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The Impact of the COVID-19 Epidemic on Gambling Behavior Intention: The Moderating Effect of Anti-Epidemic Measure

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Abstract

This study focuses on how the COVID-19 epidemic affects gambling motivation and behavior. This research also analyzes the behavioral intervention effects of the anti-epidemic measures on the COVID-19 epidemic and the relationship between the epidemic impact and gambling motivation and behavior. To investigate these connections, this research used Structural Equation Modeling to analyze 334 valid questionnaires collected during COVID-19 from gamblers from mainland China who visited the Macao Special Administrative Region. The results showed that the epidemic impact negatively affected gambling motivation and behavior, and gambling motivation partially mediated the relationship between epidemic impact and gambling behavior. Anti-epidemic measures positively moderated the epidemic's impact on gambling motivation and behavior. This paper offers a theoretical contribution by proving the influence of the social environment on human motivational behavior, especially the effect of the COVID-19 crisis, and the support of government and enterprise anti-epidemic measures for behavior intervention theory. The practicality of this study consists of behavioral interventions from anti-epidemic efforts by regional government and industry to cope with the epidemic. These measures should influence the gamblers' behavior intentions by considering the health and safety strategies that may reduce the impact of the COVID-19 epidemic on mainland Chinese gamblers.

Keywords:
COVID-19 Epidemic;
Gambling Motivation;
Gambling Behavior;
Anti-Epidemic Measures;
Behavioral Intervention.

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1- Introduction

Environmental issues explore the sustainable development of human beings in different fields and specific environments that will affect human motivation and behavior [1]. Especially for the motivations and behaviors of gamblers, their decision-making involves multivariable factors [2] that are highly influenced by economic, social, and cultural contexts [3]. Gamblers' motivation is determined by their expectation of winning and their attitude toward money [4]. The COVID-19 outbreak has spread rapidly around the globe [5], and its severity and consequences are still unpredictable [6]. COVID-19 has tossed the work [7], family life, spirituality [8], and entertainment [9] of tourists. Additionally, individual income is a secondary motivation that influences the tourists' choice of destination [10]. Especially the threat of disease and travel restrictions will also lead to psychological and social barriers to tourism [11, 12]. Therefore, gambling motivation has also been affected by the epidemic of COVID-19 through its travel limitations. However, a lack of literature that examines the impact on gamblers' motivation from a COVID-19 perspective and the mechanisms of how the epidemic affected gambling motivation is still unclear. This article attempts to bridge this research gap.

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Furthermore, the epidemic's impact on tourists' decisions extends beyond their motivation when they face homologous major emergencies and crises [13]. Tourists avoid traveling during a pandemic* by adopting non-drug procedures, such as keeping good hygiene habits and preventing contact with suspicious individuals [14]. During a global pandemic, gamblers feel encumbered when considering the risk of travel [15], as well as the social costs of traveling, and destination marketing strategies and tourism products [16]. When facing the threat of influenza, visitors will follow non-pharmacological procedures, such as maintaining personal hygiene conventions and keeping a distance from suspicious populations, to avoid the perceived risks of traveling during this period [17]. Gamblers who perceive an infectious disease threat will postpone or cancel their trips. Small and online gambling have reported a change in gambler behavior during COVID-19 [18, 19]. Therefore, gambling behavior also has been affected by the epidemic of COVID-19. However, little literature has examined the impact on gamblers' motivation and behavior from a COVID-19 perspective, including the mechanisms of how an epidemic might affect gambling motivation and behavior. This article attempts to explore this research opportunity.

Moreover, the influence of information factors on individual behavior is often intertwined with cognitive processes, such as motivation and social interpretation, influencing behavior [20]. The purpose of behavioral intervention is mainly to achieve specific behavior changes, reduce or eliminate some undesired behaviors of individuals in crisis, and cultivate or improve some aspired behaviors for the individual, to achieve specific improved behavior changes [21]. Anti-epidemic measures, such as strict travel restrictions, can be regarded as behavioral interventions authorized by the government to avoid the pervasion of the epidemic. From the perspective of behavior theory, the behavioral intervention of anti-epidemic measures might involve the decision of tourists to change their behavior to a certain extent, notwithstanding that this intervention intends to ensure their health and reduce the spread of disease. As a result, travel restriction measures profoundly changed tourist behavior during the epidemic [22]. Behavioral intervention is an intervention method that interferes with and artificially interrupts the natural process of the occurrence and development of behavior to eliminate or change behavior [23]. Several studies have proved that behavioral intervention could weaken and change individual behavior in education, smoking, gambling, and other habitual behaviors [24]. Avoiding the spread of the epidemic is the core purpose of the anti-epidemic measures, yet, another effect of interference behavior appears when the anti-epidemic measures are implemented, that is, the behavioral interference effect on gamblers and their motivation and behavior intentions. Thus, following the epidemic outbreak, the tourism industry took measures that would profoundly influence the gambling tourism industry [25]. However, few pieces of research have been conducted hitherto on the effects of behavioral interventions and anti-epidemic measures on gambling motivation and behavior, and this study intends to contribute to closing the gap in this research area.

As mentioned above, the purpose of this paper is to explore how the COVID-19 epidemic influences the motivation and behavior of gamblers. It also intends to reveal the mechanism of how the behavior intervention of the anti-epidemic measures has a moderating effect on epidemic impact, gambling motivation, and gambling behavior. From the perspective of behavior intervention, this paper gives a theoretical explanation of the influence of epidemic prevention policies on gambling behavior intentions in complex economic and social contexts. Some management suggestions are proposed for coping with the epidemic according to its impact on gamblers' behavior and intentions.

2- Literature Review

2-1- Gambling Motivation and Gambling Behavior

Gambling is different from other consumer behaviors. The process of gambling has the potential to increase income. Rational gamblers enjoy the program of the entire journey, including the winning and losing of money in the betting process. Increasing revenue appears in the particular consumption process of gambling [26]. Gambling motivation can be viewed from different perspectives: economic, social, and cultural [2]. From the point of view of economics, pursuing money is one of the main motivations for people to gamble [27]. From a sociological perspective, participation in social activities and increased communication opportunities with family and friends are the core motivations for people to gamble. From the view of problem gambling, gambling motivation comes from individual stress perception, and people's anxiety and depression trigger gambling intention [28].

From the views of the composition of gambling motivation, it can be categorized as internal or external gambling motivation [29] focused on three types of gambling motivation: intrinsic, extrinsic, and non-motivation. Moreover, a five-motivation model was developed that includes social, entertainment, relaxation, escape, and money motivations for gamblers [30]. The authors found that money was the only motivation that directly affected the gamblers' intention to engage in serious gambling, while the other four affected the money motivation and indirectly affected severe gambling. Some case studies of casino gamblers showed that gamblers focus primarily on excitement and entertainment rather than

* Throughout this study, we used the terminology *epidemic* to refer to the COVID-19 phenomenon. However, to stay truthful to the studies cited, we used the expression *pandemic* whenever the respective authors employed it in the same context.

making money, with social stimulation and trying new things of intrinsic motivation (35% and 24%, respectively) being more important than extrinsic motivation to make money (6%) [31]. Therefore, a three-dimensional gambling motivation questionnaire was designed by Stewart & Zack [32]. The three dimensions were the motivation to improve pleasure and happiness (enhancement motivation), the motivation to avoid negative emotions (coping motivation), and the social motivation (social motivation).

There are vast cultural differences in tourists" participation in gambling in different regions of the world [33]. Chinese gambling tourists have diverse gambling characteristics [34] and are dissimilar from tourists from around areas [35]. Gambling behavior is prevalent in the Chinese community as it is a preferred form of entertainment [36]. Due to the social acceptance of gambling in Chinese culture, participation in various games has increased. A scale of five motivations was designed when studying Chinese gamblers: self-worth, which refers to the realization of individual internal satisfaction [37]. Sensory seeking refers to enduring seeking external stimuli to maintain a high level of arousal. Winning money refers to individuals seeking income through gambling. Relieving boredom means that gambling can eliminate loneliness and boredom. Learning refers to the need for individuals to acquire new knowledge. Additionally, even pathological gamblers have diverse motivations when gambling, including winning money, experiencing stimulation, risk-taking, autonomy, independence, escape from everyday life, exploration, being with friends, the ability of competition, control, and power, etc. [38]. Research by Lee et al. [39] identified motivations such as socialization and learning, challenge, avoidance, and victory. They found that gambling motivations were more diverse while examining gambling motivations for visiting casinos. Lam & Vong [40] showed that mainland Chinese tourists in Macao are not simply driven by casino gambling. Instead, they travel to Macao, a tourist destination, to engage in various in-destination services and social activities.

Gambling behavior is a continuum of people's participation in gambling, involving demographics, economics, marketing, ethics, addiction, mental health, public health, and policy [41]. Gambling behavior is unambiguously influenced by the emotional state, with sad people tending to have high-risk/high-reward options. In contrast, anxious people tend to have low-risk/low-reward options. These differences arise because anxiety and sadness associate different types of information with which individuals make decisions, thus affecting final behavior [42]. Gambling behavior is also associated with gambling experience, frequency, and morbidity [43], with more frequent gambling, participation in more types of gambling, and a single gambling session spending associated with pathological gambling behavior [29].

Gambling motivation analyzes the psychological activities and emotional characteristics of gamblers who participate in gambling and proposes that concepts including luck, neglect of probability, the illusion of almost success, and an illusion of control will affect whether the individuals decide to participate in gambling [44]. In addition, the effect of the environment on gambling behavior was considered in terms of how individuals adapt to different gaming environments. This led to the argument that gamblers' social adaptation will make them gradually realize that the chance of winning is adverse in the long run. [45]. Thus, gamblers' responses are to reduce the amount of gambling or gambling activities or even give up gambling. Therefore, after being seldom exposed to gambling facilities for a period, gamblers can gradually reduce their interest in gambling games or change their habitual gambling behavior [46]. Gambling motivation and behavior are significantly related to demographic variables, and many scholars have analyzed the differences in gambling motivation by gender, income level, education level, and age [47]. In a study of casino motivation and gambling intentions among older adults [48], five distinct dimensions of gambling motivation were identified: the thrill of victory, sociability, avoidance, enjoyment, and curiosity [49]. A nationally representative sample of 43,093 non-institutionalized US residents also reported that recreational gambling was associated with some negative and positive measures [43]. Influenced by culture and history, participation in gambling has not improved despite various restrictions [3]. Regarding Chinese gambling behavior, a multi-site study on gambling patterns and associated predictors among older Chinese Canadians suggests that post-secondary or higher education levels and higher life satisfaction reduce the likelihood of gambling [50], and marriage and higher education are associated with reduced risk of problem gambling [19]. Therefore, this study proposes the following hypothesis:

H1: *Gambling motivation positively affects gambling behavior.*

2-2- Epidemic Impact, Gambling Motivation, and Gambling Behavior

COVID-19 significantly impacted the overall tourism industry and the expenditure behavior of travelers [51]. The impact of the COVID-19 pandemic on the supply and demand of urban labor, work, and private life has worsened [7]. The outbreak of the epidemic has led to people living alone, resulting in a reduction in leisure time, a change in the amount of care needed, and an increase in perceived negative impacts [52]. The pandemic has strengthened the link between lifestyle behaviors and depression [18]. Hence, the epidemic greatly influenced individuals' lifestyles, welfare, and mental health [11]. In addition, the COVID-19 pandemic affected people's consumption patterns [9]. COVID-19 affected gamblers" psychological and emotional needs and changed their behavioral states [53]. Public health emergencies can cause people's emotional states to change, often leading to problems such as gambling. The study of Dickerson et al. [54] showed that high-frequency gamblers' ex-ante emotions and cognitions significantly affect their continued gambling behavior despite consecutive losses. People gamble with anxiety or depression to soothe these

negative psychological states, which may be relieved in the short term but make gamblers more anxious and uneasy in the long run [55]. The association between gambling and other known comorbidities, such as anxiety, depression, and substance use disorders, has been highlighted in the related literature [12, 56].

In addition, tourists" travel motivations and behaviors may change due to COVID-19 [57]. When facing the threat of influenza, tourists will adopt non-drug intervention behaviors, choose to maintain good personal hygiene habits, and keep their distance from people at risk of having been contaminated instead to avoid the perceived menace of traveling at a time of such disease [14, 17]. Gamblers will postpone or cancel their travel plans when they perceive infectious disease threats [58]. Moreover, studies have revealed that most gamblers' gambling behavior has decreased or remained the same during the pandemic [25, 26, 53, 59].

From the above research, it can be inferred that COVID-19 has a widespread impact on gamblers. Therefore, we postulate the following hypotheses:

H2: *Epidemic impact negatively affects gambling motivation.*

H3: *Epidemic impact negatively affects gambling behavior.*

H4: *Gambling motivation mediates epidemic impact and gambling behavior.*

2-3-Anti-Epidemic Measures, Epidemic Impact, Gambling Motivation, and Gambling Behavior

COVID-19 can be primarily transmitted through droplets or respiratory secretions. Closed and confined spaces are dangerous environments where infection can easily spread, putting tourist destinations under a severe environmental threat [17]. The Macao Special Administrative Region government actively responded to the sudden COVID-19 public health incident. All non-local residents were prohibited from entering the territory, except for holders of identity cards for Mainland China, Hong Kong, and Taiwan and non-resident employees. From May 11, 2020, onward, all people entering Macao from Mainland China should hold a certificate of a negative test for COVID-19 with seven days of validity or an approved certificate of the Macao Health Code or Guangdong Health Code [60]. Casino operations resumed in August 2020, but foreign tourists had to exhibit a negative nucleic acid test with seven-day validity before entering Macao. The casino venues have implemented the necessary arrangements for the guests' safety, such as the availability of face masks. Those guests displaying symptoms of fever or acute cough were not allowed to enter indoor venues; guests had to answer a set of strategic questions and present an approved health code; casinos had to prevent crowds of customers in their facilities and suspend all promotional activities that could attract many customers. The casino operators also had to control the number of people at their venues to ensure it was less than 50% and try to disperse them as much as possible, avoiding gatherings and keeping a distance of at least one meter between customers [13].

During the epidemic, the government adopted prevention and control measures, including restrictions on the types of masks, their mandatory use, and isolation measures. Like in China, stricter epidemic control measures were adopted in Macao, including vaccination, self-testing, general population testing, and health code records to access public and private venues. Moreover, legislation has been passed to limit the amount and duration of online casinos [13, 26]. In addition, there were restrictions imposed by public health authorities, such as physical distancing and lockdowns [61]. The government's anti-epidemic measures can be regarded as a behavioral intervention. Behavioral intervention may change gambling behavior despite its initial purpose of protecting the population and tourists from the disease.

Behavioral intervention is an intervention method that interferes with and artificially interrupts the natural process of the occurrence and development of behavior to eliminate or change the behavior. Behavioral changes are successful in increasing physical activity if a behavioral theory is "deployed under scientifically controlled conditions" [62]. Behavioral scientists have proposed that interventions based on theories of behavioral science, particularly psychological theories, will be most effective in evoking behavioral change [63]. Behavioral concepts arise from multiple disciplines (e.g., psychology, sociology, and behavioral economics) [64] and identify various determinants or mechanisms of behavior, including beliefs, motivations, and intentions [13]. Behavioral intervention could be effective in the laboratory to eliminate and change individual behaviors such as education, gambling, and other undesirable habits [65]. The economic and social environment is hard to replicate in a laboratory [66], especially the impact and control of the sudden outbreak of COVID-19 [58]. However, besides the effect of preventing the spread of the epidemic, an additional consequence of behavioral interference during the implementation of anti-epidemic measures is the behavioral interference effect on the expected behavioral intentions and behaviors of tourists or gamblers. Therefore, this study proposes the following hypotheses:

H5: *Anti-epidemic measures moderate epidemic impact on gambling motivation.*

H6: *Anti-epidemic measures moderate epidemic impact on gambling behavior.*

The conceptual framework of the proposed moderation mediation model is presented in Figure 1.

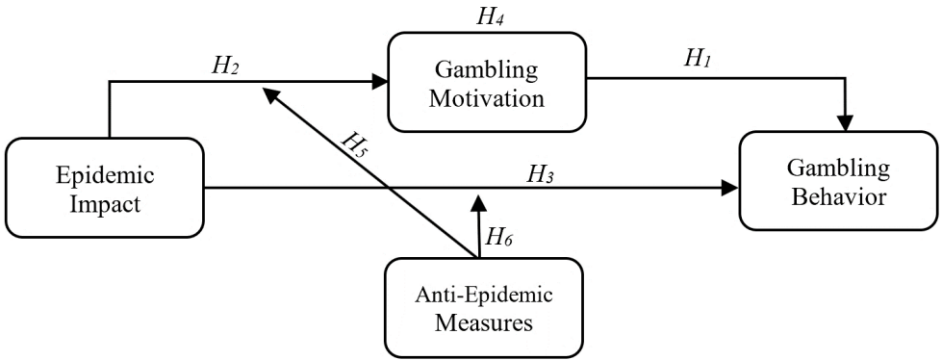

Figure 1. Conceptual framework of the proposed moderation mediation model

3- Research Methodology

3-1- Scale

The measurement scale of epidemic impact was adopted from Chen et al. [67], which combines the COVID-19 outbreak, the measures of resorts, and the actual situation in Macao, including family welfare impact (3 items) and personal emotional impact (3 items). The measurement scale of gambling motivation draws on Wu et al. [68] and Abarbanel [69], including economic income (3 items), emotional regulation (3 items), and social needs (3 items). The measurement scale of gambling behavior refers to Dickerson et al. [54] and Raylu et al. [70], including betting amount (3 items), emotional control (3 items), and social interaction (3 items). In addition, the moderating variables set the anti-epidemic measures (3 items), respectively. The items in the list were analyzed using a 5-point scale. The sociodemographic variables to measure the characteristics of the gamblers included basic information, such as gender, age, marital status, education, income, gambling frequency, and gambling budget before and after the epidemic.

3-2- Data

This study targeted gamblers from mainland China visiting the Macao Special Administrative Region. Due to the epidemic situation and limited mobility conditions, it was challenging to distribute the questionnaires face-to-face at the casino-integrated resorts. Therefore, this research adopted the strategy of online questionnaire distribution to gambling tourists who visited Macao through social media platforms, specifically WeChat. The questionnaire adopted a closed-ended question design and random sampling. The survey was implemented from January 5, 2021, to February 10, 2021, and 400 questionnaires were distributed in active WeChat groups. We obtained 334 valid questionnaires (i.e., 83.5%).

4- Results

4-1- Sample Characterization

Table 1 shows the data concerning the respondents' profiles. Most respondents were male, 215 (64.5%), and 119 (35.6%) were female. Regarding the level of education achieved, 139 (41.6%) of the respondents were in junior college, and concerning the most prevalent marital status, 259 (77.5%) of the population were married. Most participants were in the 26–35 age group, 192 (57.5%). Over half of the respondents (53.0%) had a monthly income of less than CNY10,000. In the pre-epidemic, 81 (24.3%) respondents declared to have participated in gambling once a week, 126 (37.7%) once a month, 23 (6.9%) once a day, and 104 (31.1%) considered themselves irregular gamblers. Regarding their gambling budget, 202 (60.5%) participants were under CNY10,000 before the epidemic, while in the post-epidemic period, 156 (46.7%) of the respondents had a betting budget under CNY10,000. Most respondents, 172 (51.5%), spent less than 6 hours at casinos.

Table 1. Respondents profile (N=334)

Item	Characteristic	Frequency	Percent	Cumulative Percent
Gender	Male	215	64.4	64.4
	Female	119	35.6	35.6
Marriage	Yes	259	77.5	77.5
	No	75	22.5	100
Age	25 years old and bellow	46	13.8	13.8
	26-35years old	192	57.5	71.3
	36 years old and above	96	28.7	100
Education	High school or below	83	24.9	24.9
	Junior college	139	41.6	66.5
	Bachelor and above	112	33.5	100

Income	CNY 10000 and below	177	53	53
	CNY 10001-20000	95	28.4	81.4
	CNY 20001-30000	44	13.2	94.6
	CNY 30000 and above	18	5.4	100
Gambling frequency (Pre-epidemic)	Once a week	81	24.3	24.3
	Once a month	126	37.7	62.0
	Once a day	23	6.9	68.9
	Irregular	104	31.1	100.0
Gambling Budget (Pre-epidemic)	CNY 10,000 or below	202	60.5	60.5
	CNY 10,001 to 20,000	76	22.8	83.2
	CNY 20,001 to 30,000	45	13.5	96.7
	CNY 30,001 or above	11	3.3	100.0
Betting Budget (Post-epidemic)	CNY 10,000 or below	156	46.7	46.7
	CNY 10,001 to 20,000	79	23.7	70.4
	CNY 20,001 to 30,000	37	11.1	81.4
	CNY 30,001 or above	18	5.4	86.8
	None budget	44	13.2	100.0
Time spent at the casino	Under 6 hours	172	51.5	51.5
	6 to12 hours	96	28.7	80.2
	1 to 2 day	48	14.4	94.6
	More than 2 days	18	5.4	100.0

4-2- Measurement

The scale was tested with SPSS.26.0 software. The KMO value was 0.951, significantly higher than the standard 0.70, and the Bartlett sphericity test was 5284.222, which was significant (p-value<0.000). The cumulative sum of squares of rotation was 65.045%, greater than 60%. In all observed variables, skewness and kurtosis were less than 3 and 10, respectively, which indicates a normal distribution [71]. The variance explained by the common method bias factor was 0.8% of the total interpreted variance, much less than 25% [72]. Therefore, common method bias does not exist in our data.

For all variables, Cronbach's alpha was significantly higher than 0.70, implying adequate internal consistency [73]. By employing AMOS26.0 software, the Confirmatory Factor Analysis (CFA) was examined, as indicated in Table 2. The composite reliability (CR) was between 0.884 and 0.938, meaning that the measurement model has the reliability and internal consistency of the latent construct [74]. The Average Extraction Variance (AVE) value for each potential variable was between 0.547 and 0.604, which indicates that the measurement model has accepted convergent validity [75]. Thus, the model meets the required standards and has acceptable convergence validity.

Table 2. Confirmatory Factor Analysis

Item		Loading	SMC	CR	AVE	C α
Epidemic impact	I often feel depressed or depressed after the epidemic	0.741	0.549	0.878	0.547	0.884
	After the epidemic, I was frustrated that I couldn't travel	0.66	0.436			
	I often feel anxious after the epidemic	0.769	0.591			
	The coronavirus epidemic has increased the burden on families	0.731	0.534			
	I'm willing to spend less money on gambling after the epidemic	0.695	0.483			
	My job has been precarious since the epidemic	0.831	0.691			
Gambling motivation	I gamble because my friends are also involved in gambling	0.794	0.630	0.932	0.604	0.928
	I gamble because it allows me to make friends	0.799	0.638			
	I bet because it allows me to get along well with others	0.767	0.588			
	I bet because I want to escape life's problems	0.789	0.623			
	I bet because I want to experience excitement and fun	0.77	0.593			
	I bet because it reduces stress and tension	0.81	0.656			
	I regard gambling as an investment	0.705	0.497			
	I gamble to make money from gambling to change my life	0.729	0.531			
	I gamble because it brings me financial income	0.823	0.677			

Gambling behavior	I like to be involved in gambling-related activities to socialize	0.763	0.582	0.930	0.596	0.938
	I will go without hesitation if someone invites me to gamble	0.762	0.581			
	I will quit or delay important social activities to gambling	0.757	0.573			
	I feel sorry for my gambling behavior and the consequences	0.768	0.590			
	I extend my gambling time when I feel stressed and nervous	0.825	0.681			
	I gamble more often when I'm feeling down	0.737	0.543			
	I was able to bet on a budget when I gambled	0.748	0.560			
	I can control how much money I gamble	0.799	0.638			
	I often bet big when I gamble	0.787	0.619			

***<0.001

The Average Variance Extracted (AVE) square root was used to measure the correlation between each construct and the other variables. The value of the square root of AVE (see Table 3) was significantly higher than the construct's correlation square with other constructs, indicating that convergent validity was considered valid [73]. The discriminant validity of the measurement is considered good.

Table 3. Mean values, stand deviation, and correlation coefficient

(n=334)	Convergence validity		M	S. D	Discriminant validity		
	Cronbach's α	AVE			MPA	MGM	MGB
MPA	0.884	0.547	2.650	0.741	**0.740**	-	-
MGM	0.928	0.604	3.697	0.834	-0.581**	**0.777**	-
MGB	0.938	0.596	3.702	0.839	-0.395**	0.282**	**0.772**

MPA = Epidemic impact; MGB = Gambling behavior; MGM = Gambling motivation.

In the structural model, the X^2/df value was 1.307, the GFI value was 0.931, the AGFI value was 0.914, the NFI value was 0.942, the TLI value was 0.984, the CFI value was 0.986, and the RMSEA value was 0.030, which were satisfactory when compared with the ideal values. Thus, all indicators' values meet the standard requirements for an acceptable model fit.

4-3- Results

Table 4 summarizes the SEM results for the proposed path model. As can be seen, all the indices were within the acceptable range, presenting a satisfactory model fit (refer to Table 4). Gambling motivation positively affected gambling behavior with a path coefficient of 0.299 (t = 5.64, p-value<0.01. The epidemic impact significantly positively affected gambling motivation with a path coefficient of -0.508 (t=11.223, p-value<0.001), and the epidemic impact positively affected gambling behavior with a path coefficient of -0.355 (t=6.917, p-value<0.001). Thus, hypotheses H1 to H3 were supported.

Table 4. Path Analysis

Path		COEF			t	p	95.0% CI			R^2
		B	St E	Beta			Lower Bound	Upper Bound	VIF	
MGM	(constant)	5.043	0.126	-	39.99	0	4.795	5.2	-	0.275
	MPA	-0.508	0.045	-0.524	-11.223	0	-0.597	-0.419	1	
MGB	(constant)	3.538	0.294	-	12.046	0	2.96	4.115	-	0.334
	MPA	-0.355	0.051	-0.364	-6.917	0	-0.456	-0.254	1.379	
	MGM	0.299	0.053	0.297	5.64	0	0.195	0.403	1.379	

*** p-value<0.001; MPA = Epidemic impact; MGB = Gambling behavior; MGM = Gambling motivation.

Furthermore, we used SPSS26. PROCESE2.16 software to conduct the bootstrapping method to examine the mediating effect between epidemic impact, gambling motivation, and gambling behavior (refer to Table 5). The results obtained indicate that the CI (confidence intervals) for the direct effect (-0.45; -0.254), indirect effect (-0.228; -.085), and total effect (-0.597; -0.417) did not include zero (0), which means that the total, indirect, and direct effects were significant. Therefore, gambling motivation partially negatively affected the relationship between epidemic impact and gambling behavior. Thus, H4 was supported.

Table 5. Mediating effect test

Total effect of MPA on MGB					
Effect	**SE**	**t**	**p**	**LLCI**	**ULCI**
-0.507	0.046	-11.094	0	-0.597	-0.417
Direct effect of MPA on MGB					
Effect	**SE**	**r**	**p**	**LLCI**	**ULCI**
-0.35	0.051	-6.91	0	-0.45	-0.254
Indirect effect of MPA on MGB					
Effect	**SE**	**SE**		**LLCI**	**ULCI**
MGM	-0.153	0.037		-0.228	-0.085
Normal theory tests for indirect effect					
Effect	**SE**	**Z**		**p**	
-0.152	0.030	-5.024		0	

MPA = Epidemic impact; MGB = Gambling behavior; MGM = Gambling motivation.

SPSS 26. PROCESS2.16 software was used to test the moderating effect of anti-epidemic measures between epidemic impact and gambling motivation and the moderating effect of anti-epidemic measures between epidemic impact and gambling behavior. Anti-epidemic measures had a ΔR^2(0.019) and a ΔF(8.793) mean that had a positive moderating effect between epidemic impact and gambling motivation (see Table 5). This moderating effect is shown in Figure 2. Anti-epidemic measures had a ΔR^2(0.038) and a ΔF (18.758) mean that had a positive moderating effect between the epidemic impact and gambling behavior (Table 6). This moderating effect is illustrated in Figure 3. Thus, H5 and H6 were supported.

Table 6. Income, promotion moderating effect test

Model 1	**R**	**R-sq**	**MSE**	**F**	**df1**	**df2**	**p**
	0.545	0.297	0.493	46.531	3	330	0
	coeff	se	t	p	LLCI	ULCI	
constant	3.777	0.047	80.384	0	3.685	3.87	
AEM	-0.091	0.077	-1.176	0.24	-0.242	0.061	
MPA	-0.364	0.078	-4.663	0	-0.518	-0.211	
int_1	-0.139	0.047	-2.965	0.003	-0.232	-0.047	
Product terms key: int_1 MPA X AEM							
R-square increase due to interaction(s):							
	R2-chng	F	df1	df2	p		
int_1	0.019	8.793	1	330	0.003		
Model 2	**R**	**R-sq**	**MSE**	**F**	**df1**	**df2**	**p**
	0.571	0.326	0.479	53.289	3	330	0
	coeff	se	t	p	LLCI	ULCI	
constant	3.817	0.046	82.457	0	3.726	3.908	
AEM	-0.211	0.076	-2.783	0.006	-0.361	-0.062	
MPA	-0.237	0.077	-3.083	0.002	-0.389	-0.086	
int_1	-0.2	0.046	-4.331	0	-0.291	-0.109	
Product terms key: int_1 MPA X AEM							
R-square increase due to interaction(s):							
	R2-chng	F	df1	df2	p		
int_1	0.038	18.758	1	330	0		

MPA = Epidemic impact; MGB = Gambling behavior; MGM = Gambling motivation; AEM=Anti-epidemic measures

Table 7. Hypotheses Test Results

Hypotheses	B	T Values	ΔR^2	ΔF	P Values	Result
H1: Gambling motivation positively affects gambling behavior.	0.299	5.64	-	-	0	Accepted
H2: Epidemic impact negatively affects gambling motivation.	-0.508	11.223	-	-	0	Accepted
H3: Epidemic impact negatively affects gambling behavior.	-0.355	6.917	-	-	0	Accepted
H4: Gambling motivation mediates epidemic impact and gambling behavior.	-0.152	-5.024	-	-	0	Accepted
H5:Anti-epidemic measures moderate epidemic impact on gambling motivation	-	-	0.019	8.793	0.003	Accepted
H6: Anti-epidemic measures moderate epidemic impact on gambling behavior	-	-	0.038	18.758	0	Accepted

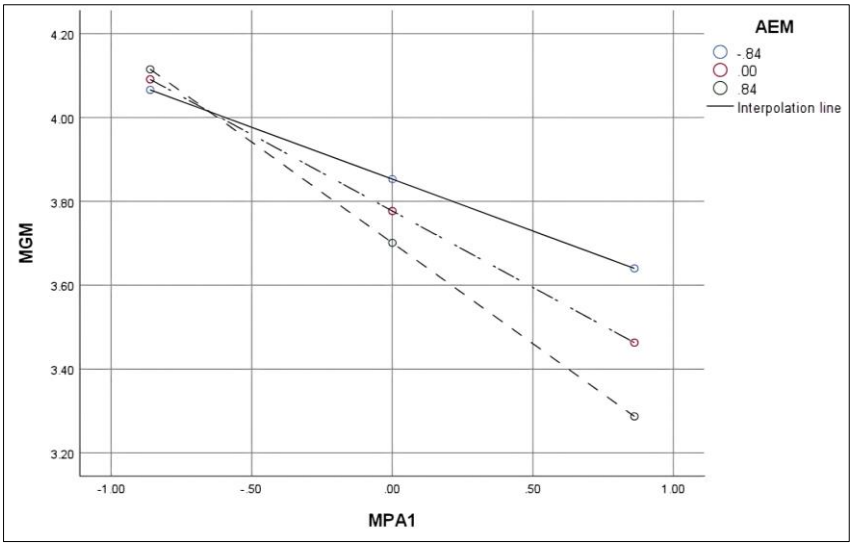

Figure 2. The moderating effect of AEM between epidemic impact and gambling motivation

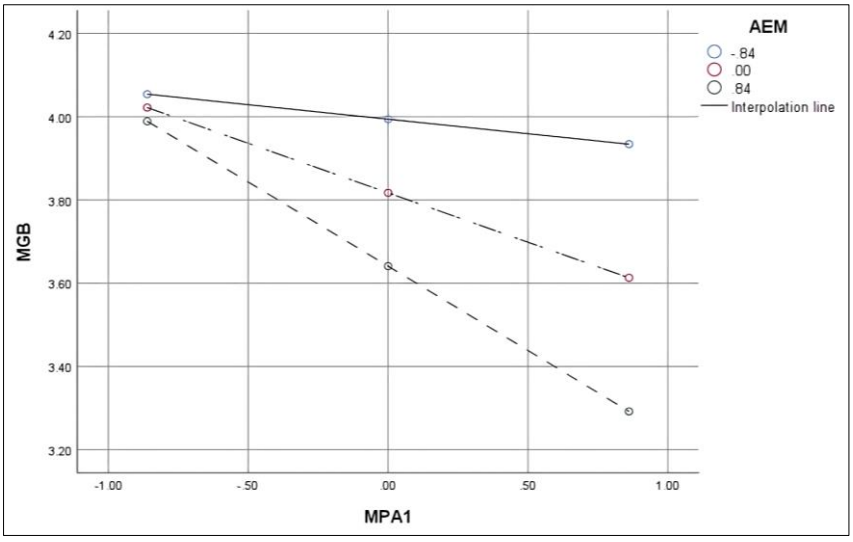

Figure 3. The moderating effect of AEM between epidemic impact and gambling behavior

5- Discussion

This research mainly discusses how the COVID-19 epidemic influences gambling motivation and behavior and the role of anti-epidemic measures on gambling motivation and behavior. This study investigated gamblers from mainland China who visited Macao Special Administrative Region in early 2021, and all hypotheses postulated in the proposed conceptual framework were supported by the empirical research conducted, as detailed next.

5-1- Discussion

Firstly, this study found that the epidemic's impact negatively affected gambling motivation. This result means that the more significant the epidemics' influence, the lower the gamblers' motivation. The COVID-19 epidemic has been a

widespread influence with catastrophic consequences, including the financial situation of gamblers, which was deeply affected after this outbreak [7]. Gamblers also felt psychological and social barriers [11], lifestyle behaviors, depression [18], and reduced their intention to travel [15]. On the one hand, gamblers have been facing health risks when traveling. On the other hand, travel restrictions, health checks, and the isolation of government policies have brought certain social costs [76]. Such circumstances implicate a reduction in gambling motivation. Furthermore, the prevention measures of companies showed that gambling behavior was also reduced during the epidemic. Ultimately, all forces combined, particularly a diminished gambling motivation, led to a decline in gambling behavior.

In addition, this study found that the epidemic directly negatively influences gambling behavior. The greater the epidemic impact, the lower the gambling behavior of gamblers. This result shows that the epidemic impacted the gamblers' families' income. While their earnings were reduced during the epidemic, the betting amount and the gambling budget got reduced [53]. On the other hand, reduced income and the impact of travel restrictions during the epidemic must also have affected travel behavior [22].

Additionally, entertainment restrictions, such as social distancing, have reduced the scope of people's social activities to a certain extent. Casino gambling and entertainment activities are known to be complementary, particularly in areas with casino-integrated resorts such as Macao. As a result, the length of stay of gambling tourists and the amount and number of times gamblers wagered decreased [26]. The restrictions imposed by the public health authorities, such as physical distancing and lockdowns [61], reduce the social scope of gambling and influence gambling behavior to some extent, and gamblers' gambling behavior decreased or remained unchanged [53]. These arguments imply that exposure to gambling facilities during the epidemic may gradually decrease interest in gambling or modify the gamblers' habitual gambling behavior.

Secondly, this study revealed that gambling motivation partially negatively mediates the relationship between the epidemic impact and gambling behavior. The epidemic's impact and gambling motivation directly affect gambling behavior. Additionally, the epidemic's impact affects gambling behavior through gambling motivation. Gambling motivation has a significant positive effect on gambling behavior, meaning that the higher the gambling motivation, the higher the gambling behavior of gamblers [26]. The desire to win dominates Chinese gamblers' gambling motivations [77], but the Chinese gamblers who visit Macao also have other drives, including social and entertainment reasons. Therefore, pre- and post-epidemic, gambling motivation positively impacts gambling behavior [25, 56, 59]. Our study revealed that the epidemic impact negatively affected gambling motivation, and the negative impact on gambling behavior can be reduced through diminished gambling motivation.

Thirdly, the results revealed that anti-epidemic measures positively moderated the epidemic's impact on gambling motivation. The epidemic prevention policies of the government and enterprises caused by the epidemic eventually reduced gambling behavior [53], so the anti-epidemic measures lowered the motivation of gamblers to increase their income through gambling. In addition, the results revealed that anti-epidemic measures positively moderated the epidemic's impact on gambling behavior. These results showed that under the influence of the epidemic, the government's travel restrictions, casino quarantine restrictions, and other epidemic prevention policies could restrain the behavior of gamblers in the casino to a certain extent, reducing the length of stay in the casino, the number of bets, and the gambling behavior of gamblers. In particular, travel restrictions during the epidemic have profoundly impacted travel behavior. These results confirm the interference effect of behavioral intervention of anti-epidemic measures on gambling motivation and behavior.

6- Conclusion

This paper first proposes to analyze the COVID-19 epidemic's impact on the income and emotions of mainland Chinese gamblers visiting Macao. To that end, gambling motivation and behavior were thoroughly examined. This study theoretically contributes to the environment's behavior from the perspective of an epidemic. The consequences of the anti-epidemic measures are multifaceted. The behavioral intervention of the anti-epidemic measures could effectively block the behavior for epidemic control, which also brings a moderation impact between epidemic impact and gambling motivation and behavior, contributing to the behavior theory [78, 79]. This finding implies that anti-epidemic measures influence gambling behavior intentions under complex economic, social, and political backgrounds.

As a result of the current epidemic impact, the government's travel restrictions and casinos' epidemic prevention measures have reduced gambling intentions. Vaccinations and COVID-19 tests for the population could improve the citizens' sense of security. The health code monitoring ensured that tourists could still travel during the epidemic, particularly from Mainland China to Macao. By increasing the security measures and health precautions in casinos, gamblers' social gambling behavior could also be protected, enhancing their motivation to gamble. On the other hand, the epidemic has led to a reduction in on-site gambling behavior. Therefore, these physical restrictions could assist in controlling problem gambling. However, long-term on-site gambling restrictions may stimulate and increase online gambling. Consequently, it is recommended to increase non-gambling activities, which will effectively relieve the psychological pressure caused by the epidemic.

6-1- Limitations and Future Research

The research has several limitations. Firstly, the study collected data through WeChat groups online, so the sample scope was insufficient to reach all types of gamblers. Future research should target the research object at Macao's entry and exit ports to make the research more solid with widened data. Secondly, in the current study, gambling behavior remains related to past experiences [43], and comparative research could be a good direction for future research. Thirdly, future research can examine anti-epidemic policies to benefit Macao's government by improving its performance, enhancing the city's attractiveness, promoting the territory more effectively, and attracting mainland Chinese tourists.

7- Declarations

7-1- Author Contributions

Conceptualization, J.Q.Z. and W.J.H.; methodology, J.Q.Z. and W.J.H.; software, W.J.H.; formal analysis, J.Q.Z. and S.M.; data curation, J.Q.Z. and W.J.H.; writing—original draft preparation, J.Q.Z., W.J.H., and S.M.; writing—review and editing, J.Q.Z. and S.M. All authors have read and agreed to the published version of the manuscript.

7-2- Data Availability Statement

Data sharing is not applicable to this article.

7-3- Funding

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7-4- Institutional Review Board Statement

Not applicable.

7-5- Informed Consent Statement

Not applicable.

7-6- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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Appendix I

Table A-1. Research Questionnaire- Epidemic impact

Number	Statement	Alternative Answer				
		Strongly Disagree	Don't Agree	Quite Agree	Agree	Strongly Agree
1	I often feel depressed or depressed after the epidemic					
2	After the epidemic, I was frustrated that I could not travel.					
3	I often feel anxious after the epidemic					
4	The coronavirus epidemic has increased the burden on families.					
5	I'm willing to spend less money on gambling after the epidemic					
6	My job has been precarious since the epidemic					

Table A-2. Research Questionnaire- Gambling motivation

Number	Statement	Alternative Answer				
		Strongly Disagree	Don't Agree	Quite Agree	Agree	Strongly Agree
1	I gamble because my friends are also involved in gambling.					
2	I gamble because it allows me to make friends.					
3	I bet because it allows me to get along well with others.					
4	I bet because I want to escape life's problems.					
5	I bet because I want to experience excitement and fun.					
6	I bet because it reduces stress and tension.					
7	I regard gambling as an investment.					
8	I gamble to make money from gambling to change my life.					
9	I gamble because it brings me financial income.					

Table A-3. Research Questionnaire- Gambling behavior

Number	Statement	Alternative Answer				
		Strongly Disagree	Don't Agree	Quite Agree	Agree	Strongly Agree
1	I like to be involved in gambling-related activities and socialize.					
2	I will go without hesitation if someone invites me to gamble.					
3	I will quit or delay important social activities to gambling.					
4	I feel sorry for my gambling behavior and the consequences.					
5	I extend my gambling time when I feel stressed and nervous.					
6	I gamble more often when I'm feeling down.					
7	I was able to bet on a budget when I gambled.					
8	I can control how much money I gamble.					
9	I often bet big when I gamble.					