Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Understanding the influence of the perceived risk of the coronavirus disease (COVID-19) on the post-traumatic stress disorder and revisit intention of hotel guests

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ABSTRACT

This study examines consumers' perceived risks of COVID-19 to develop a solid theoretical framework that explains their behavioral intentions relating to COVID-19. It also explores the influence of four sub-factors of perceived risk relating to COVID-19 and the effects of post-traumatic stress disorder and revisit intention. This study finds that the perceived risk from COVID-19 and post-traumatic stress disorder have severely negative impacts on revisit intention for hotels, with emotion regulation ability found to play a moderating role in this process. Because hotels are used by a diverse group of people in terms of race, nationality, age, and culture, they can rapidly transit epidemics such as COVID-19. Therefore, hotel managers must identify the risks of COVID-19 as perceived by hotel guests, potential development of PTSD, and influence of such negative phenomena on guests' behavioral intentions to formulate a variety of strategies.

1. Introduction

The decrease in the number of international travelers in 2020 because of the outbreak of the coronavirus disease (COVID-19) will lead to losses ranging from $300 to $500 billion, with the Asia-Pacific region experiencing the most significant difficulties (UNWTO, 2020). Revenue passenger kilometers declined by 14.1% year-on-year as of February 2020, representing the worst performance since the September 11 attacks in 2001 (IATA, 2020). Demand and supply in the hotel industry are also being severely affected by COVID-19, and this sector is expected to be impacted further by the likely downturn in the global economy. For example, AccorHotels reported that more than half of its hotels worldwide have already ceased to operate (Hotel Management, 2020).

Outbreaks of pandemics such as COVID-19 are highly likely to change the perception and behavior of the hospitality and tourism industry consumers. Pine and McKercher (2004) reported that since the initial SARS outbreak in Hong Kong in 2002, the city experienced a 67.9% decrease in the number of inbound tourists, an 89.9% decline in the number of air passengers, and a 17% reduction in the average hotel occupancy rate as of May 2003. Joo et al. (2019) also reported figures regarding the performance of the tourism sector in Korea from June 2015 to June 2016. The study revealed that the MERS outbreak reduced the number of visitors to Korea by 2.1 million (16% of expected visitors during the period), which translated into approximately $2.6 billion in lost tourism revenue. Furthermore, the per capita tourism spending loss was assessed at between $2 billion and $3 billion. Such results indicate that disease outbreaks drive consumers to perceive various risks (e.g., physical, psychological, financial, temporal, and performance risks), which may lead to extremely passive and restrictive consumer behaviors. As such, the current period with the global COVID-19 outbreak is likely to induce hospitality and tourism industry consumers to perceive more risks, in addition to having a very negative impact on purchase behaviors.

This possibility of COVID-19 transmission may lead to a perceived risk for guests, and even manifest as post-traumatic stress disorder (PTSD). In particular, the perceived risk of COVID-19 for hotel guests can include the (1) physical risk of becoming infected with COVID-19, (2) psychological risk from the stress of possible infection, (3) financial risk, where the guest believes that he/she paid too much for a hotel providing limited services because of COVID-19, and (4) performance risk, where the performance of the products/services provided by the hotel is below the guest's expectations. Furthermore, the guest's

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perceived risk of COVID-19 may cause psychological stress, leading to mental disorders such as PTSD. Ultimately, this may mean hotels cannot retain guests or encourage revisits.

Based on the foregoing, in this study, we examine the influence of COVID-19 on the hotel industry to understand the severity and negative influences of COVID-19 on guests and develop strategies to overcome such difficulties. While many studies have researched the revisit intention of hotel guests and its importance continues to be emphasized (Han & Hyun, 2017; Jones et al., 2000; Kim et al., 2017; Scarpi et al., 2019), no studies have examined the perceived risk of hotel guests in the face of a new epidemic such as COVID-19 and its influence on the PTSD development and behavioral intentions of guests. Most studies have also focused on the negative impacts of COVID-19 and past pandemics (e.g., SARS and MERS) on the hospitality and tourism industry from the viewpoint of consumers' risk perception and restrictive purchase behaviors (Joo et al., 2019; Pine & McKercher, 2004; Shin & Kang, 2020; Yu et al., 2021). Such studies intensively discuss the negative impacts of COVID-19 on the overall hospitality industry. Meanwhile, the current study explores the negative impact on consumer behaviors through the framework of PTSD, employing a medical methodology. In doing so, the study expands the academic horizons of the relationship between COVID-19 and consumer behaviors from the previous social science approach to a new medical perspective. This represents a significant academic contribution and advances the study of hotel tourism. To bridge this gap in the literature, using a sample of 320 Korean respondents of an online survey, this study aims to (1) present the sub-factors of guests' perceived risk from COVID-19, (2) identify the relationship between COVID-19 and PTSD, (3) examine the influence of COVID-19 on revisit intention for hotels, and (4) verify the moderating role of emotion regulation ability in the relationship between COVID-19 and PTSD. Ultimately, a new theoretical framework on the influence of COVID-19 on the hotel industry is then developed and meaningful implications presented.

2. Literature review

2.1. Characteristics of COVID-19

Coronavirus, a large group of viruses first discovered in the 1960s, is classified into alpha coronavirus, beta coronavirus, gamma coronavirus, and delta coronavirus according to sequencing and antigenicity; among these, the alpha and beta groups contain the coronaviruses that affect humans (SARS-CoV [Severe Acute Respiratory Syndrome], MERS-CoV [Middle East Respiratory Syndrome], COVID-19) (Layqah & Eissa, 2019). Coronavirus can cause diseases such as the common cold as well as more severe diseases such as SARS-CoV, MERS-CoV, and COVID-19, the latter of which is a new disease never before found in humans (WHO, 2020a).

COVID-19 is a respiratory infection caused by a new type of coronavirus. After a latent period of 2–14 days, it leads to symptoms such as fever, coughing, difficulty breathing, respiratory problems, and pneumonia, and it rarely occurs as an asymptomatic infection (CDC, 2020). The majority of those infected with COVID-19 experience mild to severe respiratory symptoms and can recover without treatment (WHO, 2020c). However, the elderly and people with underlying medical conditions such as cardiovascular diseases, diabetes, chronic respiratory diseases, and cancer are likely to suffer serious complications (WHO, 2020c). Furthermore, patients may experience COVID-19-related stress including (1) headaches, indigestion, nausea and palpitations, (2) an inability to sleep, (3) anxiety and anger, and (4) remembering unwanted memories (KCDC, 2020). COVID-19 first appeared in China in 2019. As of April 1, 2020, 783,360 people had been infected in 206 regions worldwide, with 37,203 deaths (WHO, 2020d).

There are some rules to remember to prevent the spread of COVID-19. First, recommended behaviors include (1) washing hands with soap in running water, (2) covering one's mouth and nose with clothing when coughing or sneezing, (3) avoiding contact with people with symptoms, including fever and respiratory symptoms, (4) wearing masks, and (5) avoiding places with many people (WHO, 2020b). Ways to cope with the stress from COVID-19 in a healthy manner include (1) communicating with healthcare personnel and health center staff and trusting their guidance, (2) accepting stress as being normal, encouraging oneself and switching focus, (3) maintaining a positive mindset and carrying out positive activities, and (4) seeking expert help if severe symptoms continue for more than four weeks and are interfering with normal day-to-day routines (KCDC, 2020). However, while physical infections may be prevented through these preventative measures, it may be difficult to resolve psychological discomfort such as anxiety.

2.2. Perceived risk

Perceived risk has long been considered to be a key factor influencing consumers' decision-making and behavior (Han et al., 2019; Quintal et al., 2010; Stone & Gronhaug, 1993). It can be defined as the subjective belief that a loss may occur when seeking desirable results from a product or service (Pavlou & Gefen, 2004; Tseng & Wang, 2016). Furthermore, perceived risk can be seen as a variety of types of losses that may occur from the uncertainty associated with consumption (Quintal et al., 2010). Therefore, it can be described as the uncertainty of the outcome (Taylor, 1974). This study defines perceived risk as consumers' various perceptions of the uncertainties and negative results related to buying or selecting a product or service.

Perceived risk in consumer behavior can be classified into a number of components depending on the nature of the losses resulting from the transactions between firms and consumers (Quintal et al., 2010; Stone & Gronhaug, 1993). Stone and Gronhaug (1993) argued that perceived risk consists of economic, physical, functional, psychological, and social risks, whereas Quintal et al. (2010) asserted that perceived risk consists of performance, financial, convenience, psychological, and physical risks. Furthermore, Han et al. (2019) classified perceived risk into functional/performance, physical, psychological, and financial risks.

Given the similarity of the components of perceived risk, this study classifies it into four components: physical, psychological, financial, and performance risks. Of these components, physical risk is defined as the physical side effect or potential risk posed by the product/service on the physical health, well-being, and external parts of the consumer, whereas psychological risk refers to the psychological discomfort caused by the product/service to the mental well-being of the consumer (Quintal et al., 2010). Financial risk relates to the possibility of monetary losses occurring by purchasing the product/service and performance-related risk refers to the function or performance of the product not meeting the expectations of the consumer (Kurtz & Clow, 1997; Laroche et al., 2004). As consumers are more inclined to avoid risk than maximize utility, perceived risk is important for explaining consumers' purchase behavior. In particular, consumers perceive higher risks when there is an outbreak of new infectious diseases without clear treatments, such as COVID-19. In turn, a higher level of risk perception may result in the strong display of intent to avoid such risks (Addo et al., 2020).

2.3. PTSD

Many people suffer from mental problems after directly and indirectly experiencing terrible experiences (e.g., natural disasters, crimes, wars, epidemics). In some cases, they may experience extreme stress through persistent and severe impacts, and more serious cases may lead to PTSD. PTSD can occur in people who have experienced or witnessed traumatic events such as natural disasters, severe accidents, terrorist acts, wars, and sexual violence (Piotrowski & Range, 2019). PTSD began to be recognized as a mental disorder in the 1980s and is characterized by continuous symptoms associated with traumatic events such as intrusive dreams or memories, changes in mood, avoidance, reactivity, and arousal (Alaqeel et al., 2019). PTSD symptoms can occur in a week

to 30 years after the traumatic experience; 30% of cases recover on their own without treatment, but 40% of patients continue to experience symptoms (i.e., panic attacks, hallucinations, aggressive tendencies, impulse control disorders, depression, drug abuse, decreased concentration, and problems with cognitive functions) (Panagioti et al., 2015).

PTSD can be classified into four symptoms: intrusive thoughts, avoiding reminders, negative thoughts and feelings, and arousal and reactive symptoms; the severity of these symptoms may vary (Alaqeel et al., 2019; Lai et al., 2018; Panagioti et al., 2015; Piotrowski & Range, 2019). Intrusive thoughts refer to the intrusion of painful memories or emotions to the consciousness, resulting in feeling or acting as if the patient is experiencing the actual trauma, and are marked by physiological responses such as severe mental pain and sudden increases in heartbeat (Piotrowski & Range, 2019). Avoiding reminders relate to the avoidance of activities, places, and people that remind the patient of the trauma, leading patients to strive to avoid reminders of such memories, thoughts and emotions to avoid the stimuli associated with the trauma (APA, 2013; Pennington et al., 2018). Negative thoughts and feelings refer to negative changes in the perceptions and emotions relating to the traumatic incident; for example, patients may not remember important parts of the traumatic incident or blame themselves or others by distorting and accepting the cause or results of the trauma (APA, 2013; Pennington et al., 2018). Specific symptoms include hypersensitivity, irritability and anger, sleeping difficulties, and negative emotions such as guilt and shame; patients may also feel distanced or isolated from others, making it difficult for them to feel positive emotions such as happiness, satisfaction, and love (Alaqeel et al., 2019). Lastly, arousal and reactive symptoms relate to keeping alert, as if the patient is constantly in danger. This might lead to difficulties falling or staying asleep and concentrating, and is angered easily after severe trauma. Considering these issues, PTSD can be regarded as an important global public health problem that requires effective prevention and treatment (Lai et al., 2018). Therefore, based on existing research, this study divides the symptoms of PTSD into four types of intrusive thoughts, avoiding reminders, negative thoughts and feelings, and arousal and reactive symptoms.

2.4. Revisit intention

Retaining customers is a key concept for a firm's survival and long-term success because it is directly related to its profits (Chua et al., 2017; Kim et al., 2016; Reichheld & Teal, 1996). Particularly in today's highly competitive environment, retaining customers, or encouraging revisits by customers, is becoming more important. Jones et al. (2000) argued that retaining existing customers or raising the revisit rates of customers is more effective than finding new customers in terms of cost and time spent. Therefore, revisits by customers are an important factor for firms' profits (Scarpi et al., 2019). Given these positive effects, methods of encouraging revisits by customers have been studied in various fields (Han & Hyun, 2017; Kim et al., 2017). While customer retention is crucial to many firms, it is particularly important to the hotel industry, whose business cycle is entering maturity (Han & Hyun, 2017). For this reason, many studies have sought methods to induce revisits by hotel guests and many predictors of revisits have been identified. More specifically, Yu et al. (2021) stated that enhancing hotels' hygiene features perceived by the guests can induce them to revisit the hotels. Hassan and Soliman (2021) also argued that socially responsible behaviors regarding COVID-19 may positively affect tourists' intent to revisit hotels. As such, under the recent and ongoing COVID-19 pandemic, there is a need to research ways to improve guests' intent to revisit.

2.5. Impact of the perceived risk of COVID-19

Consumers perceive various types of risk due to the uncertainty associated with purchasing and consuming products and services. Hence, the consumer's level of perceived risk influences his/her decision-making process and purchase behavior (Hong, 2015; Laroche et al., 2004; Quintal et al., 2010). If the consumer's perceived risk is limited to the uncertainties associated with the product or service, the negative influence may also be limited. However, if consumers are aware of the risk of epidemics such as COVID-19, this may lead to more severe side effects (i.e., anxiety, depression, distrust, stress) when purchasing and consuming products and services. Reynolds and Seeger (2005) argued that when public health crises occur, consumers can become highly uncertain, leading to a variety of psychological problems when purchasing products and services. Park et al. (2018) argued that the direct or indirect exposure to the threat of epidemics such as MERS-CoV can lead to mental health problems as well as psychological problems such as anxiety, depression, and aggressiveness. Pointing to the MERS outbreak, Joo et al. (2019) argued that new infectious diseases cause consumers to perceive various risks to themselves (e.g., physical, psychological, financial, temporal, and performance risks), which may lead to extremely passive and restrictive consumer behaviors caused by psychological burdens. Lau et al. (2006) found that people in Hong Kong who experienced SARS-CoV were subject to high stress given the fact that they or their families could have been infected with the virus, and many displayed symptoms of PTSD afterward. Considering these arguments, the outbreak of epidemics such as COVID-19 may develop distrust among hotel guests, who may experience a variety of psychological issues (i.e., intrusive thoughts, avoiding reminders, negative thoughts and feelings, arousal and reactive symptoms). Therefore, this study proposes the following hypotheses:

Hypothesis 1. The perceived risk of COVID-19 has a positive influence on intrusive thoughts.

Hypothesis 2. The perceived risk of COVID-19 has a positive influence on avoiding reminders.

Hypothesis 3. The perceived risk of COVID-19 has a positive influence on negative thought and feelings.

Hypothesis 4. The perceived risk of COVID-19 has a positive influence on arousal and reactive symptoms.

2.6. Impact of PTSD

Studies of PTSD emphasize that its symptoms are severe, requiring treatment and management (Alaqeel et al., 2019; Lai et al., 2018; Panagioti et al., 2015). Piotrowski and Range (2019) explained that PTSD leads to the formation of intentions to avoid past experiences, as patients feel that the painful experiences of the past trauma are being experienced. Pennington et al. (2018) argued that going through experiences that can induce mental problems leads to the rejection of the experience; specifically, patients tend to avoid places and people relating to the traumatic experience. Alaqeel et al. (2019) asserted that PTSD may lead to negative emotions toward oneself, such as guilt and shame, when patients directly or indirectly experience trauma. In other words, negative emotions can manifest as regret for one's own experience, leading to lower possibilities of having the same experience again. In summary, these studies indicate that PTSD demonstrates strong tendencies to avoid traumatic incidents and experiences. It was also argued that the onset of infectious diseases such as COVID-19, without vaccines or effective treatments, could lead to the formation of acute or chronic post-traumatic stress disorder (PTSD) (Forte et al., 2020). In addition, it was argued that the COVID-19 pandemic is associated with PTSD symptoms such as mental anxiety, psychological distress, and sleep disorders (Wang et al., 2020). Therefore, with the outbreak of a pandemic or by experiencing PTSD through a traumatic experience such as COVID-19, the intention to stay at a hotel used by an unspecified number of customers of various races, nationalities, and ages can dramatically diminish. Therefore, the outbreak of epidemics such as COVID-19 and potential development of PTSD through such traumatic

experiences may lead to a rapid drop in the intention to use hotels. As such, this study proposes the following hypotheses:

Hypothesis 5. Intrusive thoughts have a negative effect on revisit intention.

Hypothesis 6. Avoiding reminders have a negative effect on revisit intention.

Hypothesis 7. Negative thought and feelings have a negative effect on revisit intention.

Hypothesis 8. Arousal and reactive symptoms have a negative effect on revisit intention.

2.7. Moderating role of emotion regulation ability

Researchers have emphasized the role of emotion regulation ability that relieves aggressive behavior and mental problems through logical and emotional coping (Denson et al., 2011; García-Sancho et al., 2017). Emotion regulation ability is defined as the ability to modify emotional states to facilitate adaptive behavior, and this may partially alleviate the development or exacerbation of mental problems (Gross & Thompson, 2006). Generally, emotion regulation ability plays an important role, as it strengthens adaptive ability in a variety of social situations. For example, those who lack the ability to regulate their own emotions may react aggressively to others with anger and hostile intentions in certain situations (Garía-Sancho et al., 2014). On the contrary, people with strong emotion regulation ability can better control their emotions and behaviors; as such, they are more social, more effective, and less aggressive (Brackett & Mayer, 2003). Therefore, emotion regulation ability is necessary for coping and managing one's and others' emotions.

Studies show that emotion regulation ability is a predictor of emotional responses and mediates psychological issues such as depression. Dejonckheere et al. (2018) confirmed that emotion regulation ability mediates the relationship between depressive symptoms and affective bipolarity. In other words, higher emotion regulation ability can alleviate negative emotions despite psychological disorders such as depression. Roy et al. (2018) researched the influence of chronic stress on the risks of cardiovascular disease and found that emotion regulation ability can help control one's own state or behavior in response to given situations or stress. In other words, chronic stress is more closely related to cardiovascular disease for people with poor emotion regulation ability. Therefore, emotion regulation ability plays an important role in preventing psychological disorders such as stress and depression. As such, this study proposes the following Hypothesis:

Hypothesis 9a-d. Emotion regulation ability plays a moderating role in the relationship between the perceived risk of COVID-19 and PTSD

2.8. Research model

Fig. 1 shows the research model proposed in this study, including the perceived risk of COVID-19, PTSD, revisit intention, and emotion regulation ability. Perceived risk is divided into physical, psychological, financial, and performance risks. The nine hypotheses presented in this study are included in the proposed theoretical framework.

3. Methods

3.1. Measurement instruments

To measure the variables used in this study, we modified valid survey items from existing research to match our purpose. All items were measured on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Furthermore, this study used multi-item questions to address the research question. Specifically, the survey comprised 12 items on perceived risk based on Quintal et al. (2010), three items on revisit intention based on Henning-Thuray (2004) and Oliver (2010), and four items on emotion regulation ability based on Mayer and Salovey (1993).

In addition, this study reviewed the literature to measure PTSD. A variety of scales to measure PTSD has been developed in the past 20 years, including the Impact of Event Scale (IES) of Horowitz et al.

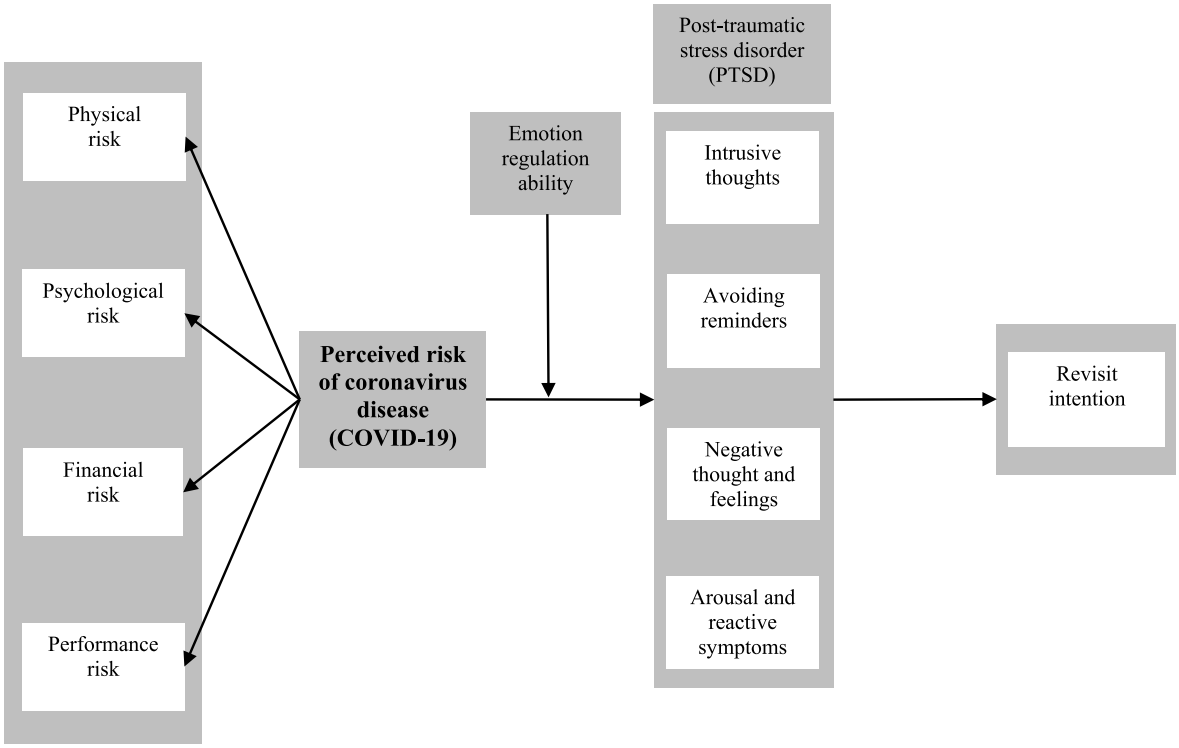

Fig. 1. Proposed conceptual model.

(1979). The IES was subsequently revised by Weiss and Marmar (1997), who increased it from the initial 15 questions to 22 questions. The reliability and validity of the IES-R, or the revised IES, have been confirmed by many researchers, and it remains the most commonly used today. Therefore, this study also used the 22 items on PTSD based on the IES-R. To revise and supplement the first version of the questionnaire, we conducted a pretest with researchers and practitioners in the hotel and tourism industry: three college professors in the field of hotel or tourism research and seven graduate students whose majors were in hotels and tourism. After conducting the pretest, the survey's contents were clearer and better understood, resulting in a more complete survey.

3.2. Data collection and sample characteristics

This study used an internet research agency to collect the data for the empirical analysis. Survey participants in Korea were randomly selected from the database of the survey company and recruited via email. The survey outlined the purpose of this study and stated that the data would not be used for non-research purposes as well as that participants' information would be kept confidential. The survey was also conducted on guests who have used hotel services (e.g., guest rooms, restaurants, spas, and fitness clubs, among others) since the COVID-19 outbreak started. Guests who have used hotel services were surveyed because the current study investigated hotel guests' perception of risk in using hotels occupied by various people during the COVID-19 outbreak, in addition to understanding the impact of the disease on the development of PTSD. The survey period lasted 10 days, and 327 samples were collected, of which seven were excluded as they were deemed unfit for the empirical analysis. As such, 320 samples were used for the analysis.

This study also investigated the demographic characteristics of survey participants. The results indicated that 52.8% were male and that most respondents were in their 20s or 30s. The age groups were as follows: 30% in their 20s, 42.5% in their 30s, 19.1% in their 40s, and 8.4% in their 50s. In terms of education level, 28.1% graduated from a professional college, 53.1% from university, and 18.8% were at graduate school or higher. The annual incomes of survey respondents, when converted into US dollars, were as follows: 28.4% below $40,000, 43.8% between $40,000 and $50,000, 17.8% between $50,000 and $70,000, and 10% over $70,000.

4. Results

4.1. Confirmatory factor analysis

Confirmatory factor analysis is the most useful method for verifying the reliability and validity of scales (Anderson & Gerbing, 1988). This study conducted a confirmatory factor analysis using maximum likelihood estimation to verify the reliability and validity of its scales. Table 1 presents the results. The goodness of fit of the measurement model was $\chi2 = 1593.844$, df = 734, $p < .001$, $\chi2/df = 2.171$, RMSEA = 0.061, CFI = 0.933, and TLI = 0.925, indicating that the model was statistically acceptable. The reliability of the measurement items was evaluated using standardized regression weights, and the results ranged from 0.736 to 0.966. Therefore, all the values were higher than the standardized regression weight criterion of 0.5, indicating that all the measurement items used in this study were reliable. Next, this study examined the average variance extracted (AVE) and composite reliability (CR) to confirm convergent validity and internal consistency. The AVE values ranged from 0.613 to 0.735 and the CR values ranged from 0.831 to 0.917. Therefore, as the AVE values were higher than 0.5 and the CR values were higher than 0.7, the internal consistency and convergent validity of the measurement variables were valid (Fornell & Larcker, 1981). Lastly, this study examined discriminant validity to verify the differentiation between the construct's concepts. If the AVE value is larger than the square of the correlation coefficients of the latent variables, discriminant validity is not an issue (Fornell & Larcker, 1981); in this study, the AVE values were higher than the square of the correlation coefficients of the presented variables, confirming discriminant validity between the variables.

4.2. Structural equation modeling

To verify the conceptual framework and validate the hypotheses, this study used the maximum likelihood method to build a structural equation model. As shown in Table 2 and Fig. 2, the goodness of fit of the model was excellent ($\chi2 = 1545.836$, df = 617, $p < .001$, $\chi2/df = 2.505$, RMSEA = 0.069, CFI = 0.915, and TLI = 0.908). Analyzing the second-order factor structure of perceived risk, the standardization coefficients of the four types of first-order factors were physical risk ($\beta = 0.795$), psychological risk ($\beta = 0.756$), financial risk ($\beta = 0.452$), and performance risk ($\beta = 0.731$), with all the associations statistically significant ($p < .01$). In addition, the R^2 values were 0.632 for physical risk, 0.571 for psychological risk, 0.204 for financial risk, and 0.535 for performance risk, indicating that they were appropriately explained by the

Table 1
Measurement model assessment and correlations.

	PHY	PSY	FIN	PER	IT	AR	NF	ARS	RI	ERA
PHY	1.000									
PSY	.626[a] (.391)[b]	1.000								
FIN	.534 (.285)	.423 (.178)	1.000							
PER	.665 (.442)	.593 (.351)	.545 (.297)	1.000						
IT	.682 (.465)	.638 (.407)	.449 (.201)	.648 (.419)	1.000					
AR	.685 (.469)	.666 (.443)	.440 (.193)	.606 (.367)	.688 (.473)	1.000				
NF	.679 (.461)	.649 (.421)	.449 (.201)	.630 (.396)	.691 (.477)	.629 (.395)	1.000			
ARS	.643 (.413)	.629 (.395)	.439 (.192)	.581 (.337)	.695 (.483)	.608 (.369)	.632 (.399)	1.000		
RI	-.636 (.404)	-.570 (.324)	-.394 (.155)	-.524 (.274)	-.686 (.470)	-.519 (.269)	-.509 (.259)	-.541 (.292)	1.000	
ERA	-.660 (.435)	-.573 (.328)	-.555 (.308)	-.523 (.273)	-.520 (.270)	-.445 (.198)	-.443 (.196)	-.426 (.181)	.507 (.257)	1.000
Mean	4.569	4.436	3.241	3.763	4.252	4.306	4.313	4.220	2.976	3.396
SD	1.700	1.617	1.034	1.286	1.245	1.133	1.146	1.178	1.605	1.472
CR	.893	.834	.831	.841	.906	.917	.895	.880	.854	.898
AVE	.735	.626	.621	.638	.618	.613	.631	.647	.661	.688

Note 1. PHY: physical risk, PSY: psychological risk, FIN: financial risk, PER: performance risk, IT: intrusive thoughts, AR: avoiding reminders, NF: negative thought and feeing, ARS: arousal and reactive symptoms, RI: revisit intention, ERA: emotion regulation ability.
Note 2. Goodness-of-fit statistics for the measurement model: $\chi^2 = 1593.844$, $df = 734$, $p < .001$, $\chi^2/df = 2.171$, RMSEA = 0.061, CFI = 0.933, TLI = 0.925.
[a] Correlations between the variables are below the diagonal.
[b] The squared correlations between the variables are within the parentheses.

Table 2
The structural model estimation.

Hypothesized paths			Coefficients	t-values
H1: PR	→	IT	.778	22.056**
H2: PR	→	AR	.766	21.249**
H3: PR	→	NF	.753	20.399**
H4: PR	→	ARS	.714	18.207**
H5: IT	→	RI	-.135	−1.437
H6: AR	→	RI	-.311	−2.971**
H7: NF	→	RI	-.056	-.542
H8: ARS	→	RI	-.299	−3.283**
Indirect effect: $\beta_{PR \rightarrow IT \& AR \& NF \& ARS \rightarrow RI} = -.865^{**}$	Explained variance:		R^2 (IT) = .532	
	R^2 (PHY) = .632		R^2 (AR) = .560	
	R^2 (PSY) = .571		R^2 (NF) = .531	
	R^2 (FIN) = .204		R^2 (ARS) = .553	
	R^2 (PER) = .535		R^2 (RI) = .577	

*p < .05, **p < .01.
Note 1. PR: perceived risk, PHY: physical risk, PSY: psychological risk, FIN: financial risk, PER: performance risk, IT: intrusive thoughts, AR: avoiding reminders, NF: negative thought and feeing, ARS: arousal and reactive symptoms, RI: revisit intention.
Note 2. Goodness-of-fit statistics for the structural model: $\chi^2 = 1545.836$, $df = 617$, $p < .001$, $\chi^2/df = 2.505$, RMSEA = 0.069, CFI = 0.915, TLI = 0.908.

higher-order structure.

The validation results of the nine hypotheses presented in this study follow. The perceived risk of COVID-19 was found to have a significant effect on PTSD. Specifically, among the sub-factors of PTSD, intrusive thoughts ($\beta = 0.778$, $p < .01$), avoiding reminders ($\beta = 0.766$, $p < .01$), negative thoughts and feelings ($\beta = 0.753$, $p < .01$), and arousal and reactive symptoms ($\beta = 0.714$, $p < .01$) all influenced PTSD. Therefore, H1–4 were accepted. Next, this study investigated the influence of PTSD on revisit intention. The results indicated that avoiding reminders (β = -.311, $p < .01$) and arousal and reactive symptoms (β = -.299, $p < .01$) had a significant influence on revisit intention. Therefore, H6 and H8 were accepted. However, intrusive thoughts (β = -.135, $p > .01$) and negative thoughts and feelings (β = -.056, $p > .01$) did not have a significant influence on revisit intention. Therefore, H5 and H7 were rejected. To help understand the complex relationships found in this research, this study used bootstrapping to verify the indirect effects between each variable. We found that the perceived risk of COVID-19 had a significant indirect effect on revisit intention ($\beta_{\text{perceived risk of COVID-19 – intrusive thoughts \& avoiding reminders \& negative thoughts and feelings \& arousal and reactive symptoms – revisit intention}}$=-.865, $p < .01$), proving the moderating role of PTSD under the theoretical framework of this study.

4.3. Structural invariance model assessment

This study also conducted an invariance test on the structural equation model to verify the moderating effects of emotion regulation ability in the relationship between the perceived risk of COVID-19 and PTSD. To analyze the moderating effect, H9a–d were tested by dividing the 320 participants into two groups: high emotional regulation ability (119 people) and low emotional regulation ability (201 people). First, this study verified the moderating effect of emotional regulation ability in the relationships between the perceived risk of COVID-19 and intrusive thoughts, avoiding reminders, negative thoughts and feelings, and arousal and reactive symptoms. The results were as follows: intrusive thoughts ($\triangle \chi^2(1) = 5.085$, $p < .05$), avoiding reminders ($\triangle \chi^2(1) = 0.842$, $p > .05$), negative thoughts and feelings ($\triangle \chi^2(1) = 1.276$, $p > .05$), and arousal and reactive symptoms ($\triangle \chi^2(1) = 0.418$, $p > .05$). Therefore, H9a was accepted and H9b–d were rejected. These results are meaningful, as they indicate that each of the proposed relationships differs depending on emotion regulation ability. Table 3 and Fig. 2 show the detailed results.

5. Discussion

A quantitative methodology was used based on survey data collected from 320 Korean respondents and the measurement items were found to have suitable reliability and validity. Furthermore, the verification of the structural equation model indicated that the conceptual framework presented in this study satisfactorily explained the perceived risk of COVID-19 on the development of PTSD in hotel guests and their revisit intention. In addition, the perceived risk of COVID-19 was satisfactorily reflected in the higher-order framework, revealing the important mediating effect of PTSD. This study also confirmed the partial moderating effect of emotion regulation ability in the relationship between the perceived risk of COVID-19 and PTSD. Therefore, the results of this study confirm the grave negative effects of COVID-19 on the hotel industry as well as the need for its prevention and active management.

Many studies have emphasized the characteristics and risks of SARS-CoV and MERS-CoV, which are caused by coronavirus as is COVID-19 (Lau et al., 2006; Layqah & Eissa, 2019; Park et al., 2018; Reynolds & Seeger, 2005). However, most have focused on the risks associated with healthcare. Furthermore, the majority of these studies focus on the infection of hospital staff directly involved in the treatment and management of patients infected with coronavirus and the resulting psychological stress. Therefore, it is necessary to research the influence of COVID-19 on consumers, particularly the behavioral intentions of guests who use hotels, the gap in the literature that this study bridges. This study found that the four sub-factors of the perceived risk of COVID-19 (physical risk, psychological risk, financial risk, and performance risk) are excellent predictors of PTSD and revisit intention. Furthermore, the higher-order structure confirmed in this study is important and practical. Of the perceived risks of COVID-19, the strongest of the first-order dimensions is physical risk. These findings indicate that hotel users are the most exposed to the physical risk of being infected with COVID-19 because such facilities are used by many people of a different race, nationality, age, and culture. The second strongest first-order dimension is psychological risk, suggesting that the COVID-19 outbreak is leading to extreme psychological pressure and stress given the high possibility of transmission. The third strongest first-order dimension is performance risk. Using hotels during the COVID-19 outbreak may render active servicing impossible due to the disease's code of conduct (e.g., mask-wearing by hotel staff and social distancing). The final first-order dimension was financial risk: as consumers cannot experience the diversity of products or services comparable to the prices they paid, they may begin to feel that they overpaid.

The findings of the empirical analysis provide important implications for researchers and practitioners in the hotel industry. Revisits by guests are critical for the survival of hotels. Because hotels are used by a diverse group of people in terms of race, nationality, age, and culture, they can rapidly transit epidemics such as COVID-19. Therefore, hotel managers must identify the risks of COVID-19 as perceived by hotel guests, potential development of PTSD, and influence of such negative phenomena on guests' behavioral intentions to formulate a variety of strategies. Specifically, to encourage revisits, hotel managers must understand what guests believe to be the riskiest aspect in the face of the COVID-19 outbreak and minimize these risks. As we show that guests perceive physical risk the most strongly, hotel managers must disinfect all facilities with which customers may directly or indirectly come into contact as they use the hotel and employ chemicals that can kill viruses. Furthermore, it is important to engage professional cleaning agencies that use specialized chemicals and disinfection techniques.

Hotel managers also need to strictly maintain staff hygiene and the cleanliness of office equipment (i.e., computers, printers, desks). Specifically, staff must wear a mask when serving customers during the COVID-19 outbreak and wash their hands frequently with hand

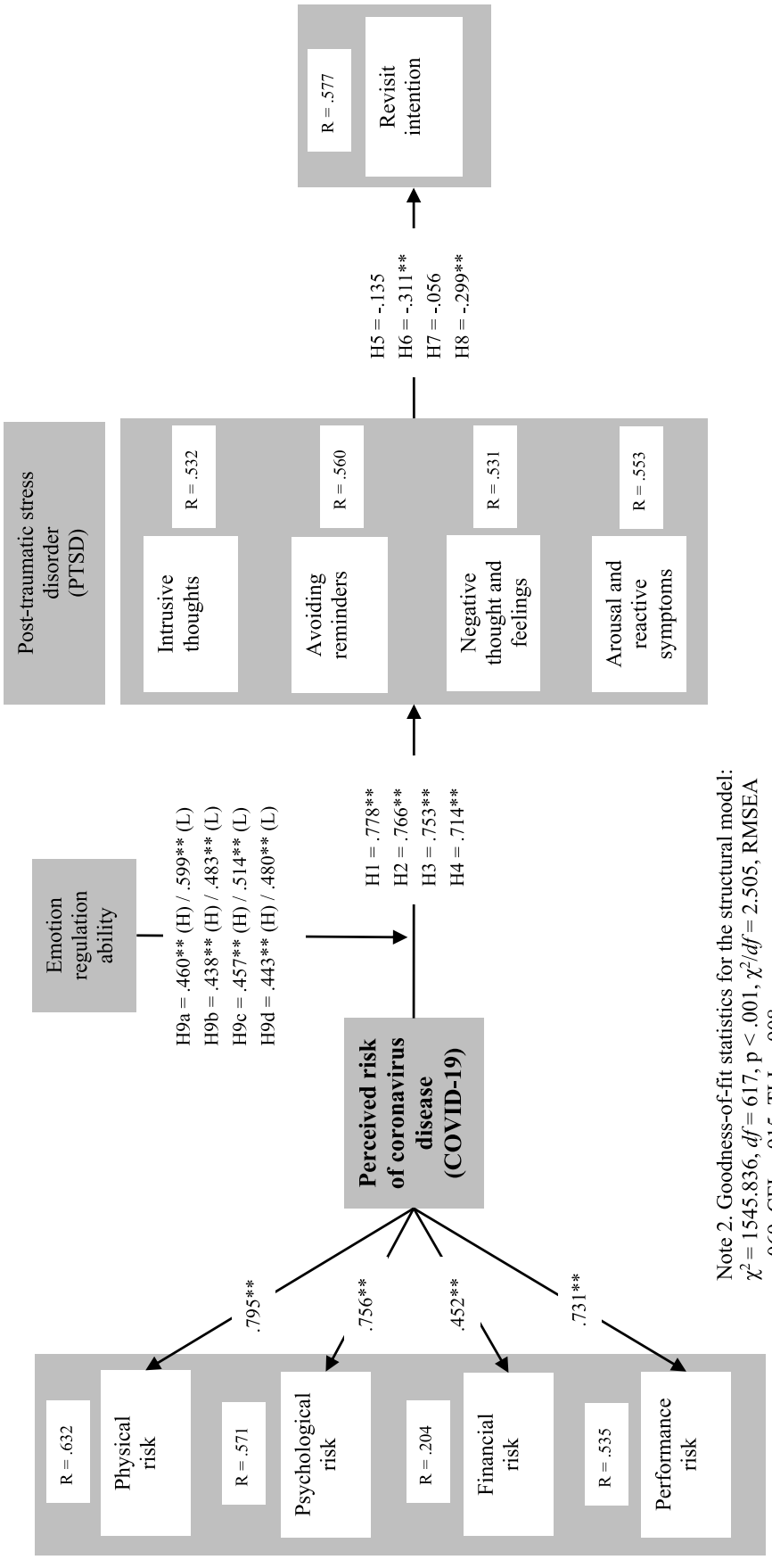

Fig. 2. Proposed conceptual model
Note 2. Goodness-of-fit statistics for the structural model: $\chi^2 = 1545.836$, $df = 617$, $p < .001$, $\chi^2/df = 2.505$, RMSEA = 0.069, CFI = 0.915, TLI = 0.908.

Table 3
Results of the invariance tests for structural models.

Paths	High ERA (n = 119)		Low ERA (n = 201)		Baseline Model(Freely estimated)	Nested Model (Constrained to be equal)
	β	t-values	β	t-values		
H9a: PR → IT	.460	9.198**	.599	10.136**	χ^2 (1265) = 2763.308	χ^2 (1266) = 2768.391[a]
H9b: PR → AR	.438	8.535**	.483	9.599**	χ^2 (1265) = 2763.308	χ^2 (1266) = 2764.150[b]
H9c: PR → NF	.457	8.807**	.514	9.674**	χ^2 (1265) = 2763.308	χ^2 (1266) = 2764.584[c]
H9d: PR → ARS	.443	8.718**	.480	9.552**	χ^2 (1265) = 2763.308	χ^2 (1266) = 2763.726[d]
Chi-square test:	Hypotheses testing:			Goodness-of-fit statistics for the baseline model:		
[a] $\Delta\chi^2$ (1) = 5.085, p < .05	H9a: Supported			χ^2 = 2763.308, *df* = 1265 p < .01, χ^2/df = 2.184,		
[b] $\Delta\chi^2$ (1) = .842, p > .05	H9b: Not supported			RMSEA = .061, CFI = .917, NFI = .918, TLI = .907		
[c] $\Delta\chi^2$ (1) = 1.276, p > .05	H9c: Not supported			*p < .05, **p < .01		
[d] $\Delta\chi^2$ (1) = .418, p > .05	H9d: Not supported					

Note 1. PR: perceived risk, PHY: physical risk, PSY: psychological risk, FIN: financial risk, PER: performance risk, IT: intrusive thoughts, AR: avoiding reminders, NF: negative thought and feeing, ARS: arousal and reactive symptoms, RI: revisit intention.

sanitizers. Office equipment frequently used by staff must be disinfected regularly to protect against viruses. Furthermore, staff must refrain from team dinners and meetings and practice social distancing. To maintain customer satisfaction, hotel managers should ensure that guests are aware of the special situation created by COVID-19 and offer various promotions (i.e., room discounts, free upgrades, bonus mileage accruals). Such efforts by the hotel are critical to retain guests and encourage them to revisit during these difficult times created by COVID-19.

Despite the meaningful findings presented in this study, it has some limitations. First, this study did not consider how consumers' demographic characteristics affect their perceptions of the risk of COVID-19. Therefore, follow-up studies would be more meaningful if demographic characteristics could be considered. Second, as this study was limited to exploring the perceived risk of COVID-19 in the hotel industry, the theoretical framework presented herein would need to be revised when applied by researchers in other environments. Lastly, the sample of this study consisted of Korean citizens, which limits the generalization of the findings to other countries and cultures. Therefore, follow-up research should expand respondents to include people from more diverse countries and cultures.

6. Conclusion

With new epidemics such as COVID-19 on the rise, the influence of COVID-19 on the hotel industry is a significant issue. Furthermore, the relationship between COVID-19 as a social phenomenon and the development of PTSD in guests is an important research topic in the hotel industry. However, no research has examined the influence of COVID-19 on the hotel industry and the development of PTSD. Therefore, this study examined the extent to which the risk perceived by hotel guests from the COVID-19 outbreak is influencing the development of PTSD and guests' revisit intention. Specifically, it divided the perceived risk of COVID-19 into four factors and confirmed the moderating effect of emotion regulation ability in the relationship between COVID-19 and PTSD, thereby helping explain the influence of the perceived risk of COVID-19 on PTSD and revisit intention in the hotel industry.

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