

REGULAR ARTICLE

Money or health? The effect of pathogen avoidance motives and life history strategies on health-economic trade-offs during the COVID-19 pandemic

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Funding information

Natural Science Foundation of Jiangsu Province, Grant/Award Number: BK20230382

Abstract

The COVID-19 pandemic has caused governments and individuals to face important but difficult trade-offs between health and the economy. How do individuals choose between health and economic outcomes during the pandemic? Based on the behavioural immune system (BIS) theory and the life history (LH) theory, the present study examined the effects of individual differences in pathogen disgust sensitivity and life history strategy on people's health-economic trade-offs during the COVID-19 pandemic. Results of an online study ($N=300$) showed that people with higher pathogen disgust sensitivity felt less sense of control during the pandemic, and therefore chose health-related options over economic-related options. In addition, the association between pathogen disgust sensitivity and health outcome preference only existed in people with relatively faster life history strategies. Further, people's health-economic trade-offs were not influenced by their current economic status. Findings have important implications for policymakers and the public to understand people's health-economic choices during the pandemic.

KEYWORDS

COVID-19, disgust sensitivity, economic-health trade-offs, life history strategies, sense of control

1 | INTRODUCTION

The outbreak of the COVID-19 pandemic has prompted governments around the world to adopt unprecedented measures to control the spreading of the infection. Especially at the early stage of the pandemic, the mortality rates of COVID-19 were reported as 10 times higher than influenza, and the virus had rapidly infected more than 1.3 million people worldwide in 100 days (United Nations News, 2020). Many countries thus chose to impose severe restrictions, such as lockdowns of various economic and social activities, which effectively mitigated the spread of the pandemic. However, the lockdown policies have also come with substantial short-term economic costs (Carrieri et al., 2021). For example, the National Bureau of Statistics of China found

that GDP fell 6.8% in the first 3 months of the outbreak (NBSC, 2021). Similarly, the Bank of Italy (2020) reported that each week of closures of non-essential activities reduced Italian GDP by 0.5%–0.75%.

After 2 years of the outbreak, as the virus continues to mutate and an increasing number of people are vaccinated, the mortality of COVID-19 has gradually decreased (Li et al., 2022; Zawbaa et al., 2022). Therefore, many countries have abolished strict pandemic prevention policies and restored normal production and living order. Nevertheless, COVID-19 continues to affect people's lives. To coexist with COVID-19, individuals will continue to face the inevitable trade-offs (Belle & Cantarelli, 2021). Some recent research investigated individuals' choices between health and the economy. For example, Chorus et al. (2020) found that

in facing choices between health impacts and those related to easing lockdown measures aimed at economic development, Dutch people believed that limiting the spread of COVID-19 through lockdowns was a rarely contested priority during the severe stages of the pandemic. Nevertheless, related research showed that the priorities were modified when participants were randomly presented with COVID-19 death estimates or COVID-19 income loss predictions (Heap et al., 2020), and people preferred to avoid income losses over the reduction in the number of victims by the same percentage (Belle & Cantarelli, 2021). Although these studies focused on people's preferences for health-economic trade-offs, they did not explore the psychological mechanisms and individual differences behind the trade-offs. Based on the behavioural immune system and life history theory frameworks, the present study aims to understand how individual differences in pathogen disgust sensitivity, sense of control during the pandemic, and life history strategies may influence people's health-economic trade-offs during the COVID-19 pandemic.

2 | THE BEHAVIOURAL IMMUNE SYSTEM AND HEALTH-ECONOMIC TRADE-OFFS

Pathogens have always played an essential role in human evolutionary history, restricting the survival and reproduction of humans (Inhorn & Brown, 1990; Loehle, 1995; Tooby, 1982). Those who survive from the recurring pressure to avoid diseases have evolved defence mechanisms against pathogens, such as the behavioural immune system (Schaller, 2006; Wu & Chang, 2011). Specifically, the behavioural immune system includes specific emotional, cognitive and behavioural components that help to avoid objects and people that pose potential pathogen threats (Schaller & Duncan, 2007).

As a dynamic component of the behavioural immune system, disgust plays a vital role in recognizing pathogenic cues and motivating subsequent behavioural responses. Environmental cues associated with disease transmissions (e.g., sneezing) often elicit people's pathogen disgust responses (Marzillier & Davey, 2004; Rozin et al., 2008). Notably, the tendency to experience disgust toward such cues, which is called disgust sensitivity, varies across individuals (Hartmann & Siegrist, 2018; Tybur et al., 2011). Recent research found that individual differences in pathogen disgust sensitivity play an essential role in people's responses during the pandemic. For example, people with higher pathogen disgust sensitivity reported greater emotional and life distress during the COVID-19 pandemic (Ding et al., 2021) and exhibited more preventative health behaviours such as wearing masks and engaging in social distancing (Díaz & Cova, 2021; Shook et al., 2020). Therefore, the present

study hypothesized that individuals with higher pathogen disgust sensitivity might choose more health-related options over economic-related options in facing health-economic trade-offs during the pandemic.

Furthermore, the uncertainty surrounding the pandemic and the increase in COVID-19 cases are likely to reduce people's sense of control (Elemo et al., 2022). Sense of control is the belief that individuals can shape their lives (Gurin et al., 1978; Kay et al., 2009; Lachman & Weaver, 1998). Previous research found that sense of control significantly influenced people's reactions toward economic and health uncertainties (Li et al., 2020; Mittal & Griskevicius, 2014). Individuals with higher sense of control are more likely to effectively cope with stressors (Compas et al., 1991; Folkman, 1984; Frazier et al., 2011). Relevant studies in the context of the COVID-19 pandemic found that sense of control was significantly related to health-protective behaviours such as social distancing (Hills & Eraso, 2021) and hand washing (Trifiletti et al., 2022). Additionally, Zhu et al. (2020) suggested that individuals' and especially adolescents' sense of control influences their health-protective behaviours and attitudes towards disease control measures, and such effect was affected by whether they come from a collectivist or individualist society. Thus, we suggest that sense of control may have a mediating role between pathogen disgust sensitivity and health-economic trade-offs. To be specific, people with high pathogen disgust sensitivity may have a lower sense of control over the pandemic than those with low pathogen disgust sensitivity, and choose more health-related options in the health-economic trade-offs to protect themselves.

3 | THE MODERATING ROLE OF LIFE-HISTORY STRATEGIES

In addition to individual differences in people's susceptibility to pathogens, we believe that people's upbringing and living environment will also influence their health-economic trade-offs in the pandemic, which could be elaborated from a life history strategy perspective. How do organisms allocate limited time and energy to activities that maximize their reproductive fitness? Evolutionists and ecologists have proposed life history theory to answer this question (Kaplan & Gangestad, 2005; Stearns, 1992). In allocating such limited resources, individuals must make the most basic trade-offs between somatic and reproductive efforts to adapt to the environment of evolutionary adaptedness (EEA, Griskevicius et al., 2011). An individual's life history strategy is the tendency or pattern of investment trade-offs made, which often vary on a slow-to-fast continuum, with some individuals following slower and others following faster strategies (Ellis et al., 2009; Figueredo et al., 2004; Nettle, 2010; Promislow & Harvey, 1990). Individuals adopting fast life history strategies are more

likely to prioritize reproductive effort over somatic effort. They mature earlier and will use their limited resources to reproduce earlier rather than further develop themselves (Belsky et al., 1991; Ellis, 2004). In contrast, slower strategies favour somatic effort over reproductive effort, which means they will prioritize improving their strength and development potential, rather than producing offspring as soon as possible (Belsky et al., 1991; Ellis, 2004).

Individual differences in life history strategies develop partly in response to early-life experiences (Brumbach et al., 2009; Griskevicius et al., 2011). Those who grew up in harsh and unpredictable childhood environments would develop fast life history strategies. In contrast, individuals raised in safe and stable environments tend to develop slow life history strategies (Belsky et al., 1991, 2012). Previous research suggested that people's childhood life environment can sensitize people's life history strategies, which will further influence people's behaviours in stressful or uncertain specific environments (Griskevicius et al., 2011). Specifically, when the current adult environment is safe and free of high levels of stress and threat, the effects of childhood may be latent and invisible (Taylor, 2010). However, once threat cues appear, individuals with fast life history strategies may notice the threat more quickly and switch to a fast strategy mode, causing them to make short-sighted decisions. While for individuals with slow life history strategies, threat cues will motivate them to adopt slower life history strategies, to be more future-oriented and to refuse to take risks (Griskevicius et al., 2011; White et al., 2013).

COVID-19 has led to enormous threats to public health and economic development worldwide (Pak et al., 2020; Pfefferbaum & North, 2020). In this threat and uncertainty scenario, those with different life history strategies may have significantly different preferences in the health-economic trade-offs. Previous research suggested that individuals with different life history strategies respond to pathogen cues differently. For example, Lu et al. (2021) proposed that slow life history strategy may lead to more preventive behaviours against pathogen stress, which represents an intrinsic death threat that can be prevented. Consistent with this idea, research found that people with slower life history strategies in the pandemic were more adherent to precautions and endorsement of medical solutions (Corpuz et al., 2020). On the contrary, fast life history strategists tend to have a stronger threat perception due to their perceived vulnerability (Park et al., 2020) and be more present-oriented than slow life history strategists (Chang et al., 2019). Therefore, when there are no pathogen cues in the environment, individuals with fast life history strategies tend to pay less attention to their health. However, when pathogens become a major threat in the present environment, they become more conscious of their health and take more health-protective behaviours in response to the present threat. In contrast, individuals with slow life

history strategies are generally more concerned about their health (Mittal & Griskevicius, 2016).

Moreover, the effect of pathogen disgust sensitivity on trade-offs may differ among people with distinct life history strategies. For those with high pathogen disgust sensitivity, the fast life history strategy may further increase their threat perception (Giroux et al., 2023), making the relationship between pathogen disgust sensitivity and health-economic trade-offs more significant in those with fast life history strategies; whereas individuals with slow life history strategies may have lower threat perception, which makes the relationship between pathogen disgust sensitivity and health-economic trade-offs less significant.

4 | THE PRESENT STUDY

Based on the behavioural immune system and life history theory, the present study tests whether people with high pathogen disgust sensitivity have less sense of control over the pandemic, and thus choose more health-related options than economic-related options in facing the health-economic trade-offs during the pandemic. In addition, since fast life history strategies may be related to greater sensitivity toward uncertain environments, we hypothesized that the association between pathogen disgust sensitivity and health-economic trade-offs would be stronger among individuals with relatively faster life history strategies.

5 | METHOD

5.1 | Participants

A total of 305 participants were recruited from Credamo, an online participant recruitment platform in China. After rejecting five participants who failed two verification questions, there were 300 valid participants (118 men and 182 women). In setting the target sample sizes, we referred to the sample sizes of previous studies including the mediation and moderation model, which were about 200 people (see Klümper & Sürth, 2023; Mittal & Griskevicius, 2014). In addition, considering the large number of questionnaire questions, we increased the sample size appropriately to ensure that valid results were obtained. The mean age of participants was 30.63 years ($SD=6.02$). In April 2022, we distributed questionnaires when a severe COVID-19 outbreak occurred in Shanghai, China. The city followed a strict lockdown policy in an effort to uphold China's zero-COVID policy, which has caused substantial economic and social disruption across Shanghai and caused extensive social discussion. The language of the questionnaires was Chinese. The questionnaires used to measure pathogen disgust sensitivity, sense of control and life history strategy all used

the translated Chinese version of the questionnaire that had been used within China and had good statistical validity (Chen, 2014; Zhang & Geng, 2021).

5.2 | Measures

5.2.1 | Health-economic trade-offs

We created five job choice scenarios, which simulated people's health-economic trade-offs during the pandemic. In each scenario, participants have to choose between two job options: one has better economic benefits but higher health risks, and the other has lower economic benefits but lower health risks. The five questions were related to different job scenarios and job types. The scenarios were mainly based on the types of work that were more commonly affected by the COVID-19 outbreak in China. For instance, some jobs required frequent travel by public transportation, which on the one hand meant a higher chance of infection and on the other hand meant additional bonuses. However, none of these scenarios involved specific occupational information. For example, one scenario was described as "Suppose you live in a city that is now a medium-risk area for the pandemic. As a

result of the pandemic, your salary will change depending on the form of office (note: your original salary was about the average salary level in the city), and you will need to choose between one of the following two forms of office, you will choose? (a) offline work, and the salary is 100% of the original salary (economy-related option), or (b) work from home, and the salary is 30% of the original salary (health-related option)." The complete health-economic trade-off questionnaire is shown in Table 1. The dependent measure was the number of times people chose the economy-related options.

5.2.2 | Pathogen disgust sensitivity

Participants completed a 7-item pathogen factor of the Three Domain Disgust Scale ($\alpha=0.82$, Tybur et al., 2009), which measures individual differences in sensitivity to pathogen-related disgust. Participants reported how disgusting they found each of seven items (e.g., "stepping on dog poop") on a 1 (not at all disgusting) to 7 (extremely disgusting) scale. We calculated the average score to represent participants' pathogen disgust sensitivity, with a higher average score indicating a higher level of pathogen disgust sensitivity.

TABLE 1 Health-economic trade-off questionnaire.

Trade-offs	Option (a)	Option (b)
1. Suppose you live in a city that is now a medium-risk area for the pandemic. As a result of the pandemic, your salary will change depending on the form of office (note: your original salary was about the average salary level in the city), and you will need to choose between one of the following two forms of office, you will choose?	Offline work, and the salary is 100% of the original salary (economy-related option).	Work from home, and the salary is 30% of the original salary (health-related option).
2. Suppose you live in a city that has just experienced a very serious outbreak, and your company has been forced to shut down due to the nature of your work, which does not allow you to work online, and during this time you have been paid only 20% of your salary. The city is now on the verge of being free of new infections, but it is still an at-risk area. In such a situation, you will wish?	The company continues to maintain shutdowns until it is downgraded to a low-risk area for the pandemic.	Before being reduced to a low-risk area for the pandemic, the company resumed work and production as soon as possible under the premise of ensuring the safety of employees.
3. Suppose the company you work for is expanding its business, the company needs some of its employees to travel frequently, and these employees will often travel by public transport (e.g., high-speed trains, airplanes, etc.) during the pandemic period, and the risk of experiencing a small outbreak of the pandemic will increase, but the company will reimburse the travelling expenses and give a certain amount of salary increase every month as a reward. Adhering to the premise of voluntary enrolment, you will choose?	Do not sign up, you will not receive a monthly salary increase.	Sign up and get 50% of the company's monthly salary increase.
4. Suppose that there are a few confirmed cases in other parts of your city, but none in your district, your company will pay extra pay to those who insist on working offline but will not penalize those who choose to work from home. On a voluntary basis, you will choose?	Work offline and receive an additional ¥150/day in overtime pay.	Work from home and receive no additional overtime pay.
5. Suppose you are currently offered an overseas training opportunity within your company, with expenses incurred during the training period being reimbursed by the company, and you can be promoted and receive a salary increase in your current company after you return from the training, but the epidemic situation in the country you are travelling to is slightly more serious, you will choose?	Accept the training and receive a promotion and a 50% monthly pay increase.	No training, no promotion or raise.

5.2.3 | Life history strategy

Participants completed a 20-item Mini-k questionnaire ($\alpha=0.84$, Figueredo et al., 2006) with ratings from 1 (strongly disagree) to 7 (strongly agree) to measure their life history strategies. The Mini-k questionnaire measures domains such as family social contact and support, friends' social contact and support, and romantic partner attachment. For example, "When growing up, I had a close relationship with my biological mother." Higher scores in the Mini-k questionnaire indicate slower life history strategies.

5.2.4 | Sense of control

Participants completed a three-item measure of personal sense of control during the pandemic ($\alpha=0.90$, adapted from Fontaine et al., 1993) with ratings from 1 (strongly disagree) to 7 (strongly agree). For example, "Generally speaking, I feel I am in control of my life in this pandemic." Higher scores indicate the higher sense of control during the pandemic.

5.2.5 | Demographics

Participants reported their age, gender and average monthly income. We assessed average monthly income with nine categories (1=less than ¥1000; 2=¥1000 to ¥2000; 3=¥2000 to ¥3000; 4=¥3000 to ¥5000; 5=¥5000 to ¥8000; 6=¥8000 to ¥12,000; 7=¥12,000 to ¥15,000; 8=¥15,000 to ¥20,000; 9=¥20,000 or more).

6 | RESULTS

6.1 | The demographic characteristics of participants

Table 2 presents the demographic characteristics of participants of the present study.

6.2 | Common method variance test

We conducted Harman's single-factor test to examine the common method variance (Podsakoff et al., 2003). The test revealed that the first factor accounted for 20.45% of the total variance and did not explain most of the variance (<40%). Thus, there was no obvious common methodological bias in this study.

6.3 | Preliminary analyses

Table 3 shows the correlations and descriptive statistics of all key continuous variables. As expected, the number of times people chose the economy-related options positively correlated with sense of control ($r=0.25$, $p<0.001$). In addition, sense of control negatively correlated with pathogen disgust sensitivity ($r=-0.17$, $p=0.003$), and positively correlated with life history strategy ($r=0.40$, $p<0.001$). However, there was no significant relationship between pathogen disgust sensitivity and the number of times people chose economy-related options. Further, individuals' current average monthly income was not

TABLE 2 Demographic characteristics of our study participants ($N=300$).

Variable	Categories	Frequency	Percentage (%)	Cumulative percentage (%)
Gender	Women	182	60.7	60.7
	Men	118	39.3	100
Number of times people chose the economy	0	53	17.7	17.7
	1	48	16.0	33.7
	2	27	9.0	42.7
	3	34	11.3	54.0
	4	62	20.7	74.7
	5	76	25.3	100
Average Monthly Income	<¥1000	8	2.7	2.7
	¥1000–¥2000	6	2.0	4.7
	¥2000–¥3000	8	2.7	7.3
	¥3000–¥5000	40	13.3	20.7
	¥5000–¥8000	63	21.0	41.7
	¥8000–¥12,000	97	32.3	74.0
	¥12,000–15,000	28	9.3	83.3
	¥15,000–20,000	18	6.0	89.3
>¥20,000	32	10.7	100	

TABLE 3 Correlations among the key continuous variables.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4
1. Number of times people chose the economy	2.77	1.87				
2. Pathogen disgust sensitivity	4.80	1.10	-0.06			
3. Sense of control	5.02	1.33	0.25***	-0.17**		
4. Life history strategy	5.68	0.60	0.07	0.08	0.40***	
5. Current average monthly income	5.76	1.79	-0.03	-0.08	0.24***	0.30***

Note: $N=300$. ** $p<0.01$; *** $p<0.001$.

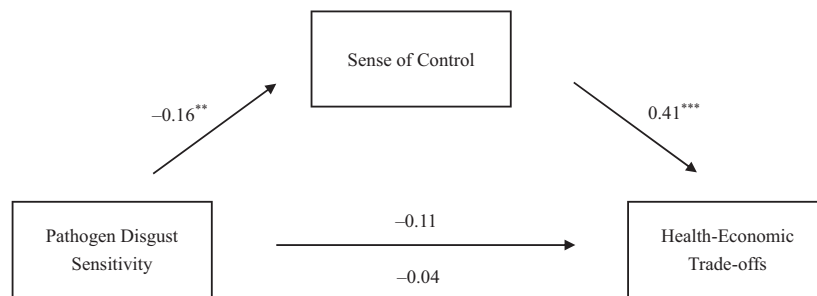


FIGURE 1 The mediating role of sense of control between pathogen disgust sensitivity and health-economy trade-offs. Significance of the standardized regression coefficients is indicated (** $p<0.01$ and *** $p<0.001$).

significantly correlated with the number of times people chose economy-related options.

6.4 | Mediation analysis

To investigate whether sense of control mediated the effect of pathogen disgust sensitivity on health-economic trade-offs, we conducted a mediation analysis in which the number of times people chose the economy-related options was the dependent variable, pathogen disgust sensitivity was the independent variable, and sense of control was the mediator. Given that people's current economic status, gender and age may influence their trade-offs between health and the economy, we included individuals' current average monthly income, gender and age as covariates in the model. We used the PROCESS macro in the IBM SPSS software developed by Hayes (2012) and conducted a mediation analysis using Model 4 of the PROCESS macro. Results are determined through the bootstrapping procedure based on 5000 bootstrap samples. The results showed a significant indirect effect of sense of control on the relationship between pathogen disgust sensitivity and the number of times people chose the economy-related options ($B=-0.07$, $SE=0.03$, 95% CI [-0.13, -0.02], see Figure 1), which suggests people with high pathogen disgust sensitivity experienced lower sense of control during the pandemic, and thus chose more health-related options in facing the health-economic trade-offs.

6.5 | Moderation analysis

To test the hypothesis that life history strategy moderates the association between pathogen disgust sensitivity and health-economic trade-offs, we first conducted a regression analysis on relevant variables (see Table 4). The number of times people chose the economy-related options was the dependent variable. Pathogen disgust sensitivity, life history strategy, and their interactions were the predictors. Given that people's present economic status, gender and age may have influenced their health-economic trade-offs, we added individuals' current average monthly income, gender and age as a covariate in a separate model. In the regression model, the main effect of pathogen disgust sensitivity was significant. Specifically, people with high pathogen disgust sensitivity would choose more health-related options. However, the main effect of life history strategy was marginally significant. In addition, the Pathogen disgust sensitivity \times Life history strategy interaction was significant. Further simple slope tests revealed a negative relationship between pathogen disgust sensitivity and number of times people chose economy-related options for those with relatively faster (-1 *SD*) life history strategy ($B=-0.31$, $SE=0.12$, 95% CI [-0.54, -0.07], see Figure 2), whereas there was no relationship between these constructs for those who have relatively slower ($+1$ *SD*) life history strategy ($B=0.08$, $SE=0.13$, 95% CI [-0.17, 0.34], see Figure 2). Furthermore, this interaction remained significant even when the current average monthly income, gender and age was entered into the model simultaneously.

TABLE 4 Regression analyses of moderating model: Predictors of health-economic trade-offs.

	Model 1			Model 2		
	<i>B</i>	<i>t</i>	<i>p</i>	<i>B</i>	<i>t</i>	<i>p</i>
Pathogen disgust sensitivity (PDS)	-1.87	-2.56	0.01	-1.96	-2.67	0.01
Life history strategy (LH)	-1.25	-1.96	0.05	-1.24	-1.93	0.06
PDS × LH	0.31	2.43	0.02	0.33	2.52	0.01
Current average monthly income				-0.04	-0.61	0.54
Gender				-0.27	-1.20	0.23
Age				-0.02	-1.15	0.25
	$\Delta R^2=0.02; F=2.89; p=0.04$			$\Delta R^2=0.02; F=2.00; p=0.06$		

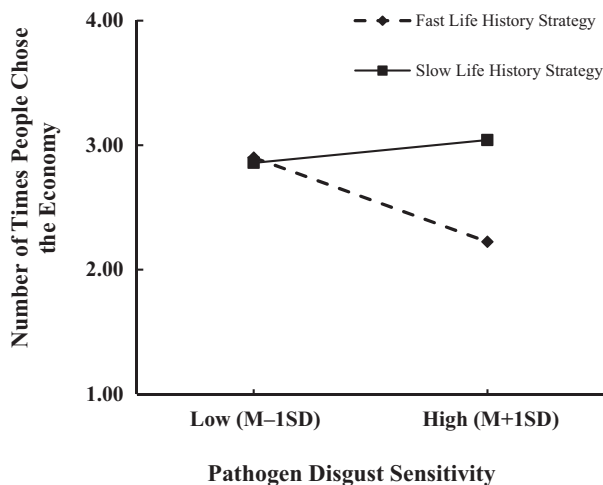


FIGURE 2 The simple slope test of life history strategy between pathogen disgust sensitivity and health-economy trade-offs.

Additionally, we attempted to combine the two models of mediation and moderation into one by constructing a moderated mediation model, using sense of control as the mediating variable and life history strategy as the moderating variable (see Figure 3). Individuals' current average monthly income, gender and age were included as covariates in the model. Results showed that the moderating effects of life history strategy were not significant for the path from pathogen disgust sensitivity to sense of control ($B=0.07$, $SE=0.05$, 95% CI [-0.01, 0.15]), and for the path from sense of control to the number of times people chose the economic-related options ($B=0.01$, $SE=0.02$, 95% CI [-0.05, 0.04]). But the moderating effect of life history strategy was significant for the path from pathogen disgust sensitivity to the number of times people chose the economy-related options ($B=0.27$, $SE=0.13$, 95% CI [0.02, 0.51]).

7 | DISCUSSION

The coronavirus outbreak caused unprecedented challenges around the world (Trougakos et al., 2020). Countries and people encounter an inevitable but

unfortunate trade-off between lives and the economy (Crook, 2020). Therefore, it is important to understand people's choices between health and economic outcomes during the pandemic and the underlying psychological mechanisms. Based on behavioural immune system and life history strategy theory, results of the present study confirmed the idea that individuals with higher pathogen disgust sensitivity felt less sense of control over the pandemic and less sense of control was related to choosing fewer economy-related options in the health-economic trade-offs during the pandemic. In addition, the effect of pathogen disgust sensitivity on health-economic trade-offs was significant only for those with faster life history strategies. The current study is the first step in understanding the psychological mechanisms of people's health-economic choices during the pandemic, and it raises critical issues for future research.

First, the present study revealed an indirect effect of sense of control on the association between pathogen disgust sensitivity and health-economic trade-offs. Specifically, people with higher pathogen disgust sensitivity reported less sense of control and chose more health-related options during the pandemic. The indirect effect was consistent with the behavioural immune system literature on personality. Previous studies found that people with high disgust sensitivity would be more sensitive to social stimuli and have a higher level of neuroticism (Druschel & Sherman, 1999; Haidt et al., 1994). The COVID-19 pandemic has caused the loss of many resources. People with high pathogen disgust sensitivity may perceive more pathogenic environmental threats and thus have a lower sense of control. Consistent with this idea, relevant studies during the pandemic found that pathogen disgust sensitivity positively predicted risk perceptions toward the pandemic (Li et al., 2020), which may lead to a lower sense of control. The indirect effect found in the present study also suggests that individuals with lower sense of control would choose more health-related options in the health-economic trade-offs. This is consistent with previous findings suggesting that people's perceived behavioural control were significantly related to hand washing and social distancing through intentions (Trifiletti et al., 2022), and people with lower

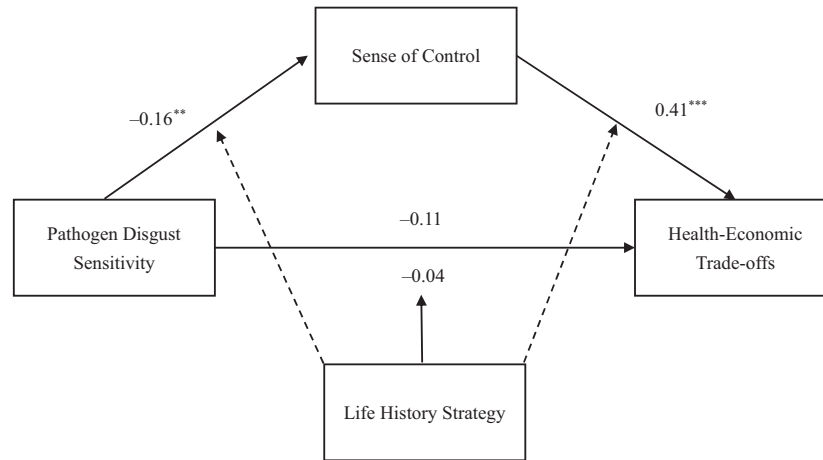


FIGURE 3 Moderated mediator model diagram. The dotted line denotes statistical insignificance of the pathway results. Significance of the standardized regression coefficients is indicated ($**p < 0.01$ and $***p < 0.001$).

sense of control would do more preventive behaviours during the pandemic, such as decreasing their intention to travel and wearing facemasks (Li et al., 2020; Peluso & Pichierri, 2021). Moreover, people with high pathogen disgust sensitivity are more concerned about the pandemic, and thus show more preventative measures (Díaz & Cova, 2021; Shook et al., 2020).

Second, we found that the effect of pathogen disgust sensitivity on people's health-economic trade-offs varies across individuals with different life history strategies. Specifically, the increasing pathogen disgust sensitivity would lead to more health-related options selection among individuals who follow faster life history strategies. In contrast, pathogen disgust sensitivity did not influence health-economic choices for individuals who follow slower life history strategies. The moderating role of the life history strategy was consistent with past research findings, which showing that, when a lot of stress and threats are present in the current adult environment, individuals with relatively scarce resources in their childhood environment often show greater sensitivity and more rapid responses toward the threat, switching to a fast strategy mode to deal with them (Griskevicius et al., 2011; Mittal & Griskevicius, 2016). Similar things also happened during the pandemic. People with higher pathogen disgust sensitivity might have experienced more severe health threats during the pandemic. In response to the growing health threat, those who follow faster life history strategies would respond rapidly by shifting their preferences to focus more on health and choosing more health-related options. Moreover, compared to people with slower life history strategies, people with faster life history strategies have fewer accumulated resources (Belsky et al., 1991; Ellis, 2004). Infection might lead to losses of time and money, and even to death. Thus, during the pandemic, people with faster life history strategies will be more readily changing their preference from economic to health-related options in response to the increasing health threat.

In the moderated mediation model, with pathogen disgust sensitivity as the independent variable, health-economic trade-offs as the dependent variable, sense of control as the mediator and life history strategies as the moderator, we observed the moderating effect of life history strategies solely on the pathway from pathogen disgust sensitivity to health-economic trade-offs, not on the mediating role of the sense of control. Previous research has shown that individuals with fast life history strategies tend to focus more on present-oriented perspectives, and allocate more attention to current threat cues (Mittal & Griskevicius, 2016). As a result, they behave accordingly in response to the current threat and make more health-related choices when faced with pathogen threats. This is consistent with our findings showing a significant moderating effect of life history strategy on the pathway from pathogen disgust sensitivity to health economic trade-offs. However, we found that the moderating effect of life history strategy was not significant in the other two pathways. This may be due to the fact that we collected our data during a period of severe pandemic outbreaks in Shanghai, where people were under high levels of stress and anxiety in the face of the rapid spread of the pandemic. This high level of environmental threat may have obscured the role of life history strategy itself.

The correlation analysis of the present work showed a non-significant correlation between pathogen disgust sensitivity and health-related options. However, we need to understand this insignificant result in combination with other analyses. Firstly, the mediation analysis showed a significant indirect effect between pathogen disgust sensitivity and health-related options via the effect of sense of control, which suggested that even though pathogen disgust sensitivity did not directly influence people's health-related options, it may indirectly influence people's health-related options by affecting people's sense of control. In addition, our results of the moderating model found that the relationship between pathogen disgust sensitivity

and health-related options only existed among those with fast life history strategies, which suggests that pathogen disgust sensitivity can only influence people's health-related choices among a specific group of people.

Notably, the present work did not find the influence of people's current economic status on their health-economic trade-offs. Recent findings during the pandemic showed that individuals with low current socioeconomic status were more concerned with their economic status rather than general public health issues (Green et al., 2021, 2022; Su et al., 2021). While people's current socioeconomic status has been recognized as a factor influencing their health-economic trade-offs. However, in the present work, we found that people's current socioeconomic status did not affect the influences of their life history strategies, which may emphasize the importance of childhood environment on adult decision-making. From a life history perspective, future research could benefit from further comparing the effects of an individual's childhood environment versus their current socioeconomic status on their decision-making in adulthood.

This research makes several significant theoretical and practical contributions. First, we draw on prior literature and theoretical models indicating that COVID-19 outbreaks would affect health-economic trade-offs at the national level (Belle & Cantarelli, 2021; Carrieri et al., 2021; Chorus et al., 2020; Heap et al., 2020). Building on these findings, we broadened the scope of the research and found that COVID-19 outbreaks would also affect health-economic trade-offs at the individual level. Although many researchers have focused on the health-economic trade-offs that were faced in the context of the COVID-19 pandemic, they have mostly explored people's choices about health-economic trade-offs from the perspective of policymakers (Manipis et al., 2021; Oana et al., 2021; Zeytoon-Nejad & Hasnain, 2021), ignoring the fact that health-economic trade-offs were also faced at the individual level. Specifically, our study showed that individuals with high pathogen disgust sensitivity had a lower sense of control during the pandemic and would choose health-related options more often in health-economic trade-offs. This finding offers empirical support for how individuals may make health-economic trade-offs during public health emergencies. Second, our study enriches research related to life history strategies. We found the relationship between pathogen disgust sensitivity and health-related options was only significant among individuals with fast life history strategies. This not only reaffirms previous research findings that individuals with fast life history strategies would quickly change their behaviour and attitudes in response to a threatening situation, but also extends our understanding of the role of life history strategies in real threat situations. Third, previous research on

health-economic trade-offs has focused only on what choices people would make in health-economic trade-offs during a pandemic, neglecting the exploration of psychological mechanisms. Our results suggested that sense of control and life history strategies played important roles in pathogen disgust sensitivity and health-economic trade-offs during a pandemic, which was an important step in exploring the mechanisms of health-economic trade-offs. Last but not least, the findings of this article have various practical implications, especially for policymakers. As shown in our study, in the context of COVID-19 pandemic, individuals' sense of control and life history strategies influenced their choices about health-economic trade-offs. Thus, in the future, if faced with similar public health emergencies, policymakers should endeavour to manage people's sense of control through methods such as timely disclosure of information, and providing effective and temporary assistance to those who do not have sufficient resources to cope with the pandemic. Therefore, the public can be guided to make reasonable choices in the health-economic trade-offs, and unnecessary confusion and panic could be avoided.

We should note that there are some limitations in our present research. First, we collected the static data at a certain stage of the pandemic, therefore it is unclear whether the results would generalize to other contexts. Further longitudinal research on the relationship between people's health-economic trade-offs and the dynamics of pandemic severity would be beneficial. For example, future studies could test whether people's preferences in health-economic trade-offs differ when the pandemic is relatively stable from when it breaks out. Second, we also need to consider the temporal distance perception of economic and health-related options in different pandemic scenarios. That is, which of the economic-related and health-related options is a present-oriented option and which is a future-oriented option? Previous research found that in uncertain situations, people with faster life history strategies were more likely to choose immediate rewards than delayed rewards (Griskevicius et al., 2011, 2013). In our study, people with faster life history strategies were more likely to prefer health-related options when they had higher pathogen disgust sensitivity. Does this suggest that health is an immediate option during an outbreak? If so, would the economy become an immediate option as the pandemic situation changes? This was not directly tested in the present work, and more evidence is needed in this area before firmer conclusions can be drawn. Third, differences in preventive measures in different countries at various stages of the pandemic may be related to the differences in results. Therefore, in follow-up studies, the options of the health-economic trade-offs need to be further adjusted according to the actual situation. Last but not least, the proposed hypothesis regarding the moderating role of life history strategy is primarily associated with two studies (Giroux

et al., 2023; Mittal & Griskevicius, 2016). However, these two articles used childhood socioeconomic status as a proxy for the measurement of life history strategy, rather than directly measuring life history strategy itself. In contrast, our current study used the Mini-k scale to directly measure life history strategy, which is debatable whether the results of the current study can be directly compared to those of Giroux and Mittal & Griskevicius. Yet, current research on life history strategy generally faces the challenge of limited measurement tools (Stearns & Rodrigues, 2020). In the future, expanding measurement methods, such as incorporating physiological indicators (Sear, 2020) could be one of the focuses for future research.

8 | CONCLUSION

The present study demonstrated that individual differences in pathogen disgust sensitivity significantly influenced people's health-economic trade-offs during the pandemic. Specifically, individuals with high pathogen disgust sensitivity had a lower sense of control over the pandemic, and a low sense of control was related to choosing more health-related options. In addition, the association between pathogen disgust sensitivity and health-economic trade-offs only existed in people with relatively faster life history strategies. As COVID-19 continues to spread and coexist with human beings, the findings could be beneficial for governments and policymakers to understand how people make choices between health and economic benefits during the pandemic.

AUTHOR CONTRIBUTIONS

Qingyi Ma: Conceptualization; data curation; formal analysis; methodology; writing – original draft. **Tingting Ji:** Conceptualization; data curation; formal analysis; methodology; writing – review and editing. **Yongyu Guo:** Writing – review and editing.

ACKNOWLEDGEMENTS

This work was supported by the Natural Science Foundation of Jiangsu Province [grant number: BK20230382]. The authors wish to thank Joshua M. Tybur for providing writing suggestions.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

PRE-REGISTRATION STATEMENT

This study was not pre-registered.

RESEARCH MATERIALS AVAILABILITY STATEMENT

The research materials that were used in this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

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How to cite this article: Ma, Q., Ji, T., & Guo, Y. (2024). Money or health? The effect of pathogen avoidance motives and life history strategies on health-economic trade-offs during the COVID-19 pandemic. *Asian Journal of Social Psychology*, 00, 1–13. <https://doi.org/10.1111/ajsp.12601>