Hospitality workers' COVID-19 risk perception and depression: A contingent model based on transactional theory of stress model

Jiaqi Yan [a], Sunghoon Kim [b], Stephen X. Zhang [c],[*], Maw-Der Foo [d], Aldo Alvarez-Risco [e], Shyla Del-Aguila-Arcentales [f], Jaime A. Yáñez [g],[h]

[a] *School of Business Administration, Northeastern University, China*
[b] *Business School, The University of Sydney, Australia*
[c] *Faculty of Professions, The University of Adelaide, Australia*
[d] *Nanyang Business School, Nanyang Technological University, Singapore*
[e] *Universidad de Lima, Peru*
[f] *Escuela Nacional de Marina Mercante "Almirante Miguel Grau", Peru*
[g] *Universidad Peruana de Ciencias Aplicada, Peru*
[h] *Teoma Global, Peru*

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ABSTRACT

The hospitality industry worldwide is suffering under the COVID-19 pandemic. Drawing on the transactional theory of stress and coping, this study aims to investigate when hospitality workers' COVID-19 risk perception affects their likelihood of having depressive symptoms. Using data from 211 hospitality workers in 76 hotels in Peru, we examined the effects of perceived COVID-19 risk on the likelihood of experiencing depressive symptoms. We posited that this relationship is moderated by the workers' environment at work (job satisfaction) and at home (the number of children). The results indicate that job satisfaction weakens the link between hospitality workers' COVID-19 risk perception and their likelihood of depressive symptoms while the number of children exacerbates this link. We discuss the implications of our findings for research on COVID-19 risk perception and offer practical implications for hospitality workers under COVID-19 crisis.

1. Introduction

The hospitality workers are facing extremely challenging times as countries around the world restrict travel and prohibit social gatherings to slow the spread of COVID-19. This unprecedented disruption threatens the mental health of hospitality workers by increasing their worries on health and job prospects (e.g., Alonso et al., 2020; Filimonau et al., 2020). This study explores under what situations hospitality workers are more or less likely to experience depressive symptoms during the COVID-19 pandemic. We draw on the transactional theory of stress and coping that considers acute and chronic stress outcomes as the result of individuals' cognitive appraisals of the situation (Bliese et al., 2017; Lazarus, 1968; Lazarus and Folkman, 1984). We hypothesized that hospitality workers' perceived risk of COVID-19 increases the

likelihood of depressive symptoms, moderated by the workers' environment at work (job satisfaction) and at home (parental obligation).

It has been reported that working adults, especially hospitality workers, are enduring mental health challenges including anxiety, depression, loneliness, and compulsive behavior amidst the COVID-19 pandemic (Murray, 2020; Zhang et al., 2020a). Still, not all hospitality workers perceive the same level of risk in the COVID-19 pandemic, and risk perception reflects "a subjective judgement that people normally do about the characteristics and severity of a risk" (Spencer, 2016, p. 3). Individuals' perception of the COVID-19 risk tends to weigh heavily on depression symptoms (Ding et al., 2020; Georgiou et al., 2020) to affect their likelihood of depressive symptoms and behaviors regardless of the actual risks (Birch et al., 2018; Qin et al., 2020). For instance, even within the same country, such as Peru, some individuals are very
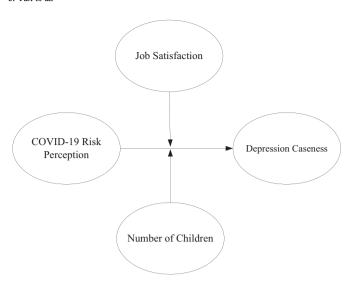
Fig. 1. The theoretical model with two coping strategies.

concerned about the risks of contracting COVID-19 while others are sanguine about contracting it (Caycho-Rodríguez et al., 2021; Quispe-Cañari et al., 2021; Yáñez et al., 2020). Research has shown that perceived risk has significant associations with distress, sleep disturbances, and anxiety (e.g., Casagrande et al., 2020). These findings suggest individuals' perceived risk is a major concern in the COVID-19 pandemic. To date, however, the literature has not investigated whether individuals' COVID-19 risk perception is associated with their likelihood of experiencing depressive symptoms, which are highly prevalent in the ongoing pandemic (Dai et al., 2020). Specifically, the current literature is limited in examining when individual hospitality workers' perceived COVID-19 risk can predict their likelihood of experiencing depressive symptoms. This question is important because, when faced with a stressor, appraisal of that stressor in terms of ability to cope determines stress levels (Biggs et al., 2017). Biggs et al. (2017) posit that no single coping strategy is inherently effective or ineffective. The effectiveness of a given coping strategy is dependent on how well the coping strategy corresponds with appraisals and situational conditions. Thus, it is critical to investigate the effect of individuals' COVID-19 risk perception in conjunction with the key factors that can influence their appraisals of coping ability.

We study the boundary conditions on the effects of hospitality workers' COVID-19 risk perception on their likelihood of experiencing depressive symptoms based on the transactional theory of stress and coping as a theoretical framework (Bliese et al., 2017; Lazarus, 1968; Lazarus and Folkman, 1984). The transactional theory of stress and coping offers a suitable theoretical framework because it specifically emphasizes that "it is the perception that the event is stressful, rather than the event itself, that determines whether coping strategies are initiated and whether the stressor is ultimately resolved" (Biggs et al., 2017, p. 352), in accordance with our focus on individual hospitality workers' risk perception. Drawing on the transactional theory of stress and coping, we reason that hospitality workers who perceive high COVID-19 risk are likely to view the COVID-19 pandemic as a threat, depleting their psychological resources such that they could be more depressed. More importantly, we propose the relationship between hospitality workers' COVID-19 risk perception and their likelihood of experiencing depressive symptoms is moderated by their environment at work (job satisfaction) and at home (the number of children).

Job satisfaction reflects individual workers' cognitive evaluation of the quality of their jobs (Steel et al., 2019) and is a key job-specific factor in the cognitive appraisal process (Hu and Cheng, 2010). Job satisfaction is also regarded as a pivotal indicator in hospitality and contributes to maintaining high job performance and providing good service to

increase productivity in the hospitality service (Cheng and Yi, 2018; Gunlu et al., 2010). We posit that high job satisfaction can help hospitality workers to buffer the negative effect of their COVID-19 risk perception because job satisfaction serves as a psychological protection resource to avoid negative consequences of stress (Satuf et al., 2018; Visser et al., 2003). Employees with high job satisfaction have higher tolerance (Kollmann et al., 2020) to changes in adverse work environments. We also study the number of children as a contingency factor at home. One key aspect of COVID-19 is that the restrictions on travel and social gatherings are adversely affecting the hospitality industry, resulting in economic uncertainty for hospitality workers. This financial uncertainty is especially dire for workers with more parental responsibilities to provide for their children. The overall theoretical model is presented in Fig. 1.

We contribute to the hospitality management literature that is in urgent need of knowledge to help hospitality workers to better manage their lives during the prolonged COVID-19 pandemic. We also advance the workplace stress literature by investigating whether hospitality workers' perceived risk of infectious diseases can affect the likelihood of experiencing depressive symptoms. We also developed a scale to measure COVID-19 risk perception by adapting from a scale to measure perceived risk in the Middle East Respiratory Syndrome (MERS) epidemic. Our newly adapted scale can be employed in future research and intervention efforts regarding hospitality workers' perceived COVID-19 risk and actions to cope with it. In addition, we advance the job satisfaction literature by offering more focused consideration of the buffering role of job satisfaction in the stress-coping process and the role of children in aggravating this process.

2. Theory and hypothesis

2.1. Stress and mental health in the hospitality industry

Employees' stress and mental health represent important concerns in the hospitality industry (Teoh et al., 2019). Scholars have noted that hospitality workers often experience emotional distress due to the precariousness of their work, abusive customer behaviors, and work–family issues (Cheng and Yi, 2018). First, hospitality workers are often stressed by the precariousness of their work. Unfortunately, the hospitality industry has unskilled, low-paying, and insecure jobs with dire employment conditions (Kusluvan et al., 2010). Hospitality workers are reported to experience frequent workplace bullying (Ariza-Montes et al., 2017), endure long and irregular work hours (Tromp and Blomme, 2012), bear heavy workloads (Mansour and Tremblay, 2018), and suffer from a high level of job insecurity (Wang and Xie, 2020). Such poor employment conditions may cause hospitality workers to experience anxiety and depression. Second, hospitality workers can face abusive customer behaviors. Hospitality workers are expected to satisfy customers, even customers that behave badly (Boukis et al., 2020). Studies have found that customer incivility (Han et al., 2016), aggression (Kim et al., 2014) and deviance (Reynolds and Harris, 2006) cause stress among hospitality workers. Third, work–family issues can also distress hospitality workers. Studies suggest that hospitality workers find it difficult to balance work and family responsibilities due to their long and irregular working hours that constrain personal and family time (e.g., Xu et al., 2020; Zhao, 2016). The difficult-to-balance work–family relationship can cause hospitality workers to experience anxiety (Vanderpool and Way, 2013), depression (Zhao, 2016), exhaustion (Zhao et al., 2014) and burnout (Mansour and Tremblay, 2018). As a result, hospitality workers feel less competent (Kong, 2013), less successful (Kong et al., 2018) and more likely to leave their jobs (Park and Min, 2020), which represents a key threat to the hospitality industry (Darvishmotevali and Ali, 2020).

Given the prevalence of stress in the hospitality industry, scholars are concerned about the conditions under which hospitality workers are more or less successful in coping with their stressors. For instance,

researchers have identified the importance of job-related factors such as job control (Lee and Ravichandran, 2019), autonomy (Amran et al., 2019), the relationship with coworkers (Ariza-Montes et al., 2018), and job crafting (Cheng and Yi, 2018) in coping with stress. Studies have also identified the critical role of psychological resources of individual hospitality workers. Evidence suggests that hospitality workers with emotional regulation strategies such as feeling alignment, self-control, empathy, and diversion can better cope with stressful situations (Cheng and Yi, 2018; Teoh et al., 2019).

Lacking in the literature on stress in the hospitality industry is workers' stress experiences and their response under major crisis situations, exemplified by but not limited to the COVID-19 pandemic. With increasing frequency, the hospitality industry around the world is experiencing large-scale shocks that result in many workers facing highly stressful situations. Shocks can arise from natural disasters. For instance, the eruption of a volcano in 2017 had a damaging effect on the Indonesian tourism industry (BBC News, 2017). Large-scale shocks and uncertainty can also come about due to socio-political events. Terrorism incidents in the Middle East (Kim and Sandler, 2020) and political unrests in South America (Sofia Ortega, 2017) caused the tourism industry and hospitality workers in those regions to experience difficult times. Another source of large-scale shock to the tourism industry is infectious diseases. The 2003 outbreak of SARS substantially reduced tourism in Hong Kong, Singapore, and China (Madden, 2003). In 2009, the H1N1 outbreak caused significant losses to the Mexican tourism industry. In 2015, the MERS outbreak reached South Korea and its tourism industry suffered a USD 3 billion loss (Joo et al., 2019). In this study, we examine hospitality workers' risk perception and mental health under an unprecedented crisis of the COVID-19 pandemic.

2.2. Perceived COVID-19 risk and the likelihood of experiencing depressive symptoms of hospitality workers

Perceived risk (i.e., the individual's belief in potential harm) has been a major scholarly concern as it has significant ramifications on health behaviors (Brewer et al., 2007), disaster response activities (Sullivan-Wiley and Gianotti, 2017), organizational decision-making (Sitkin and Pablo, 1992), and consumer behaviors (Chang, 2011). Understanding individuals' perceived risk is critical because it is a key antecedent of their mental health regardless of the actual risks (Pizam et al., 2004; Qin et al., 2020). Risk perception, by involving subjectively evaluated likelihood, is distinct from real risks. Real risks involve statistical calculations of probability of an event while risk perception is susceptible to cognitive biases including available heuristic or social-psychological factors such as their social networks (Sullivan-Wiley and Gianotti, 2017; Zhang and Cueto, 2017). This subjective nature of risk perceptions explains why different individuals respond differently even to the same source of risk (Hardy et al., 2020).

The perceived risk arisen from infectious diseases, however, is a relatively new research topic. Studies have examined how people perceived and reacted to the recent outbreaks of SARS (Cava et al., 2005), the MERS pandemic (Kim and Choi 2016; Yang and Cho, 2017), and the Ebola outbreak (Prati and Pietrantoni, 2016; Yang, 2016). The literature urgently needs research on the perceived risks of COVID-19 (Huynh, 2020). Regional and temporal variations of COVID-19 infection rates and the diversity in public health response may contribute to the variance of COVID-19 risk perception. In some societies, the perceived risk of COVID-19 may diverge depending on political ideologies, as exemplified by the situation in the United States (Macias, 2016). Just like the politicians and policymakers who react vastly differently to COVID-19 threat, not all working adults perceive the same level of risk from COVID-19 – while some perceive a high risk, others are more sanguine about it. With this backdrop, our study focuses on how hospitality workers' COVID-19 risk perception may lead to their likelihood of experiencing depressive symptoms.

The relationship between individuals' perceived COVID-19 risk and

their likelihood of experiencing depressive symptoms can be explained by the transactional theory of stress and coping, a well-established view in workplace stress research (Bliese et al., 2017; Lazarus, 1968; Lazarus and Folkman, 1984). The transactional theory builds on the insight that individuals' stress arises in the process of a 'transaction' between a person and the environment. It emphasizes the role of individuals' cognitive appraisal about the situation as the driver of their stress reactions. When facing potential stressors, the theory suggests individuals undertake a series of cognitive appraisals. The initial and primary appraising involves the judgement whether the potential stressor can be regarded as harmful, threatening, or challenging. The appraisal of a stressful situation is contingent upon individual and environmental factors. The primary appraising is based on how benign, threatening, harmful, or challenging the stressful situation is deemed by the individual (Dillard, 2019). A secondary appraising, based on coping self-efficacy, is the result of the degree to which an individual feels capable of dealing with the threat, harm, or challenge (Dillard, 2019).

An important insight of transactional theory of stress is that the same environmental stimulus such as COVID-19 may engender different reactions from different individuals depending on how individuals assess and cope with it. In the face of COVID-19 pandemic, individuals are to undertake an appraisal of the situation and formulate personal judgements on how much a risk the COVID-19 pandemic is to them. Workers perceive a high COVID-19 risk when they believe that the possibility of contracting COVID-19 is not trivial. Workers may also perceive a high level of COVID-19 risk depending on their belief on the severity of COVID-19 on their physical health. Individuals would vary in their level of knowledge and understanding about the contagiousness and health risk of COVID-19 (Elhadi et al., 2020; Riguzzi and Gashi, 2021; Serwaa et al., 2020; Shiina et al., 2021). Some individuals may draw on their religious faith and spirituality in formulating their risk assessment of contracting and being inflicted by COVID-19 (Hamilton et al., 2021; Kowalczyk et al., 2020; Pirutinsky et al., 2021). There could be individuals who have developed robust cognitive and emotional stress coping strategies of their own, and therefore they are less likely to evaluate COVID-19 pandemic as a source of risk (Majd Ara et al., 2017; Jin et al., 2008). Such variance in cognitive appraisal of COVID-19 situation, according to transactional theory of stress, will lead to differing stress responses and can affect the chances for individuals to develop depressions. Therefore, we hypothesize that hospitality workers' COVID-19 risk perception would affect their likelihood of experiencing depressive symptoms.

Hypothesis 1. : *Hospitality workers' COVID-19 risk perception is positively associated with their likelihood of experiencing depressive symptoms.*

2.3. Job satisfaction as a work-domain contingency factor on the relationship between individuals' perceived COVID-19 risk and depression

We next propose that the relationship between hospitality workers' perceived COVID-19 risk and their likelihood of experiencing depressive symptoms is moderated by their workplace experiences based on the transactional theory of stress and coping. This theory proposes that the consequence of a primary appraisal of risk factors is contingent upon a secondary appraisal process that is subject to individuals' stress coping strategies. This theory led us to posit that the consequence of a stressor appraisal (in this case, the impact of perceived COVID-19 risks on likelihood of experiencing depressive symptoms) is moderated by individuals' capacity to cope with the perceived stressor. Therefore, if hospitality workers are situated in a workplace environment that provides them with psychological resources to cope with stressors, the perceived risk of pandemic is less likely to translate into mental health problems.

We focus on hospitality workers' job satisfaction as a work domain psychological resource. Job satisfaction represents workers' positive emotions that emanate from a retrospective evaluation of their

experiences at the job (Hewagama et al., 2019). Studies indicate that job satisfaction is a critical psychological resource for workers to prevent burnout and get through the COVID-19 pandemic (Zhang et al., 2020a, 2020b). Indeed, job satisfaction has been regarded as a protection resource to avoid negative consequences of stress (Satuf et al., 2018; Visser et al., 2003). Job satisfaction as a resource helps workers to feel less pessimistic and less tired (Steel et al., 2019) and even have higher tolerance (Kollmann et al., 2020) to changes in their work environment, such as being suspended from work and salary reductions.

In particular, job satisfaction as a resource can serve as a coping strategy to mitigate the effect of stress (Hu and Cheng, 2010). Visser et al. (2003) suggest that workers with high stress and low job satisfaction have low energy and negative mental health effects, but high job satisfaction protects the worker against the negative consequences of stressors. Similarly, according to the transactional theory of stress and coping, job satisfaction can be seen as an emotion-focused protection resource positively affecting cognitive appraisals of ability to cope and subsequently protecting against negative mental health outcomes (Hu and Cheng, 2010). Thus, we hypothesize that job satisfaction weakens the relationship between risk perception and likelihood of experiencing depressive symptoms.

Hypothesis 2. : *Hospitality workers' job satisfaction weakens the positive relationship between their COVID-19 risk perception and likelihood of experiencing depressive symptoms.*

2.4. Family responsibility as a family-domain contingency factor on the relationship between individuals' perceived COVID-19 risk and depression

The transactional theory of stress and coping suggests that workers with a high level of COVID-19 risk perception could be vulnerable to depression when they are unable to effectively cope with the stressor. As a factor that could undermine hospitality workers' capacity to cope with stress, we examine the demand of family responsibility as a family-domain contingency factor. We specifically focused on the number of children as a key resource-specific factor in terms of working adults' family responsibility.

The demands of child caring responsibilities could exacerbate the impact of hospitality workers' COVID-19 risk perception on their likelihood of experiencing depression by depleting psychological resources. The transactional theory of stress and coping indicates that stress is a result of the conditions that exceed the perception of available personal resources (Sessions et al., 2020). In line with this emphasis on personal psychological resources, workers with children are likely to experience the depletion of psychological resources to use to cope with additional stress factors during the COVID-19 pandemic.

Due to public health policies to curb the transmission of COVID-19, many schools were closed for an extended period of time, requiring children to study from home. This disrupted family routines and increased the burden of parenting at home. Due to social distancing measures, parents face difficulty in finding alternative care-givers for their children such as grandparents, kinship group members and childcare services (Shahid et al., 2020). Workers have to take care of their children themselves, which further increases the mental pressure introduced by the perception of COVID-19 risk. Parenting during the COVID-19 pandemic is emotionally and physically challenging. Such mental pressure represents a psychological resource loss. During the secondary appraisal, the psychological resource loss will also interact with perceived COVID-19 risk, and possibly lead to depressive symptoms. Hence, having children could potentially aggravate the negative effect of COVID-19 risk perception because the added childcare responsibility could result in appraisals that they are uncertain of their capability to cope with the new situation (Vaziri et al., 2020).

In addition, family obligations may have economic implications affecting how individuals appraise their ability to cope with stress factors. The transactional theory of stress and coping suggests that good economic conditions may allow individuals to come up with strategies not to consider the stress factor as a threat (Ben-Zur, 2019). However, poor economic conditions would exacerbate the negative assessment of stress factors, and thereby tighten the link between a stress-inducing event and stress responses (Ben-Zur, 2019). Workers with parenting obligations are under heavier economic pressure as they need stable sources of income to provide for their children and place a high value on job security (Fegert et al., 2020). High economic pressure leads to increased negative feelings toward perceived COVID-19 risk (Trougakos et al., 2020), especially that the COVID-19 pandemic has caused many job losses and reduced work hours resulting in economic hardship for many hospitality workers (Probst et al., 2020).

Considering both increased parenting and economic demands, we hypothesize that workers' number of children strengthens the relationship between their COVID-19 risk perception and likelihood of experiencing depressive symptoms.

Hypothesis 3. : *Hospitality workers' number of children strengthens the positive relationship between their COVID-19 risk perception and likelihood of experiencing depressive symptoms.*

3. Method

3.1. Setting

Our empirical setting is the hospitality industry in Peru for several reasons. First Hospitality is the third-largest source of foreign exchange in Peru after mining and agriculture. Second, Peru is among the top 20 countries in the world with more COVID-19 cases despite the restrictive measures imposed (Alvarez-Risco et al., 2020). It has been reported that Peru's economy contracted by more than 40% on a year-on-year basis in April 2020, the worst-ever percentage drop in the country's history (BBC News, 2020). Third, being a developing country, the healthcare system in Peru is stretched. The country is reported to have inefficient public health policies (Rojas and Román et al., 2020), inadequate COVID-19 testing (Godlee, 2020), underreporting of COVID-19 confirmed deaths (Quispe-Cañari et al., 2021), high counts of COVID-19 cases in children and adolescents (Yáñez et al., 2020), and a high prevalence of mental issues among healthcare workers (Yáñez et al., 2020). Fourth, the impact of COVID-19 on the hospitality sector in Peru has been disastrous due to measures that restricted travel and social gatherings. Those measures were very similar to the ones imposed in other countries and have resulted in increased anxiety, distress and a higher intention of changing jobs in hospitality workers in Peru (Yáñez et al., 2020). Hence, the COVID-19 crisis presents a challenging situation for the individuals including the hospitality workers in Peru. Given the above, the hospitality industry in Peru provides an important empirical context to study COVID-19 risk perception and hospitality workers' likelihood of experiencing depressive symptoms.

3.1.1. Data collection and sample characteristics

We collected survey data online from hospitality workers in Peru from June 1 to June 9, 2020, when the country was in the midst of a strict lockdown to slow the spread of COVID-19. Peru reported its first confirmed case on March 6, 2020 and went into a strict lockdown on March 16, closing borders, restricting domestic travel, and forbidding nonessential business operations (Rojas and Román et al., 2020). At the time of the survey, Peru had over 200,000 confirmed cases, the second-highest in South America after Brazil, a much larger country. COVID-19 has had a devastating impact on the economy of Peru in general, and its hospitality industry in particular.

We designed the survey in English and back-translated (Brislin, 1970) it into Latin American Spanish. We adopted several procedures at the data collection stage, as suggested in Podsakoff et al. (2003) by informing all the participants that the survey was only for academic research and their responses would remain confidential to reduce the

Table 1

Means, standard deviations, and correlations of the study variables.

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender (female)	0.57	0.50	1											
2. Age	35.05	7.91	0.05	1										
3. Number of children	1.26	1.10	-0.10	-0.23***	1									
4. Education	2.97	0.93	0.02	0.23***	-0.23***	1								
5. Job level	2.71	1.79	-0.02	0.15**	0.03	-0.01	1							
6. Layoff	0.25	0.14	0.05	0.01	0.23***	-0.13*	0.06	1						
7. Salary reduction	0.53	0.21	-0.00	-0.02	0.16**	-0.07	-0.02	0.19***	1					
8. Infected with the COVID-19 virus	0.03	0.17	0.03	0.06	-0.01	-0.03	-0.07	0.02	-0.07	1				
9. Exercise hours	0.37	0.65	-0.02	-0.21***	0.01	-0.06	-0.09	0.04	0.03	0.03	1			
10. Using PPE (personal protective equipment) at work	4.55	0.73	0.06	0.07	0.01	0.02	0.01	-0.03	0.06	0.07	-0.05	1		
11. COVID-19 risk perception	5.18	1.23	0.06	-0.17**	0.04	0.00	0.07	-0.13*	-0.02	-0.09	-0.13*	0.12*	1	
12. Depression caseness	0.81	0.39	-0.00	-0.02	-0.05	0.11	0.00	0.09	-0.04	0.11	0.04	-0.07	-0.05	1
13. Job satisfaction	3.83	0.52	0.10	0.13*	-0.16**	0.02	-0.15**	-0.03	-0.02	0.04	0.03	0.02	-0.10	0.24***

Notes: n = 211;
*** p < .001.
** p < .01.
* p < 0.05.

likelihood of respondents providing socially desirable answers.

We collected data from hospitality workers in 76 hotels in 11 cities in Peru. The human resources managers in the 76 hotels helped us distribute questionnaires to the hospitality workers in each hotel. Of the 419 hospitality workers reached, 211 of them completed with a response rate of 50.3%.

Of the 211 respondents, 42.65% were male (n = 90) and 57.35% were female (n = 121). The respondents were on average 35.05 years old (S.D. = 7.91), 42.65% had attended some college (n = 90) and 28.91% had a college degree (n = 61). In terms of COVID-19 status, 2.84% of the respondents were confirmed COVID-19 cases (n = 6) and 27.01% were unsure whether they were infected by COVID-19 (n = 57). The participants exercised on average 0.36 h per day. Of the respondents, 25.12% (n = 53) reported that some workers in their hotels had been laid off and over half of them, 53.08% (n = 112), had received salary reductions.

3.1.2. Measures

3.1.2.1. COVID-19 risk perception.
The measure for perceived COVID-19 risk was adapted from the 7-item Middle East Respiratory Syndrome (MERS) risk perception scale (Yang and Cho, 2017). We adjusted the wordings in the items to account for the differences between COVID-19 and MERS.

Specifically, first, in all the items, we referred to COVID-19 instead of MERS. Second, due to the asymptomatic cases associated with the COVID-19 infection, we adapted the MERS item of "*I think that I will contract MERS if I come into contact with a MERS patient*" into "*I think that I will contract COVID-19 if I come into contact with a COVID-19 patient knowingly or unknowingly*", and adapted "*I think that I might contract MERS even if I do not come into contact with a MERS patient*" into "*I think that I might contract COVID-19 even if I try to avoid it*". Third, given the MERS virus was localized and COVID-19 has been a widespread pandemic, we replaced "*MERS may spread in Korea again someday*" (the MERS scale was developed in Korea) with "*COVID-19 will inflict serious damage to my society*". All the items had 7-point Likert scales (1 = "strongly disagree" to 7 = "strongly agree"). The content validity of the measures was evaluated and confirmed by five researchers: four professors in business schools and one professor in hospitality management.

3.1.3. A pilot test

We first examined the scale with the 7 preliminary items by a pilot survey from 113 hospitality workers. First, the 7 items were factor-analyzed using Principal Axis Factoring and the oblique (oblimin) rotation method with Kaiser Normalization (Fabrigar et al. 1999). The result of Kaiser–Meyer–Olkin (KMO) was 0.78, and Bartlett's test of sphericity was 546.84 (p < .001), indicating the appropriateness of using factor analysis. Then, exploratory factor analysis (EFA) was used to identify the factorial structure of this scale. The EFA results (Hinkin, 1998) from that sample indicated that all seven items loaded on one factor. EFA results indicated that all seven items loaded on one factor. However, the factor loadings of three items were below .60.

3.1.4. EFA and CFA in the main sample

We still collected the data using the seven items, and then carried out exploratory factor analysis (EFA) again to test the psychometric properties using the final sample of 211 (Hinkin, 1998, p. 110). EFA results also indicated that all seven items loaded on one factor and the factor loadings of three items were below .60 (the same items with the pilot test), and therefore, we decided to drop those three items.

Then, we conducted CFA with the remaining four with the main sample of 211 hospitality workers, in order to examine whether the measure demonstrated the factor structure as expected (Knekta et al., 2019). CFA results showed a relatively poor model fit with the four items (χ^2 = 114.48, df = 14, CFI = .86, TLI = 0.79 RMSEA = 0.18 SRMR = 0.07. However, removing the item that showed the lowest factor loading of the four items led to a good model fit (χ^2 = 1.60, df = 1, CFI = 0.99, TLI = 0.99, RMSEA = 0.05 SRMR = 0.01. The resultant scale of COVID-19 risk perception consists of three items (please see the appendix). The Cronbach's alpha was .88.

3.1.4.1. Job satisfaction.
We used the Spanish version of the commonly used 7-item job satisfaction scale of Brayfield and Rothe (1951). Two sample items are "I feel fairly satisfied with my present job" and "Most days I am enthusiastic about my work". The Cronbach's alpha was .79. The Spanish version of the job satisfaction scale has been used in Latin America in the COVID-19 situation (Zhang et al., 2021) with a Cronbach's alpha of .80.

3.1.4.2. Depressive symptoms.
We used the clinically validated PHQ-2 scale with two items to measure depressive symptoms (Kroenke et al. 2003). The items were "In the last week, how often have you been bothered by little interest or pleasure in doing things" and "In the last week, how often have you been bothered by feeling down, depressed, or hopeless". Both items were scored from 0 to 3 (0 = "not at all", 1 = "several days", 2 = "more than half the days", 3 = "nearly every day"). The PHQ scale manual indicated "likelihood ratio and receiver operator characteristic analysis identified a PHQ-2 score of 3 as the optimal cutpoint" (Kroenke et al. 2003, p. 1284) to identify caseness of

Table 2

The CFA (confirmatory factor analysis) results (n = 211).

Models	Factors	χ^2	df	χ^2/df	RMSEA	CFI	TLI	SRMR
1	1 factor: COVID-19 risk perception+ depressive symptoms+ job satisfaction	398.33	35	11.38	0.22	0.55	0.42	0.19
2	2 factors: COVID-19 risk perception + depressive symptoms, job satisfaction	114.86	34	3.38	0.11	0.90	0.87	0.09
3	2 factors: COVID-19 risk perception, depressive symptoms + job satisfaction	101.04	54	1.87	0.10	0.92	0.89	0.07
4	3 factors: COVID-19 risk perception; depressive symptoms; job satisfaction	47.13	32	1.47	0.05	0.98	0.97	0.04

depression. It is important to note that PHQ serves not as a diagnostic tool but rather to identify a caseness of depression (Kroenke et al. 2003).

3.1.4.3. Number of children. To measure the number of children, we asked the participants the number of children under 18 years old in their household.

3.1.4.4. Controls. We followed prior studies on mental health during the COVID-19 pandemic (Zhang et al., 2020a, 2020b) to control gender (0 =male; 1 =female), age, education background (1 = less than secondary school (high); 2 =completed secondary school (high school); 3 =attended some college but no degree; 4 =completed college degree; 5 =attended or completed graduate degree), infection status with the COVID-19 virus (1 =yes; 2 =unsure; 3 =no), job level (1 =entry-level or non-executive; 2 =junior management; 3 =middle management; 4 =senior management; 5 other), layoff (the percentage of employees that were laid off in their organizations during the COVID-19 pandemic), salary reduction (the percentage of employees that received a salary reduction in their organizations during the COVID-19 pandemic), exercise hours per day, and the use of personal protective equipment (PPE) at work.

4. Results

4.1. Descriptive findings

The means, standard deviations, and correlations of the study variables are in Table 1. The results indicate 81.0% of the hospitality workers had depressive caseness based on the PHQ scale.

4.2. Confirmatory factor analyses

We first assessed the validity of the focal variables by conducting a series of confirmatory factor analyses (CFA). As shown in Table 2, the CFA results showed that the three-factor model of COVID-19 risk perception, depressive symptoms, and job satisfaction (Model 4: χ^2/df= 1.47, CFI= 0.98, TLI= 0.97, RMSEA= 0.04, SRMR= 0.04) fitted the data significantly better than all the alternative models.

We also conducted a series of analyses to check for common method variance. First, the fit of the one-factor model via CFA demonstrated poor fit (χ^2/df= 11.38, CFI= 0.22, TLI= 0.55, RMSEA= 0.42, SRMR= 0.19), suggesting that the common method variance does not pose a serious concern. Second, we added a latent common methods variance factor to the model based on the single unmeasured latent method factor test (Podsakoff et al., 2003). The model with the latent factor fits the data (χ^2/df= 1.39, CFI= 0.99, TLI= 0.98, RMSEA= 0.04, SRMR=0.04) but not significantly better than the hypothesized baseline model and therefore common methods variance is unlikely to have a significant impact (Dulac et al., 2008).

4.3. Hypothesis testing

We used logistic regression analysis to investigate the relationship between hospitality workers' COVID-19 risk perception and their likelihood of experiencing depressive symptoms, entering the moderators into the models step-by-step. The control variables of gender, age, education background, infected with COVID-19, job level, layoff, salary

Table 3

Logistic regression testing the hypotheses.

	Depression caseness (odd ratio)		
	M1	M2	M3
Intercept	0.000	0.001	0.000
	(0.000)	(0.014)	(0.001)
Gender (female)	0.996	0.923	0.994
	(0.365)	(0.365)	(0.405)
Age	0.992	1.005	1.007
	(0.025)	(0.028)	(0.029)
Education	1.406	1.430	1.410
	(0.294)	(0.323)	(0.331)
Job level	0.981	1.097	1.127
	(0.101)	(0.127)	(0.133)
Layoff	9.667	4.252	5.030
	(13.424)	(6.248)	(7.785)
Salary reduction	0.448	0.657	0.904
	(0.399)	(0.647)	(0.914)
Infected with the COVID-19 virus	0.177	0.137*	0.112*
	(0.160)	(0.134)	(0.115)
Unsure whether infected with the COVID-19 virus	0.726	0.653	0.592
	(0.298)	(0.299)	(0.277)
Exercise hours	1.284	1.310	1.425
	(0.397)	(0.445)	(0.488)
Using PPE (personal protective equipment) at work	0.796	0.646	0.573
	(0.221)	(0.215)	(0.214)
COVID-19 risk perception		0.748	0.775
		(0.187)	(0.198)
Job satisfaction		2.513	2.624
		***	***
		(0.605)	(0.679)
COVID-19 risk perception × job satisfaction		0.449**	0.465**
		(0.123)	(0.135)
Number of children			0.858
			(0.198)
COVID-19 risk perception × numbers of children			1.693*
			(0.427)
Pseudo R^2	0.05	0.16	0.18
LR chi^2	10.78	33.56**	38.36**

Note: N = 211; The contents in bracket represent standard error (i.e. SE);
* p < .05.
*** p < .001.
** p < .01.

reduction, exercise hours, and the use of personal protective equipment at work form the base model. The results are shown in Table 3.

Hypothesis 1 posits a positive association between COVID-19 risk perception and likelihood of experiencing depressive symptoms. The results of model 3 in Table 3 indicate an insignificant odds ratio (M3, odd ratio=0.775, *n.s.*), not supporting Hypothesis 1. Hypothesis 2 posits that job satisfaction buffers (negatively moderates) the relationship between hospitality workers' COVID-19 risk perception and likelihood of experiencing depressive symptoms. The results of model 3 in Table 3 indicate a significant interaction (M3, odds ratio=2.624, p < .001). To illustrate the interaction effect, we ran the marginal analysis and plotted the interaction effects in Fig. 2. Fig. 2 shows the relationship between individuals' COVID-19 risk perception and likelihood of experiencing depressive symptoms is weaker for workers with higher job satisfaction.

Importantly, the marginal analysis reveals the relationship between hospitality workers' COVID-19 risk perception and likelihood of experiencing depressive symptoms is significantly negative for workers whose job satisfaction is below − 1.2 standard deviation and above 0.7.

The Effect of COVID-19 Risk Perception on Depression
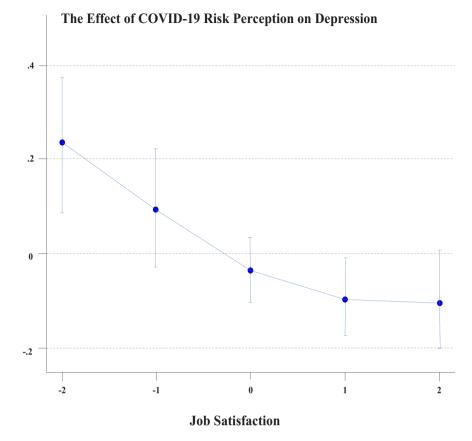

Fig. 2. Average marginal effects plot on the relationship between COVID-19 risk perception and the likelihood of experiencing depressive symptoms at varying levels of job satisfaction.

Thus, Hypothesis 2 was supported.

Hypothesis 3 posits that the number of children positively moderates the relationship between hospitality workers' COVID-19 risk perception and likelihood of experiencing depressive symptoms. The results of model 3 in Table 3 indicate a significant interaction (M3, odd ratio=1.693, p < .05). To further illustrate the interactive effect, we ran the marginal analysis and plotted the interaction effects in Fig. 3. Fig. 3 shows the relationship between hospitality workers' COVID-19 risk perception and likelihood of experiencing depressive symptoms is higher for workers with more children.

The marginal analysis reveals the relationship between hospitality workers' COVID-19 risk perception and likelihood of experiencing depressive symptoms is significantly positive for workers with the number of children below − 1.9 standard deviation. Thus, Hypothesis 3 was supported.

5. Discussion

Based on the transactional theory of stress and coping, we theorized that hospitality workers' COVID-19 risk perception is linked to their likelihood of experiencing depressive symptoms with two contingent factors. Specifically, this link is weakened by job satisfaction that acts as a stress buffer. In contrast, a higher number of children, which can deplete psychological resources and place financial demands on workers, exacerbates the impact of hospitality workers' COVID-19 risk perception on their likelihood of experiencing depressive symptoms.

5.1. Theoretical implications

First, our study advances the research on perceived risk of infectious

diseases, uncovering when hospitality workers' COVID-19 risk perception is associated with their likelihood of experiencing depressive symptoms by identifying the contingent roles played by the job and home situation. Much of the work on risk perception has attempted to understand the different perceived levels of risk between different groups (e.g., countries and age) rather than investigate how individuals' COVID-19 risk perception predicts their likelihood of experiencing depressive symptoms under different conditions. For instance, Dryhurst et al. (2020) compared the level of public risk perception in ten countries, while Bruine de Bruin (2020) examined the differences between younger people and older people. Understanding the contingent factors is important because they can point to intervention and support strategies to buffer the negative impact of perceived COVID-19 risks.

Because the impact of risk perception depends on appraisals of the individual's ability to cope with the stressor, we used the transactional theory of stress and coping that allowed us to move the field toward a more nuanced understanding of risk perception (Cutchin et al., 2008 p. 592). We observed that although the perceived COVID-19 risk resulted in the emotional distress of hospitality workers, job satisfaction buffered this adverse effect. Given the unique situation of the COVID-19 pandemic where many children had to remain home, we tested the number of children as another contingency factor in the home-domain, finding that it aggravated the detrimental effects of hospitality workers' COVID-19 risk perception on depressive symptoms. Our findings demonstrate that an individual's stress reactions to COVID-19 are influenced by a complex, dynamic process involving simultaneous interchange between the stressors and appraisal of the stressors depending on the job and family situation of the hospitality worker.

This effort furthers understanding of the role of cognitive appraisal and coping in determining the likelihood of depressive symptoms of
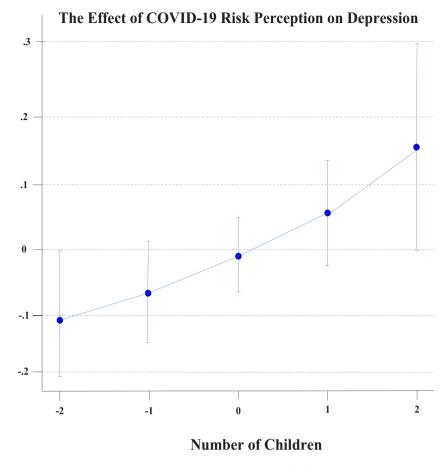
The Effect of COVID-19 Risk Perception on Depression

Number of Children

Fig. 3. Average marginal effects plot on relationship between COVID-19 risk perception and the likelihood of experiencing depressive symptoms at varying levels of the number of children.

workers. As far as we know, this study is the first to propose a transactional theory of stress and coping framework in the context of COVID-19 risk perception. The lack of previous empirical research on this point, and theory that supports the findings, suggests that more research is needed. We call on future research to further investigate the effect of other job-related and family-related coping strategies, such as job crafting, job demands, family support, and family resources.

Second, our study contributes to the measurement of perceived COVID-19 risk perception. To date, scholars have used some indices to measure COVID-19 risk perception (Bruine de Bruin, 2020,; Dryhurst et al., 2020) but these indices have not been validated due to the severe time constraint under the sudden COVID-19 outbreak. Other scholars used the risk perception scale from previous infectious diseases without adaptation to account for the differences between COVID-19 and previous epidemics (e.g. Taghrir et al., 2020). Instead, we generated a perceived COVID-19 risk perception by adapting the MERS risk perception scale of Kim and Choi (2016) to account for the distinct characteristics of COVID-19 specifically. In particular, COVID-19 patients can be asymptomatic and infectious. Moreover, COVID-19 is recognized by the World Health Organization (WHO) as a worldwide pandemic that poses risks not only to individuals but also to their societies. Accordingly, we customized the scale to account for individuals' perception of the amount of serious damage that COVID-19 can inflict on their society. Our adapted scale of COVID-19 risk perception is more specific and relevant to research this unprecedented pandemic and can serve as an initial step to related research on COVID-19 risk perception in the hospitality industry and beyond.

Third, we advance the job satisfaction literature by offering more focused consideration of the buffering role of job satisfaction in the stress-coping process. Our findings help to specify the conditions under

which the risk perception–likelihood of experiencing depressive symptoms relationship is strengthened or weakened. In particular, we extended emerging research on COVID-19 risk perception by introducing a new moderator in job satisfaction. Some COVID-19 related studies regard job satisfaction of workers as a critical dependent variable and propose that the COVID-19 pandemic resulted in low job satisfaction (Chen et al., 2020a, 2020b; Zhang et al., 2020a, 2020b). In our study, job satisfaction, as a critical emotion-focused coping resource (Shimazu and Kosugi, 2003), was found to help with the emotional responses to the stressor. Ben-Zur (2019) reported that emotion-focused coping is more probable in the context of health, or if the situation is perceived as uncontrollable. Our study reported that the efficacy of job satisfaction plays a role as a buffer of the effect of hospitality workers' COVID-19 risk perception on likelihood of experiencing depressive symptoms.

5.2. Practical implications

We provide a measure of COVID-19 risk perception that hospitality employers can use to assess their individual workers to enable them to identify, benchmark, and compare the level of their risk perception. This measure is also useful as an outcome variable in possible intervention or treatment programs implemented by the management or other professional services to examine the effect of those programs. For instance, managers in the hospitality industry may use our online survey to assess their employees' COVID-19 risk perception and depressive symptom as COVID-19 crisis evolves. Such an assessment would allow a better understanding of their employees. Our results indicate job satisfaction buffers the negative effect of hospitality workers' COVID-19 risk perception on likelihood of experiencing depressive symptoms,

suggesting that managers in the industry should focus on improving workplace safety, increasing work flexibility, and providing psychological rewards (Pizam and Shani, 2009), which serve as concrete avenues to enhance their employees' job satisfaction in the hospitality industry (Yang, 2010). Moreover, our findings that number of children positively moderates the relationship between COVID-19 risk perception and the likelihood of depressive symptoms suggest that hospitality industry could pay special attention to their employees with more children, as they are more likely to suffer from depressive symptoms when perceiving higher COVID-19 risk.

5.3. Limitations and future directions

Our study has several limitations and potential for future studies. We are limited in examining all possible factors that lead to mental issues in this study. Future research may consider some psychological feelings as mediators, such as job insecurity (Darvishmotevali and Ali, 2020) and perceived industry attractiveness (Turban et al., 2001), understanding of science (Provenzi and Barello, 2020), conspiracy theory (Chen et al., 2020a, 2020b), and religiosity (Kranz et al., 2020) as possible factors that shape the cognitive appraisal process for workers in the hospitality industry during the COVID-19 pandemic. Another limitation is that we did not have information whether the respondents had suffered from depressive symptoms, psychiatric disorders or other mental health issues before the pandemic or at any point of the lifetime.

Empirically, one limitation is the cross-sectional design that prevents us from making stronger causal inferences. The theory we used, the transactional theory of stress and coping, indicates causality runs from external perception of situational cues to internal mood, not vice versa, which lend some support to the causal direction of our study.

Nonetheless, we recommend experimental studies in the future for better casual inferences. In addition, our survey was conducted in Peru. COVID-19 has had a devastating impact on Peru's economy in general, and its hospitality industry in particular. We recommend increasing external validity and generalizability by using data from other countries to contribute to the understanding of the context-sensitivity of our findings.

6. Conclusion

By applying the transactional theory of stress and coping, we advanced COVID-19 risk perception research as applied to hospitality workers. We generated a scale to measure COVID-19 risk perception and examined two factors where job satisfaction buffers the negative effect of COVID-19 risk perception on likelihood of experiencing depressive symptoms, while the number of children under 18 years old aggravates it to advance research and identify specific strategies to cope with the COVID-19 pandemic.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

Appendix. The COVID-19 risk perception scale

	Items
1	I think that I might contract COVID-19 even if I try to avoid it
2	My health will be severely damaged if I contract COVID-19
3	I think COVID-19 is more severe than other respiratory diseases

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Jiaqi Yan is a lecturer in School of Business Administration at Northeastern University (China). He received his Ph.D. from Tongji University. His research focuses on the strength of the human resource management system, entrepreneurship and innovation.

Sunghoon Kim is an associate professor in the Discipline of Work and Organizational Studies at the University of Sydney Business School. He received his Ph.D. from Cornell University. He is currently serving as an Associate Editor of Human Resource Management. His research focuses on strategic human resource management, international human resource management, and comparative employment relations.

Stephen X. Zhang is an associate professor of entrepreneurship and innovation at the University of Adelaide. He studies how entrepreneurs and top management teams behave under uncertainties, such as the impact of major uncertainties in the contemporary world (e.g. COVID-19 and AI) on people's lives and work. Such research has also given Stephen opportunities to raise more than US$1.5 millions of grants in several countries. Prior to his academic career, Stephen has worked in several industries and has founded startups

Maw-Der Foo is a professor at Nanyang Business School, Nanyang Technological University, Singapore. He holds honorary/guest professorships in Jilin University and in Nankai University. His research uses management concepts to understand entrepreneurial processes in high growth startups. He serves as Field Editor of the Journal of Business Venturing; from 2012 to 2017 he was editor of Entrepreneurship Theory and Practice where he continues to serve on its editorial review board. He is also on the editorial review boards of the Academy of Management Journal, Academy of Management Perspectives, Journal of Management, and Strategic Entrepreneurship Journal. He teaches leadership, management, and entrepreneurship courses.

Aldo Alvarez-Risco is a lecturer in Universidad de Lima, Peru. He got his Ph.D. degree from Universidad Autónoma de Nuevo León. His research interest includes sustainability, international business, and management.

Shyla Del-Aguila-Arcentales is a lecturer in Escuela Nacional de Marina Mercante "Almirante Miguel Grau", Peru. She got his Master degree from Universidad Nacional Mayor de San Marcos. Her research interest includes sustainability, entrepreneurship, and international business.

Jaime A. Yáñez is a lecturer in Universidad Peruana de Ciencias Aplicada, Peru and Corporate Head of Scientific and Regulatory Affairs in Teoma Global. He got his Ph.D. degree from Washington State University. His research interest includes public health, functional foods, phytochemicals, nutrition, and its role in school performance.