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Rethinking Sleep Quality in Fotels: Examining the Risk and Protective Factors Associated with Travel-related Insomnia

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Rethinking sleep quality in hotels: Examining the risk and protective factors associated with travel-related insomnia

Abstract

This study attempts to illustrate how traveling affects the sleep and well-being of hotel guests. We collected data from hotel guests and looked at various factors affecting their sleep quality during travel. The particular impact of said variables on insomnia was analyzed using a binary logistic regression. Study results show that the risk factors of developing insomnia while traveling include unhealthy sleep habits at ordinary times, being an early riser, short sleep durations, business trips, and sensitivity to unfamiliar environments. Protective factors include being a late sleeper and being satisfied with the accommodation facilities. The research findings offer specific theoretical and practical implications for improving the sleep experience of hotel guests.

Keywords: sleep, tourism, insomnia, hotel, welfare, well-being.

Introduction

Sleep is vital for health and its importance has been widely recognized in medical research (Adams et al., 2017; Hsu, 2014). Such studies suggest that dysfunctional sleep impacts public health, well-being, safety, and economic productivity (Hsu, 2014; Schwartz, 1970). Insufficient sleep increases a person's risk of developing major medical conditions (Valtonen & Veijola, 2011), including obesity, diabetes, and cardiovascular disease, along with mental conditions such as anxiety, depression, and bipolar disorder (Adams et al., 2017; Balogun, Alohan, & Orimadegun, 2017). Sufficient and quality sleep is a crucial part of a traveler's well-being. Sleep disturbance refers to a subtype of circadian rhythm sleep disorder such as jet lag that may cause disturbances of sleep patterns, alertness, and mood, accompanied by fatigue and lightheadedness (Jamieson, Zammit, Rosenberg, Davis, & Walsh, 2001). Approximately 93 percent of travelers feel some type of jet lag (American Sleep Association, 2018). Jet lag severity may correlate with the number of time zones crossed (Fullagar et al., 2016), direction of travel, age, personal health, and the ease and speed of travelers' ability to cope with transmeridian travel (American Sleep Association, 2018; Jamieson et al., 2001).

Sleep is a vital component of hotel stays, as guests spend considerable time sleeping (Mao, Yang, & Wang, 2018). When selecting hotels, guests primarily consider such aspects of the sleeping environment as cleanliness, bedding, and air conditioning (Mao et al., 2018). It is easy to disrupt vulnerable sleep in hotels; in turn, hotels cannot recoup losses incurred by poor sleep quality among their guests (Valtonen & Veijola, 2011). Therefore, hotels aim to offer a peaceful and comfortable sleeping environment to satisfy guests' needs and expectations (Pallesen, Larsen, & Bjorvatn, 2016). Even a faint smile on the faces of

sleepers is true and cordial, and can depict how satisfied they are with their accommodation (Valtonen & Veijola, 2011). It is therefore imperative to consider the holistic sleeping experience of a hotel stay. Previous studies, however, have primarily focused on guests' daytime activities, while nocturnal travel-related issues have been largely overlooked (Chen, Petrick, & Shahvali, 2016; Valtonen & Veijola, 2011). Majority of previous studies tend to focus on offering memorable guest experiences (Cohen, 1979; Kandampully, Zhang, and Jaakkola, 2018; Valtonen & Veijola, 2011). However, only when sleep is fully reconsidered can we better understand and evaluate hotel guest experiences.

Some previous studies have examined the value of hotel sleep quality (Pallesen, Larsen, & Bjorvatn, 2016; Mao, Yang, & Wang, 2018; Valtonen & Veijola, 2011), while others have explored factors influencing sleep quality in hotels (Mao, Yang, & Wang, 2018; Chen, Severt, Shin, Knowlden, & Hilliard, 2018; Fung & Hon, 2019). In addition, Mao et al. (2018) have proposed conceptual frameworks of hotel sleep quality, comprised of both hotel and personal characteristics. The latter refer to demographic, biopsychosocial, and tripographic factors, while the former refer to location, facilities, and sleeping environment (Mao et al., 2018). Previous research studies in this area have focused on hotel characteristics, especially sleeping conditions, including bedding, surrounding environment, noise, light, temperature, and air quality (Hsu, 2014; Mao et al., 2018; Valtonen & Veijola, 2011).

Previous studies have investigated the correlation between demographic and tripographic factors (Mao et al., 2018). Yet limited hospitality and tourism research has illustrated the effects of biopsychosocial factors on sleep quality. The significant impact of biopsychosocial factors on sleep quality has gained broad recognition in other disciplines such as psychology, sociology, and medicine. Reportedly, sleep habit, individual family, psychological affection, and stress significantly affect sleep quality (Fischer, Lombardi, Marucci-Wellman, & Roenneberg, 2017; Hsu, 2014; Schwartz, 1970) in everyday life. When guests visit a hotel for the night, relatively stable characteristics or traits mentioned above continue to affect sleep quality. It is therefore crucial to explore whether and how biopsychosocial factors affect sleep quality in hotels.

The role of traveling as a stress reliever and its positive effects on physical and psychological health have been well recognized (Kucukusta,2011). Although traveling is beneficial, it can also adversely affect health and well-being because of the stresses related to unfamiliar sleeping environments (Cohen, 1979; Valtonen & Veijola, 2011). Sleep-related epidemiological and physiological studies have already assessed the benefits of sufficient sleep with regard to human performance (Fullagar et al., 2016; Richmond et al., 2007). Although quality sleep is a crucial part of a traveler's well-being, the effects of insufficient sleep and sleep deprivation on travelers' behavior has received inadequate attention in the hospitality and tourism field. In addition, only very empirical

studies have examined how traveling affects the sleep and well-being of hotel guests (Mao, Yang, & Wang, 2018; Pallesen, Larsen, & Bjorvatn, 2016). The effects of traveling on physical health therefore warrant further attention.

Given this, the present study aims to investigate the pivotal issue of travel's impact on sleep health and well-being. In particular, this study rethinks sleep quality in hotels. First, to adequately understand the factors influencing hotel sleep quality, this study responds to the lack of investigation of biopsychosocial factors, especially physical and psychological characteristics, in hotel sleep research. In addition, this study follows an interdisciplinary approach, which combines typical research methods from hospitality and psychology to examine the influencing factors regarding travel-related insomnia. The next section reviews previous research in this area. The third section explains the methodology employed in this study. The fourth section presents and discusses the study findings. The final section offers emerging conclusions and provides the emerging theoretical and practical implications.

Literature review

Sleep quality refers to individuals' satisfaction with their sleep experience (Balogun et al., 2017). Good sleep quality depends on getting enough sleep, and is accompanied by feeling more refreshed and less tired during the day. In contrast, poor sleep quality is the result of a shortened sleep period or light sleep (Hsu, 2014). Poor sleep quality is typically accompanied by insomniac symptoms, such as difficulty initiating sleep (DIS), difficulty maintaining sleep (DMS), and early morning awakening (EMA) (Schwartz, 1970). Poor sleep quality and insomnia have detrimental effects on one's physical and psychological well-being, and can lead to depression, diabetes mellitus, and cardiovascular disease (Selvi et al., 2010).

Individual factors and sleep quality in hotels

Previous hospitality studies have examined the effects of demographic factors such as age, gender, and marital status on sleep quality in hotels (Chen et al., 2018; Fung & Hon, 2019; Mao et al., 2018; Pallesen et al., 2016). There is both an inverse as well as a U-shaped relationship between age and hotel sleep quality (Mao et al., 2018; Pallesen et al., 2016). Males reported sleeping better in hotels than females, but the reverse could also occur (Mao et al., 2018; Pallesen et al., 2016). Single tourists might experience lower satisfaction with regard to sleep quality in hotels than others (Chen et al., 2018). Following these results, this study further explores the relation between demographic factors (i.e., age, gender, income, occupation, and educational level) and sleep quality in hotels.

Very few studies have explored the relationship between physiological factors and sleep quality in hotels (Mao, Yang, & Wang, 2018; Pallesen, Larsen, & Bjorvatn, 2016). First, some research has found that travelers who exhibit symptoms of insomnia at home tend

to sleep well in hotels (Pallesen et al., 2016). Hence, this manuscript proposes following hypothesis (**H1**): *Hotel guests with normally poor sleep quality are less likely to suffer from insomnia while traveling.*

Second, Pallesen et al. (2016) found that travelers might take longer to fall asleep when staying at hotels, which means they might not be guaranteed an adequate duration of sleep (Pallesen et al., 2016). Yet relevant epidemiologic studies have found that an optimal duration is the foundation of quality sleep (Fatima, Doi, & Mamun, 2016). Whether sleep duration has an effect on sleep quality in hotels needs to be confirmed. Therefore, this manuscript makes the following hypothesis (**H2**): *Hotel guests experiencing short sleep durations are more prone to insomnia while traveling.*

Furthermore, in the area of international travel and health, scientific evidence has suggested that jet lag and distance negatively affect sleep quality due to spatial change (Fullagar et al., 2016; Adan et al., 2012; Xiong, Fan, & Qi, 2020) due to circadian rhythm disorder (Jamieson, Zammit, Rosenberg, Davis, & Walsh,2001b). This means that individuals show the appearance of desynchronization between internal rhythms and external time (Fischer et al., 2017; Ong, Huang, Kuo, & Manber, 2007). Most domestic travelers, however, are less likely to suffer from jet lag and there is limited research on whether circadian rhythm would still affect sleep quality in such instances. In relevant sleep medicine studies, chronotype (i.e., whether one is a "morning person" or an "evening person") reflects how the circadian system embeds itself into the 24-hour day (Adan et al., 2012; Selvi et al., 2010). Morning types are accustomed to waking up early but are more sensitive to changes in sleeping environment (Ong et al., 2007). Evening types sleep late and wake up late, and as a result often suffer from poor sleep quality or insomnia (Winget, DeRoshia, Markley, & Holley, 1984). Chronotype preference is a spectrum and most people fall somewhere between "morningness" and "eveningness" (Adams et al., 2017). This manuscript examines the relationship between chronotype and sleep quality in hotels while traveling, and proposes the following hypothesis (**H3**): *Hotel guests who favor eveningness are more prone to insomnia than guests who favor morningness while traveling.*

The effects of psychological factors on sleep quality in hotels have not been explored. Most relevant research in the field of medicine and psychology has proved that psychologically negative emotions detract from sleep quality while positive emotions enhance it (Kahn, Sheppes, & Sadeh, 2013). Previous studies in hospitality and tourism have long sought the role of positive and negative emotions in experiences of service quality, satisfaction, and intention (Li, Scott, & Walters, 2015). Yet previous research studies have confirmed the effects of psychological emotion on the experience of waking while neglecting its effects on the experience of sleeping. Therefore, this manuscript examines the effect of guests' emotion during travel on sleep quality in hotels, and makes the following hypothesis (**H4**): *Hotel guests with negative affect are more likely to suffer*

from insomnia than guests with positive affect while traveling.

The authors of this study have chosen not to elaborate on other important factors affecting sleep quality in hotels while traveling, such as physiological factors (i.e., hormones or a weak bladder) (Kemmer et al., 2009; Monti, Torterolo, & Lagos, 2013), psychological factors (i.e., personality and perceived stress) (Chen, Severt, Shin, Knowlden, & Hilliard, 2018; Kanno, Tsugawa, & Yoda, 2014), and lifestyle (i.e., exercise, dietary behaviors and mobile phone addiction) (Hong, Liu, Ding, Sheng, & Zhen, 2020; Mao, Yang, & Wang, 2018; Rabanipour, Roohafza, Feizi, & Sarrafzadegan, 2019).

Travel factors and sleep quality in hotels

Previous research in hospitality has examined the effects of some travel factors on sleep quality. On the one hand, studies have suggested the potential impact of travel purpose on such satisfactions as sleep quality. The differences of sleep experience between leisure travelers and business travelers have also been explored (Rundle, Revenson, & Friedman, 2018). According to Chen et al. (2018), compared to leisure travelers, business travelers are more prone to experiencing poor sleep due to fatigue and stress, and subsequently seek out a more comfortable and peaceful sleeping environment (Chen et al., 2018). On the other hand, a study by Mao et al. (2018) found no relationship between hotel sleep quality and either travel experience. Given the fact that previous research studies have no consistency in this area, this study hypothesizes the following (**H5**): *Compared to leisure travelers, business travelers in hotels are more likely to suffer from insomnia while traveling.*

The effects of travel frequency on sleep quality in hotels remain unclear. In general, experienced travelers sleep better than inexperienced travelers because they tend to adapt to new sleeping environments more quickly (Mao et al., 2018). Yet other evidence has suggested that experienced travelers had more sleep problems in hotels (Radojevic, Stanisic, & Stanic, 2017). It is therefore worth exploring how travel frequency affects sleep quality. Hence, the following hypothesis (**H6**): *Frequent travelers in hotels are less likely to suffer from insomnia while traveling.*

Hotel factors and sleep quality in hotels

Most relevant sleep studies have associated environmental novelty with transitory insomnia in everyday life (Hsu, 2014; Kaplan, Horner, Bandettini, Doeller, & Burgess, 2014; Schwartz, 1970). Previous studies in hospitality have also investigated how guests' sensitivity toward hotel sleeping environment (both its physical and intangible characteristics) affects hotel satisfaction in terms of sleep quality (Schreck, Mulick, & Rojahn, 2003). Said studies have identified three important factors: the perception of tangible attributes, the perception of external environmental attributes, and the perception of intangible attributes. The perception of tangible attributes of hotel rooms such as light,

sound or noise, temperature, air quality or ventilation, bedding and linen, and layout was found to be important with regard to sleep quality (Chen et al., 2018; Fung & Hon, 2019; Hon and Fung, 2019; Hsu, 2014; Mao et al., 2018; Pallesen et al., 2016). Similarly, perceived external environmental attributes such as distance from airports or highways, green space, and neighborhood environment (e.g., noise from a nearby restaurant) (Mao et al., 2018; Pallesen et al., 2016), as well as the perception of intangible hotel attributes (e.g., service level and the luxuriousness of the hotel) were also associated with hotel sleep quality (Chen et al., 2018; Mao et al., 2018). Based on the above discussions, the present study further hypothesizes the following (**H7**): *Guests with high sensitivity to hotel sleeping environments are more prone to insomnia while traveling.*

This study measures overall satisfaction with the hotel, itself a process of dynamic change from the moment one commences a hotel stay (Li, Liu, Tan, & Hu, 2020). It may therefore affect sleep. This research, however, innovatively attempts to examine the inverse relationship between sleep quality and hotel satisfaction: specifically, whether overall customer satisfaction with the hotel will also affect sleep quality. Moreover, extensive research in hospitality has confirmed that sleep quality can significantly affect the overall satisfaction of hotel customers (Li, Liu, Tan, & Hu, 2020; Moro, Esmerado, Ramos, and Alturas, 2019; Valtonen & Veijola, 2011) and influences travelers' overall rating of hotels (Berezina, Bilgihan, Cobanoglu, & Okumus, 2016; Xu, 2018). And yet, the extent to which overall hotel satisfaction impacts sleep quality remains unclear. This study proposes a bidirectional relationship between sleep quality and overall hotel satisfaction and hypothesizes the following (**H8**): *Guests with high hotel satisfaction are less likely to suffer from insomnia while traveling.*

Methodology

Survey measurement

The survey measurement had six sections. The first section was designed to measure sleep quality in hotels while traveling. This study measured insomnia by using an adapted scale of the Pittsburgh Sleep Quality Index (PSQI). Items measured included difficulty initiating sleep (DIS), difficulty maintaining sleep (DMS), and early morning awakening (EMA) (Buysse, Reynolds, Monk, Berman, & Kupfer,1989). Of interest was whether insomnia developed while traveling or at home. Participants were classified as "insomniacs at home" if answered one of the three items with "3 or more times a week" (DSM-5) (Liu, Uchiyama, Okawa, & Kurita, 2000). The Cronbach's α was 0.81 for these items. Participants were classified as "insomniacs while traveling" (Cronbach's $\alpha = 0.87$) if they answered "very often or always" to at least one of the three symptoms. The incidence of insomnia, which is the most typical sleep problem in adults, rated from 8 to 20 percent (Adams et al., 2017).

Section 2 included items to measure individual physiological factors. Physiological

factors consisted of chronotype and sleep duration. Sleep duration was measured by the estimated length of average sleep time while traveling. Participants were classified into either a short group (SSD, sleep duration < 6h) or normal group (NSD, sleep duration ≥ 6h) (Khassawneh, Bathgate, Tsai, & Edinger, 2018). Next, this study utilized the scale of Horne and Östberg's reduced Morningness/Eveningness Questionnaire (rMEQ) to measure travelers' chronotype (Adan & Almirall, 1991). The reduced scale consisted of five items, including automatic wake-up time (5 = 05:00-06:30, 4 = 06:30-07:45, 3 = 07:45-09:45, 2 = 09:45-11:00, 1 = 11:00-12:00), how tired they were when waking up in the morning (1 = very tired, 2 = fairly tired, 3 = fairly refreshed, 4 = very refreshed), "become tired and need to sleep" time (5 = 20:00-21:00, 4 = 21:00-22:15, 3 = 22:15-0:45, 2 = 0:45-02:00, 1 = 02:00-03:00), "feeling best" peak time (5 = 05:00-08:00, 4 = 08:00-10:00, 3 = 10:00-17:00, 2 = 17:00-22:00, 1 = 2:00-05:00), and perceived morningness/eveningness type (0 = definitely a morning type, 2 = rather more an evening than a morning type, 4 = rather more a morning than an evening type, 6 = definitely an evening type). On the basis of the total score range, the following criteria were used to designate three preference groups (Adan & Almirall, 1991): morning type (18-25), evening type (4-11), or neither type (12-17). Internal consistency with $p < .0001$ of the scale was high (Adan & Almirall, 1991). Hence, a scientific reliability (Cronbach's α = 0.701-0.738) was reported based on a sample from China (Zhang et al., 2006).

Section 3 contained items measuring individual psychological factors. This study adapted the Positive and Negative Affect Schedule (PANAS) to measure tourists' affective states (Watson, Clark, & Tellegen, 1988). The PANAS measures ten positive emotional states (excited, interested, enthusiastic, strong, proud, inspired, alert, determined, active, and attentive) and ten negative emotional states (upset, ashamed, scared, hostile, distressed, irritable, nervous, guilty, jittery, and afraid). We adopted a 5-point Likert scale where 1 = "very slightly or not at all" and 5 = "extremely." Huang et al. (2003) studied the applicability of the PANAS within a Chinese sample, and reported a Cronbach's α of 0.85 for the positive affect scale and a Cronbach's α of 0.83 for the negative affect scale (Huang, Yang, & Li, 2003). In this study, the positive affect (Cronbach's α = 0.90) and negative affect (Cronbach's α = 0.90) scales both had high reliability.

Section 4 included items to measure travel factors, including frequency and purpose. This research asked participants to choose among the following options with regard to their travel frequency in the last 12 months: 1 = Once or twice last year, 2 = 3-5 times last year, 3 = 6 times or more last year. In order to measure travel purpose, the participants were asked to choose from among the following options when asked about the purpose of their trip: 1 = Non-official business, 2 = Official business, 3 = Holiday or vacation, 4 = Sightseeing, 5 = friends and relatives. Only "Non-official business" and "Official business" were classified as business trips; the rest were classified as leisure trips. Section 5 aimed to assess travelers' sensitivity to the hotel sleeping environment, using measures

adapted from Mao et al. (2018), Chen et al. (2018), and Pallesen et al. (2016). This consisted of 12 items that included questions related to ventilation system, sound reduction effect, sleeping state of partner, temperature, light, hotel service quality, bedding (mattress, pillow, etc.), distance between hotel and airport or highway, green space, the neighborhood environment, color layouts, and the hotel facility (Chen et al., 2018; Mao et al., 2018; Pallesen et al., 2016). We adopted a 5-point Likert scale where 1 = "Not important at all" and 5 = "Very important" (Cronbach's $\alpha = 0.88$).

The current study further measured guests' overall hotel satisfaction while using the following items from the hotel customer satisfaction index (H-CSI) model: (1) The hotel's overall performance satisfied me, (2) If having the chance, I would like to visit the hotel again, (3) I have a tendency to praise this hotel, and (4) I will make an effort to recommend it to anyone I know (1 = strongly disagree, 5 = strongly agree) (Deng, Yeh, & Sung, 2013). We calculated the total score for presenting hotel satisfaction. The Cronbach's α of this scale was 0.91, indicating highly acceptable reliability. Section 6 included questions related to demographics of participants.

Data collection and analysis

We launched data collection during China's summer vacation. We adopted a convenience sampling method and recruited samples in 28 hotels (18 business hotels and 10 resorts) located in Guangdong province, China. From 9:00 AM to 12:00 PM, we stayed at these hotels and waited for guests who had stayed overnight. We invited them after checking out to participate in our survey in the hotel lobby. The participants were asked to scan a QR code for an online questionnaire and complete the scales immediately. Ultimately, of the 505 hotel guests who were invited to complete the self-reported scale, 33 responses were excluded for being incomplete or untrue, leaving us with 472 effective responses - an effectiveness rate of 93.47%. Empirical data collected were analyzed via SPSS 24.0. We performed the adjusted chi-square test to reflect the relationship between different variables (e.g., normal sleep quality, sleep habits, nocturnal sleep duration, travel purpose) and insomniac symptoms while traveling. We computed binary logistic regression to examine the effects of the risk and protective factors on insomnia. After variance analysis, variables that significantly affected sleep while traveling and variables that were significant at $p < .05$ were adopted into next statistical model. We reported the results with an OR, significance, and 95% CI. The statistical model contained the variables retaining significance after adjusted. An alpha value of .05 was considered statistically significant.

Results

A total of 472 respondents answered the questionnaire, 40.5% of which were male. The most significant ages ranged between 26 and 45 (48.5%). A total of 27.3% were business travelers and 26.5% were students. In terms of education, 55.3% had a bachelor's degree.

In terms of monthly income, 53% ranged from $289.10 to $1445.54. Demographic details of the respondents are shown in Table 1.

Table 1. Demographic information of the respondents (n = 472)

Variables	Frequency	Percent (%)
Age		
18-25	215	45.6
26-35	136	28.1
36-45	93	19.7
> 45	28	6.0
Gender		
Male	191	40.5
Female	281	59.5
Occupation		
Government official	95	20.1
Enterprise staff	129	27.3
Private owners	77	16.3
Students	125	26.5
Other	46	9.7
Education level		
High school or below	120	25.4
Bachelor's degree	261	55.3
Graduate degree	91	19.3
Income ($ per month)		
≤ 289.10$	104	22.0
289.10-722.78	98	20.8
722.78-1445.54	152	32.2
> 1445.54$	118	25.0

Of the 472 adults who participated in the study, about 15.47% reported insomniac symptoms while traveling. The latter were classified as insomniacs and the rest as non-insomniacs. We selected and analyzed the data from the insomniac and non-insomniac groups.

Table **2** shows the results of the chi-square tests. Our findings differ from prior hospitality studies indicating that the chi-square tests did not reveal significant differences in the proportions of participants with insomnia ($F/\chi 2 = 2.61$, $p > .05$). Characteristics such as normal sleep state, sleep habits, travel nocturnal sleep time, travel purpose, negative and positive affect, sensitivity to the hotel sleeping environment, and hotel satisfaction were significantly correlated with the occurrence of insomnia while traveling. There may, however, be confounding factors.

We conducted a binary logistic regression to test the associations between significant variables and the occurrence of insomnia while staying in hotels (see Table 2). We further estimated the risk factors or protective factors, while the odds ratio was used to indicate an association. As presented in Figure 2, negative and positive affect ($p > 0.05$) were irrelevant to insomnia. Based on this, Hypothesis 4 (indicating that hotel guests with negative affect are more likely to lose sleep than guests with positive affect while traveling) was not supported. The other seven independent variables had significant predictive effects on sleep health. First, the correlation between unhealthy sleep at ordinary times and incidence of insomnia while traveling was the strongest (OR = 20.24; 95% CI, 8.43-48.61), Hypothesis 1 was therefore invalid.

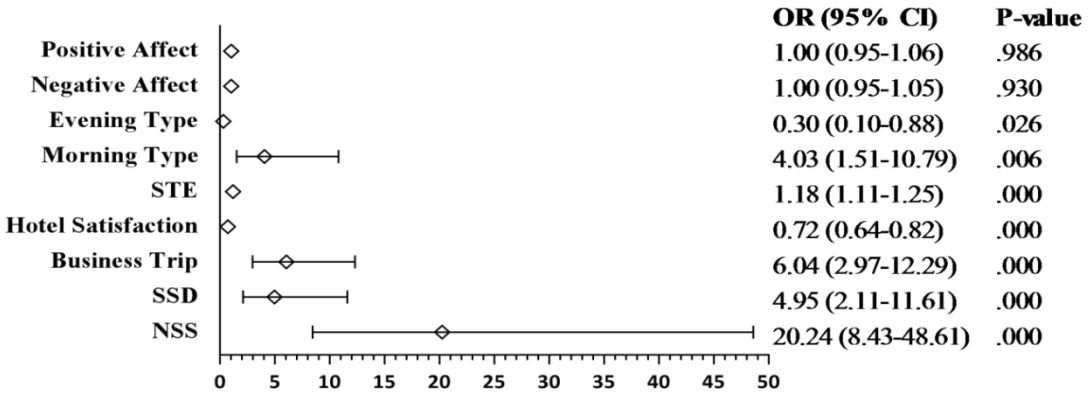
Hotel guests with short sleep durations while traveling (OR = 4.95; 95% CI, 2.11-11.61) were more likely to have insomnia. Hence, Hypothesis 2 was supported. Interestingly, evening-type travelers (OR = 0.30; 95% CI, 0.10-0.88) were more likely to suffer from insomnia than morning-type travelers (OR = 4.03; 95% CI, 1.51-10.79). In short, Hypothesis 3 was not supported. Next, study results found that business travelers were more likely to suffer from insomnia (OR = 6.04; 95% CI, 2.97-12.29). Based on the study results, Hypothesis 5 was supported. Even relevant travel frequency did not predict the incidence of insomnia, which indicates that Hypothesis 6 was not supported. Guests with high sensitivity to the hotel sleeping environment are prone to insomnia (OR=1.18; 95% CI, 1.11-1.25). This finding supported Hypothesis 7. Finally, those with high hotel satisfaction were less likely to suffer from insomnia (OR = 0.72; 95% CI, 0.64-0.82). This finding supported Hypothesis 8.

Table 2. Results of Chi-squared Test between Variables

Variables	Insomnia	No Insomnia	F/χ2
	Frequency		
Normal sleep state			33.19***
Insomnia	37	77	
No insomnia	36	322	
Sleep habits			18.06***
Neither type	49	321	
Morning type	16	26	
Evening type	8	52	
Travel nocturnal sleep duration			26.65***
Normal sleep duration	52	367	
Short sleep duration	21	32	
Travel frequency			2.61
Once or twice last year	39	213	
3-5 times last year	25	122	
6 times or more last year	9	64	
Travel purpose			42.95***

Leisure trip	34	327	
Business trip	39	72	
Age			4.17
18-25	35	180	
26-35	16	120	
36-45	19	74	
>45	3	25	
Gender			1.39
Male	25	166	
Female	48	233	
Occupation			1.61
Government official	17	78	
Enterprise staff	18	111	
Private owners	10	67	
Students	19	106	
Other	9	37	
Education level			1.08
High school or below	15	105	
Bachelor degree	43	218	
Graduate degree	15	76	
Income (Yuan/month)			0.50
≤ 289.10$	16	88	
289.10-722.78	16	82	
722.78-1445.54	25	127	
> 1445.54$	16	102	
	M (±SD)		
Negative Affect	22.40（±8.39）	19.98（±6.62）	56.36**
Positive Affect	32.68（±7.32）	32.50（±7.26）	53.76*
Sensitivity to the environment	46.66（±6.21）	40.08（±8.97）	75.30**
Hotel satisfaction	13.00（±3.46）	14.69（±3.10）	40.68***

Note: ***p < .001; **p < .01; *p < .05.



Note: **NSS** = Normal sleep quality (Insomnia); **SSD** = Short sleep duration in travel; **STE** = Sensitivity to the Environment.

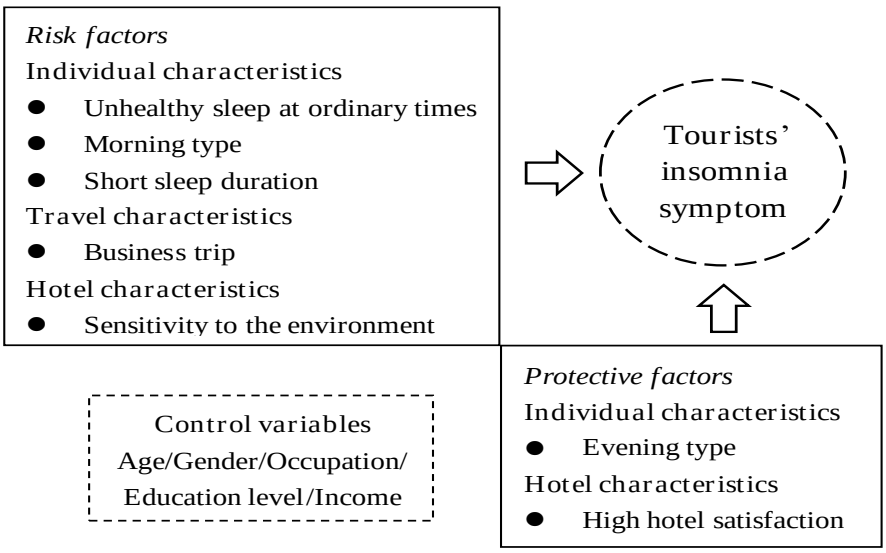
Figure 1. Binary Logistic Regression for Predicting Insomnia Incidence in Travel

Discussion and implications

Conclusions

This study investigated the pivotal issue of travel's impact on sleep health and well-being by rethinking sleep quality in hotels. Guided by prior literature, the study fills the gap investigating the impacts of biopsychosocial factors, especially physical and psychological characteristics, on hotel sleep. Contributing to extant knowledge in several areas, the findings highlighted the risk and protective factors regarding travel-related insomnia, thus offering emerging conclusions and implications to scholars and practitioners. Overall, as presented in Figure 2, the study findings highlight the risk factors of travelers developing insomnia. They include poor sleep quality in daily life, having a morningness preference, having short sleep duration, being on a business trip, and having high sensitivity to the sleep environment in question. Protective factors include having an eveningness preference and high satisfaction with the accommodation facility (see Figure 2). These findings provide a scientific basis for improving the sleep quality of travelers—mostly young adults—while also considering the significance of travelers' sleep health.

Figure. 2. Factors shaping hotel guests' insomnia



According to the study findings, the impact of travel on sleep quality has a differential effect, and influencing factors mainly include individual factors, travel factors, and hotel factors (Pallesen, Larsen, & Bjorvatn, 2016; Mao, Yang, & Wang, 2018). Moreover, these findings offer a new understanding of how nocturnal activities of travelers, like sleeping, are as important—if not more—than daytime activities while traveling. Regarding

individual factors, this study found no effect of demographic factors on sleep quality, which highly contradicts previous research. In particular, this study found no correlation between age and sleep quality, while previous studies reported a reverse or U-shaped correlation (Mao, Yang, & Wang, 2018; Pallesen, Larsen, & Bjorvatn, 2016). In addition, this study found no difference in gender when assessing sleep quality, while previous studies reported that males might sleep better in hotels than females. And yet, the reverse could also occur (Mao et al., 2018; Pallesen et al., 2016). Neither did the current study find any significant role played by other demographic factors, such as income, occupation, and educational level, in sleep quality. This result is not consistent with the study results of Mao et al. (2018).

Next, this study found that physiological factors, such normal sleep state, sleep duration, and chronotype, could affect insomnia in hotels. Hotel guests with insomnia at home are more likely to experience sleep disorder while traveling (**H1**), which is inconsistent with Pallesen et al. (2016), who determined that travelers who have insomnia symptoms at home sleep well in hotels. Moreover, hotel guests with short sleep durations while traveling (**H2**) were more likely to have insomnia, which is in line with Teng-Teng et al. (2019). A possible explanation for this tendency toward developing insomnia is that research samples tend to be comprised largely of young adults, who often experience sleep loss (Adams et al., 2017). Morningness-oriented people are more likely to experience insomnia, while eveningness-oriented people are protected from developing insomnia (**H3**). This finding disagrees with Winget et al. (1984), who reported that evening types often suffer from poor sleep quality or insomnia. We posit that it is not easy for morning people with regular sleep rhythms to adjust themselves to disruption of biological clocks in a novel sleeping environment while traveling. Conversely, evening people are more flexible and adaptive to sleep-related changes while traveling because they are prone to being risk-takers compared with morning people (Xiong, Fan, & Qi, 2020; Adan et al., 2012). Regarding individual psychological factors, we found that positive and negative effects do not predict the prevalence of insomnia in hotels (**H4**). This finding does not support Kahn et al. (2013).

We observed no effect of travel frequency on insomnia in hotels (**H5** and **H6**), which is in line with Mao et al. (2018). Business travelers are more prone to insomnia in hotels compared with leisure travelers, which is consistent with the findings of previous studies (Mao et al., 2018; Rundle et al., 2018), which determined that business travelers sleep worst when on a trip. Regarding travel factors, high sensitivity to the sleeping environment (**H7**) correlates with insomnia, and guests who express high levels of satisfaction with the hotel are less likely to experience insomnia (**H8**). Regarding hotel factors, we established the effect of travelers' sensitivity to the hotel's tangible and intangible environment, such as noise insulation, room temperature, air quality or ventilation, bedding, and indoor lighting, on sleep quality. These findings support Mao et

al. (2018) and Pallesen et al. (2016). Moreover, travelers are more likely to lose sleep when they are satisfied with the hotel. Although previous research has concluded that sleep quality directly affects satisfaction (Schuckert, Liu, & Law, 2016), this study surprisingly fond that, while traveling, tourists' satisfaction with a hotel also significantly affects sleep quality. In other words, there is a bidirectional relationship between hotel guests, sleep problems, and their satisfaction.

Theoretical Implications

This study offers several specific theoretical implications. First, healthy sleep directly affects well-being. Good quality of sleep while staying in a hotel requires a complete reconsideration, as it is not just about the cultural meanings of sleep but also about its relations to the surrounding social, natural, and material environments (Valtonen & Veijola, 2011). Previous research in the fields of medicine and psychology largely explored the effects of individuals' sleep state on well-being from the views of everyday life. This study makes an effort to explore how travel affects sleep health. We consider sleep as an integral part of everyday life and bring it into tourism. We further examine the risk and protective factors associated with sleep health during travel. Thus, this study will improve sleep research by building a bridge between mobility and well-being. We have laid the foundation of fusing everyday sleep health with well-being in mobility.

Second, in the hospitality and tourism field, sleep is not a specific but figurative factor, which allows us to redefine the notion of tourism with regard to ethical and sustainable issues (Valtonen & Veijola, 2011). The relatively high incidence of insomnia while traveling urges us to rethink the impact of traveling on sleep health in greater depth. This study examined the sleep time of travelers rather than waking hours and, in so doing, urges scholars to focus on more person-related aspects of sleep in hotels—not just profits or marketing. This study urges tourism researchers to pay more attention to silent experiences like sleep as one of the key experiences in today's tense, noisy, and congested societies (Valtonen & Veijola, 2011).

Furthermore, our study suggests interdisciplinary approaches for sleep research in hotels or other similar sleep settings while traveling. This study builds on the framework of Mao et al. (2018), replenishing personal physical attributes of sleep health in hotels. Our study considered and adopted the method of psychological or traditional sleep research studies. It employed authoritative sleep research scales, such as the Pittsburgh Sleep Quality Index (PSQI), the reduced Morningness/Eveningness Questionnaire (rMEQ), and the Positive and Negative Affect Schedule (PANAS), to obtain essential findings. So far, the knowledge and theory put forth by limited sleep studies in hospitality and tourism based on tourists' sleep experiences and effects of hotel material facilities ignores the impact of individual internal characteristics. More than an effect of lodging facilities and services, this study examined the specific ethnicity (Chinese-East Asian) and looked at the effects

of travelers' characteristics such as age/gender, normal sleep quality, sleep habits, travel nocturnal sleep time, travel purpose, negative and positive affect, hotel sleeping environmental sensitivity, and hotel satisfaction on the occurrence of insomnia while traveling. Moreover, our study brings a new perspective of physiological factors and psychological emotion (affective states) into sleep research in hospitality and tourism. The findings of this study will further encourage hospitality scholars to explore the role of emotions in sleep experiences while staying in hotels and other lodging businesses.

Practical Implications

This study examined the development of insomnia as a proxy for the quality of sleep while traveling. The research findings imply that hotels should focus more on ensuring guests experience good quality sleep, and that travelers should fully recognize the significant role of sleep health while traveling and adopt habits to improve their sleep. For one thing, it is responsible for hotel managers or staff to help tourists recognize their own sleep state while traveling, providing travelers with an accurate personalized sleep service. Our research confirms the importance of certain individual factors such as sleep state at home and circadian rhythms on sleep quality in hotels. Given this, with permission from guests, some basic information such as sleep state at home and trip purpose could be measured by hotel front desks when checking in, allowing staff to recommend tailored hotel sleep services, such as sleep monitoring and personalized sleep coaches. Furthermore, hotels could offer a personalized sleep program provided by specialists to travelers. A sleep tracker prepared by hotel staff would determine bodily signals and sleep patterns of travelers, and a sleep expert would explain the data during a 30-minute consultation (Six Senses, 2018). After the assessment, physicians or sleep specialists would provide guests with a diagnosis and treatment of insomnia symptoms, a sleep screening test, and polysomnography (Canyon Ranch, 2018).

In line with previous research, this study confirms the significance of hotel environment on sleep quality. This study is also the first to report a positive relation between guests' overall satisfaction and sleep quality in hotels. As a basic neurobehavioral and physiological function, it is important to provide a high-quality sleeping environment and diet to enhance travelers' hotel experience. Hotels should guarantee comfortable mattresses, linens, and pillows. Depending on guests' requests, hotels may consider providing other amenities, such as pajamas, lavender oil, earplugs, eye masks, and calming herbal tea. With the development of intelligent technology, hotels might one day be able to equip guest rooms with intelligent climate control systems, so that guests can use digital sound insulation, distress pillows with automatic massage, or virtual indoor lighting in accordance with personal requirements.

For another, travelers should make a conscious effort to improve their sleep quality. This study emphasizes the significance of obtaining enough sleep for optimal performance

while traveling. Thus, travelers should ensure adequate sleep time. In addition, travelers should know their circadian rhythms or chronotype and use that knowledge to protect themselves from risk factors while traveling. Travelers can ask hotel employees to prepare what they need for sleep in advance or equip themselves with the appropriate sleep supplies. Travel purpose is significantly related to developing insomnia while staying in a hotel. Furthermore, business travelers should adjust their work arrangements according to their sleep habits and balance their work and relaxation as much as possible to experience better sleep and refresh their bodies.

Limitations and future prospects

This study was limited by a number of factors. First, we relied on self-reported data. Some respondents might obscure their responses or are prone to recall bias, leading to measurement errors, though the self-reported scale has a completed construct as well as scientific reliability and validity. Future studies can employ experimental research approaches to explore hotel sleep quality. Secondly, our survey was conducted during the summer vacation, which is a peak period for young Chinese travelers. Our initial sample was therefore mainly limited to young adults. Future research may collect data from a higher number of respondents across a wider range of ages. Third, since the factors influencing travelers' sleep quality are complex, other sleep-related elements (e.g., lifestyle) were not incorporated in this study. Future research can use hotel customer satisfaction as a mediator between emotions and sleep quality or capture the emotion of travelers or guests in the hotel by psychophysiological measurements, such as heart rate response and facial muscle activity. We recommend that future research continue collecting relevant data to broaden the scope of this study.

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