^2 = 870.523; df = 271; p < .001; NFI = .903; IFI = .931; CFI = .931; TLI = .917; RMSEA = .063$ | | |

Note: All factor loadings are significant at $p < .001$. NFI = normed fit index; IFI = incremental fit index; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation.

<sup>a</sup>5-point scale (1 = strongly disagree to 5 = strongly agree).

<sup>b</sup>5-point scale (1 = not serious at all to 5 = very serious).
Contrary to the results of the structural invariance tests (Table 5), the results of ANCOVA indicated significant difference in NBT intentions between periods (diff. = .156; \( p = .049 \), Table 6). NBT intentions for 2021 (mean = 3.570) were higher than those for 2020 (mean = 3.414), whereas attitudes, age, marital status, and level of education were identified as covariances that influence this difference (Table 6).

\( T \)-tests were employed to obtain additional insights into the influence of covariance on the relationship between NBT intentions and periods. For both years, respondents who were under 40, married, and highly educated exhibited higher levels of NBT intentions than their counterparts (Figure 2; Table 7). These differences were increasingly evident for 2021, as all differences were larger and significant (diff. = −.368, \( p = .008 \) for age; diff. = .559, \( p = .000 \) for marital status; and diff. = .307, \( p = .031 \) for education level).

NBT intentions increased from 2020 to 2021 for all groups. In particular, the increase in NBT intentions for those who were under 40, married, and highly educated were statistically significant (diff. = .377, \( p = .001 \) for under 40; diff. = .302, \( p = .007 \) for married individuals; and diff. = .356, \( p < .000 \) for those who achieved a bachelor’s degree or above).

### Table 3. Descriptive statistics and associated measures.

| No. of items | Mean (SD) | AVE | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|--------------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| (1) Perceived risk | 4 | 3.151 (1.488) | .530 | .817a | .410c | .306 | .309 | .336 | .359 | .038 | .080 |
| (2) Perceived severity | 4 | 3.579 (1.252) | .565 | .640b | .837 | .112 | .274 | .220 | .361 | .013 | .020 |
| (3) Perceived benefits | 3 | 3.487 (1.161) | .516 | .553 | .334 | .759 | .118 | .144 | .063 | .482 | .504 |
| (4) Interpersonal barriers | 3 | 3.053 (1.907) | .504 | .556 | .523 | .344 | .753 | .465 | .496 | .000 | .026 |
| (5) Structural barriers | 3 | 3.236 (1.073) | .478 | .580 | .469 | .379 | .682 | .732 | .454 | .006 | .016 |
| (6) Intrapersonal barriers | 3 | 3.162 (1.718) | .524 | .599 | .601 | .251 | .704 | .774 | .767 | .011 | .016 |
| (7) Attitude | 3 | 3.827 (1.014) | .557 | .194 | .115 | .694 | −.018 | .076 | −.104 | .789 | .585 |
| (8) NBT intentions | 3 | 3.497 (1.401) | .676 | .282 | .143 | .710 | .160 | .128 | .126 | .765 | .862 |

Note: SD = standard deviation; AVE = average variance extracted; NBT = nature-based tourism.

a Composite reliabilities are along the diagonal line.
b Correlations are below the diagonal line.
c Squared correlations are above the diagonal line.

### Table 4. Standardized parameter estimates for the proposed structural model.

| Independent variables | Dependent variables | Coefficients (\( \beta \)) | t-Value | Hypothesis |
|-----------------------|---------------------|---------------------------|---------|------------|
| H1 Perceived risk → Perceived benefits | .550 | 8.316*** | Supported |
| H2 Perceived severity → Perceived benefits | −.020 | −3.141 | Not supported |
| H3 Perceived benefits → Attitude | .824 | 14.198*** | Supported |
| H4 Interpersonal barriers → Attitude | −.079 | −.703 | Not supported |
| H5 Structural barriers → Attitude | .026 | .242 | Not supported |
| H6 Intrapersonal barriers → Attitude | −.210 | −2.382* | Supported |
| H7 Attitude → NBT intentions | .803 | 16.308*** | Supported |

\( R^2_{\text{Perceived benefits}} = .290; R^2_{\text{Attitude}} = .610; R^2_{\text{NBT intentions}} = .645 \)

Goodness-of-fit statistics: \( \chi^2 = 960.007; df = 282; p < .001; NFI = .894; IFI = .922; CFI = .922; TLI = .910; RMSEA = .066 \)

Note: NFI = normed fit index; IFI = incremental fit index; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; NBT = nature-based tourism.

* \( p < .05. \)

*** \( p < .001. \)

Contrary to the results of the structural invariance tests (Table 5), the results of ANCOVA indicated significant difference in NBT intentions between periods (diff. = .156; \( p = .049 \), Table 6). NBT intentions for 2021 (mean = 3.570) were higher than those for 2020 (mean = 3.414), whereas attitudes, age, marital status, and level of education were identified as covariances that influence this difference (Table 6).

\( T \)-tests were employed to obtain additional insights into the influence of covariance on the relationship between NBT intentions and periods. For both years, respondents who were under 40, married, and highly educated exhibited higher levels of NBT intentions than their counterparts (Figure 2; Table 7). These differences were increasingly evident for 2021, as all differences were larger and significant (diff. = −.368, \( p = .008 \) for age; diff. = .559, \( p = .000 \) for marital status; and diff. = .307, \( p = .031 \) for education level).

NBT intentions increased from 2020 to 2021 for all groups. In particular, the increase in NBT intentions for those who were under 40, married, and highly educated were statistically significant (diff. = .377, \( p = .001 \) for under 40; diff. = .302, \( p = .007 \) for married individuals; and diff. = .356, \( p < .000 \) for those who achieved a bachelor’s degree or above).
Discussion and implications

Summary of findings and discussion

An increasing number of studies report that risk perception of COVID-19 has increased NBT (Craig, 2021; Qiu et al., 2021; Rice et al., 2020). Most of the research mainly focused on prevention, protection, and restoration after the pandemic outbreak but did not consider the ever-changing situations of COVID-19. This is a critical limitation in the context of tourism and hospitality industry, that has to pay close attention to identify the most effective times and target markets for NBT. To address this gap, this study used HBM, which comprises perceived risk, perceived severity, perceived benefits, perceived barriers, attitudes, and NBT intentions, to identify participants’ potential intentions to visit nature-based areas during the COVID-19 pandemic. More significantly, the study variables were compared according to the two periods amid COVID-19 and demographic variables.

The study findings related to Hypothesis 1 indicated that perceived risk was positively associated with individuals’ perceived benefits toward NBT. Consistent with Craig’s (2021) findings that pandemic exerted a significant impact on Americans’ decision to consider tent camping and glamping, this study results proved that perceived risk due to COVID-19 exerted a positive influence on perceived benefits toward nature-based area. However, this study did not find a link between perceived severity and benefits (Hypothesis 2). One of the possible explanations for this finding is that potential tourists were overconfident about their physical and psychological health and underestimated the impact of COVID-19 in this situation. Although the result may differ depending on the type of risk, it is highly suggestive in that similar results were obtained from studies on coping with other diseases such as diarrhea, altitude sickness, and the common cold. For example, Huang et al. (2020) found that perceived severity exerted a non-significant influence on attitude or preventative behaviour. Hubbell’s (2006) findings also confirmed that perceived severity had relatively low predictive power on preventive behaviour, compared with the other factors.

The study findings related to Hypotheses 3 and 6 showed that perceived benefits were positively ($\beta = .824$), and perceived intrapersonal barriers were negatively ($\beta = -.210$), related to individuals’ attitude toward NBT. Chaulagain et al.’s (2021) findings confirmed that both benefits and barriers were critical components in creating individuals’ opinions about NBT amid COVID-19 pandemic. However, this result can appear contradictory to Su et al.’s (2021) findings, which showed that health risk perception exerted a negative influence on attitude toward travelling in times of a health-related crisis; it seems as an attribute of the rationale due to different content used in measurement (e.g. one item from their study is that “I feel safe when I travel in times of a disease outbreak”).

More specifically with respect to perceived barriers, interpersonal and structural barriers had non-significant impacts on attitudes (Hypotheses 4 and 5) whereas perceived intrapersonal barriers were significantly related to attitudes in the negative way (Hypothesis 6). This finding indicates that the main issue hindering NBT activities, such as camping, is related to intrapersonal aspects. In other words, family, friends, time, or information cannot deter positive attitudes toward visiting nature-based areas. This result is partially consistent with that of Chien et al. (2017), who identified worry as an intrapersonal barrier that influences the degree of perceived travel risk. These findings also support Chaulagain et al.’s (2021) result; however, the current study further identified three specific perceived barriers while their study conflated the three perceived barriers into one integrated model in the context of medical tourism. Given that the findings reveal a non-significant relationship between interpersonal barriers and attitude as well as structural barriers and attitude, this study suggests that researchers should further delve into investigating the effect of more specific barriers on nature-based activities.

In regard to Hypothesis 7, attitude was identified to be significantly associated with NBT intention ($\beta = .803$). This finding supports the previous tourism studies (Baе and Chang, 2021; Chaulagain et al., 2021; Su et al., 2021), indicating that attitude is a positive predictor of behavioural intention. More specifically, the results of this study suggest that positive attitudes toward NBT exert a positive impact on individuals’ intention to engage in NBT. Furthermore, this is partially in accordance with Yuen et al.’s (2021) findings, which proved that perceived benefit of travelling with cruise line was associated with the intention to use cruise services post COVID-19.

With regard to Hypothesis 8, the finding partially confirmed the moderating effects of
Table 5. Structural invariance and moderation test of period.

| Path | 2020 (N = 260) | 2021 (N = 298) | Difference |
|------|----------------|----------------|------------|
|      | β            | t-value | p-value | β           | t-value | p-value | χ² | p-value |
| H8a. Perceived risk → Perceived benefits | 0.349 | 3.777 *** | .564 | 5.970 *** | 2.910 | .088 |
| H8b. Perceived severity → Perceived benefits | −0.154 | −1.762 .078 | .120 | 1.325 .185 | 4.303 | .038* |
| H8c. Perceived benefits → Attitude | 0.667 | 8.379 *** | .852 | 9.937 *** | 0.55 | .814 |
| H8d. Interpersonal barriers → Attitude | 0.018 | 0.172 .78 | −0.060 | −2.60 .795 | 0.65 | .799 |
| H8e. Structural barriers → Attitude | −0.072 | −0.836 .403 | −1.100 | −3.94 .693 | 0.10 | .920 |
| H8f. Intrapersonal barriers → Attitude | −0.388 | −4.169 *** | −0.005 | 0.031 .976 | 5.073 | .024* |
| H8g. Attitude → NBT intentions | 0.719 | 10.643 *** | 0.856 | 11.514 *** | 2.090 | .148 |

Goodness-of-fit statistics for the baseline model (freely estimated): χ² = 1351.694; df = 564; χ²/df = 2.397; p < .001; NFI = .855; IFI = .910; CFI = .909; TLI = .896; RMSEA = .050

Goodness-of-fit statistics for the nested model (fully constrained): χ² = 1396.346; df = 571; χ²/df = 2.445; p < .001; NFI = .851; IFI = .905; CFI = .905; TLI = .892; RMSEA = .051

Note. NFI = normed fit index; IFI = incremental fit index; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; NBT = nature-based tourism.

* p < .05.
** p < .01.
*** p < .001.

Table 6. Results of ANCOVA of NBT intentions between 2020 and 2021.

| Independent variable: Period | 2020 (N = 260) | 2021 (N = 298) | Diff. | p-Value |
|-----------------------------|----------------|----------------|-------|---------|
| NBT Intentions              | 3.414 (SD = .056) | 3.570 (SD = .052) | .156 (SD = .079) | .049* |
| p-value of covariance       | Attitude | Gender | Age | Income | Marital status | Level of Education |
|-----------------------------|---------|--------|-----|--------|----------------|------------------|
| 2020                         | 0.000*** | 0.061  | 0.001** | 0.689  | 0.000***       | 0.000***         |
| 2021                         | 0.000*** | 0.061  | 0.001** | 0.689  | 0.000***       | 0.000***         |

R² = .345 (Adjusted R² = .347).
* p < .05.
** p < .01.
*** p < .001.
period. Interestingly, the structural invariance tests of period indicated that the influence of perceived severity on perceived benefits differed between 2020 and 2021 ($\Delta \chi^2 = 4.303; p = .038$). The relationship was negatively non-significant for 2020 ($\beta = -.154; t = -1.762; p = .078$) but positively non-significant for 2021 ($\beta = .120; t = 1.325; p = .185$). Additionally, the influence of intrapersonal barriers on attitudes differed between 2020 and 2021 ($\Delta \chi^2 = 5.073; p = .024$). The relationship was significantly negative for 2020 ($\beta = -.388; t = -4.169; p < .000$) but non-significantly positive for 2021 ($\beta = .005; t = .031; p = .976$). In line with Cheval et al. (2021) and Neuburger and Egger (2021), the findings revealed that the time gap during COVID-19 exerted significant differences in engagement in tourist behaviours.

Finally, the finding uncovered that Hypothesis 9 was partially supported, indicating that the relationship between NBT intentions and periods differed according to age, marital status, and level of education. In particular, respondents under 40 years of age, married, and with higher levels of education responded to higher intention to visit nature-based area in 2021. The results partially supported Craig’s (2021) and Neuburger and Egger’s (2021) findings, which presented distinct differences in risk perception and travel behaviours when considering age and travel frequency. Additionally, the study result is consistent with Barber and Kim’s (2021) findings that older adults were less worried about COVID-19 and uncovered fewer behavioural changes amid COVID-19 pandemic.

**Theoretical implications**

There are several academic implications to this study. First, one of the most striking findings is the empirical demonstration of the changing perceptions of health beliefs during the ongoing pandemic. Although a few previous studies have investigated changes regarding travellers’ behaviour amid COVID-19 period, little is known about changes in decision-making, especially in NBT literature, in responses to fluctuations in fears and health perceptions due to COVID-19. For example, Neuberger and Egger’s (2021) results revealed a significant increase in perceived risk of COVID-19, travel risk perception, and travel behaviour during COVID-19; however, their research focused on the general travel behaviour (e.g. travel avoidance or travel cancellation) in the DACH region (Germany, Austria, Switzerland) and was limited to only two weeks gap. Given that significant difference in physical activities, physical and mental health, anxiety and depressive symptoms during two weeks gap (Cheval et al., 2021), and the increased symptoms of anxiety or depressive disorder from August 2020 to February 2021 (Vahratian et al., 2021), this study can provide comprehensive academic insight into the changing perceptions of health beliefs and behavioural intentions. The structural invariance tests indicated that the influence of intrapersonal barriers on attitudes differed between 2020 and 2021. The relationship was significant for 2020 but non-significant for 2021. This finding suggests that the negative influence of the above-mentioned relationship on attitudes
Table 7. Results of t-test of age, marriage status, and level of education for 2020 and 2021.

|                          | 2020     | 2021     | Diff.     | p-Value  |
|--------------------------|----------|----------|-----------|----------|
| **Age**                  |          |          |           |          |
| Under 40 years (N_{2020} = 144; N_{2021} = 206) | 3.41 (SD = 1.101) | 3.78 (SD = .932) | .377 (SD = .112) | .001** (t = 3.358) |
| 40 years or older (N_{2020} = 116; N_{2021} = 92) | 3.16 (SD = 1.114) | 3.42 (SD = 1.146) | .256 (SD = .156) | .106 (t = 1.624) |
| Diff.                    | -.246 (SD = .138) | -.368 (SD = .126) |           | .075 (t = −1.785) |
| p-Value                  | .008** (t = 2.707) |           |           |          |
| **Marital status**       |          |          |           |          |
| Single (N_{2020} = 126; N_{2021} = 78) | 3.08 (SD = 1.115) | 3.27 (SD = 1.012) | .193 (SD = .55) | .216 (t = −1.241) |
| Married (N_{2020} = 129; N_{2021} = 216) | 3.53 (SD = 1.069) | 3.83 (SD = .968) | .302 (SD = .112) | .007** (t = 2.692) |
| Diff.                    | .450 (SD = .137) | .559 (SD = .129) |           | .001*** (t = 3.294) |
| p-Value                  | .000*** (t = 4.322) |           |           |          |
| **Education level**      |          |          |           |          |
| Less than Bachelor’s degree (N_{2020} = 74; N_{2021} = 65) | 3.09 (SD = 1.251) | 3.43 (SD = 1.147) | .345 (SD = .205) | .094 (t = −1.687) |
| Bachelor’s degree or above (N_{2020} = 186; N_{2021} = 233) | 3.38 (SD = 1.042) | 3.74 (SD = .968) | .356 (SD = .098) | .000*** (t = 3.629) |
| Diff.                    | .296 (SD = .152) | .307 (SD = .142) |           |          |
| p-Value                  | .074 (t = 1.803) | .031* (t = 4.673) |           |          |

* Nine respondents who answered “others” were excluded from analyses.

*p < .05.

**p < .01.

***p < .001.
weakened over time. Our observations revealed the early empirical evidence for changes in NBT-related perceptions adopting HBM during the COVID-19.

Second, we pioneered the application of HBM to NBT and contextualized it in a predictive model, which identified decision-making processes related to the intentions of tourists to engage in NBT during the COVID-19 pandemic. Although some studies have corroborated the applicability and significance of HBM during health-related decision-making in various contexts (Ban and Kim, 2020; Chaulagain et al., 2021; Curtin, 2009; Huang et al., 2020), only a few have examined its application in the context of tourism during COVID-19. The proposed model explained 64.5% of variance in individuals’ behavioural intentions to engage in NBT, which suggests that investigating NBT during the COVID-19 era is appropriate from a health-related perspective.

Third, this study is one of the first studies to empirically confirm that NBT intentions are related to the perceived risk and severity of the disease in the coronavirus pandemic. Prior research has reported the applicability and significance of the severity of disease in health beliefs in various contexts (Mehta et al., 2014; Turkington et al., 2018); however, no studies have been investigated in the context of NBT. Our findings indicated that perceived risk had a positive effect on perceived benefits toward NBT. In other words, the higher the level of the perceived risk of contracting COVID-19, the more likely tourists are to perceive benefits and be willing to travel to nature-based areas. This finding is inconsistent with an argument that the perception of risk negatively affects travel intentions (Zhu and Deng, 2020); hence, we can conclude that perceptions of NBT may differ from those regarding general tourism. In this regard, Yang et al. (2015) argued that tourists selectively only avoid areas that are considered risky; the influences of risk perception are tourism area-specific. Therefore, although tourists perceive crowded tourism destinations as risky, they may view suburbs and nature-based areas as safe in the ongoing pandemic.

Lastly, the current study contributed to providing a more comprehensive methodological approach by using ANCOVA to identify the moderating effects. Most studies have investigated moderating effects using structural invariance analyses. However, the results from SEM cannot control covariance that influences the dependent variable. To address this concern, this study employed ANCOVA and t-test. The results indicated that NBT intentions between periods differ according to demographic variables. These findings suggest that the results of moderating effects using SEM should be carefully interpreted.

Managerial implications

Our findings present several managerial implications for the sustainability of tourism and hospitality businesses. First, this study provides a timely analysis with implications for the tourism industry in the United States during the progressive pandemic era. According to The Washington Post (December 16, 2020), the first coronavirus vaccine was administered on December 14, 2020. However, many people continued to mistrust the vaccine and hesitated to be vaccinated (The Harvard Gazette, 2020). The Harvard Gazette (December 10, 2020) reported that the end of COVID-19 will be reached when the vaccination rate reaches 75–80%. However, current vaccination levels as of mid-October 2021 are under 60%, significantly lower than the projected rate. This suggests that the end of the COVID-19 pandemic only through vaccinations may be delayed. Thus, the government should simultaneously apply various supplementary measures. NBT could be recommended as an alternative preventative measure.

Second, identifying the determinants of NBT engagement will enable the implementation of expeditious marketing strategies to promote NBT to potential tourists. The results of this study indicate that NBT intentions increase as potential tourists understand more about the benefits of NBT, such as prevention of COVID-19, recovery from mental stress, and physical treatment for damages caused by COVID-19. Destination marketing organizations should inform the public about the advantages of NBT in schools, community centers, and other public organizations. Meanwhile, efforts should be made to address the barriers that impede engagement in NBT. For example, reducing anxiety, worry, and safety concerns should be prioritized through explanations that natural sites are not crowded and can heal a distressed soul.

Lastly, this study suggests that the most effective target markets are likely to be young, married, and highly educated persons. The unprecedented global outbreak of COVID-19 has shocked many industries, particularly tourism. However, focusing on domestic tourism and hospitality markets
during a national crisis could be an alternative and effective strategy (Yang et al., 2015). In conclusion, understanding the factors that influence intentions to engage in NBT via HBM is important for effective NBT site management and marketing during the severe COVID-19 pandemic. During or after the pandemic, tourism will remain an intrinsic human desire. Thus, tourism activities should not be halted; people will eventually live with COVID-19 until FDA-approved treatment medicines are 100% successful. In this regard, marketers should understand that the tourism crisis is not insurmountable because domestic tourism can bridge this gap.

Limitations and future research
Despite its academic and management contributions, this study has its limitations. A primary limitation is the age distribution of the sample. Online self-reported data were limited to a relatively young cohort as half of the respondents were younger than the age of 40. This aspect limits the generalizability of the findings to the general population, where people over age of 60 years are more susceptible to viral diseases, such as COVID-19. For the convenience of sampling, 2020 and 2021 were not compared for the same respondents. We also did not examine individual differences in personality (Nowak et al., 2020), medical insurance coverage plans, living environment, or regular travel habits among the respondents. In addition, previous studies have demonstrated that perceived risk is significantly influenced by nationality and experience. Therefore, future studies should include variables such as diverse nationalities and experience to develop a nuanced measurement of perceived risk. Lastly, this study overlooked other indicators, such as perceived self-efficacy and cues for action, which were included in the original HBM (Champion and Skinner, 2008). Therefore, future studies can be more insightful if they include these variables.

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