Influence of Social Media Contact on College Students' COVID-19 Vaccination Intention – The Mediating Role of Health Beliefs and the Moderating Role of Government Trust

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Abstract

Background

Vaccination is an important measure of campus epidemic prevention and control. At present, the intention of COVID-19 vaccination is mainly affected by the public opinion of vaccine safety, and most college students understand the relevant public opinion information about vaccine safety from social media.

Methods

In this paper, 377 college students were investigated by a questionnaire network. The influence of social media contact on college students’ vaccination intention was analyzed by the hierarchical regression model.

Results

Social media contact, perceived severity of the epidemic situation, and perceived benefits of vaccination had a positive impact on vaccination intention; college students’ health belief partially mediated the relationship between social media contact and vaccination intention, while government trust moderated the relationship between perceived severity, perceived barriers and vaccination intention.

Conclusions

In order to increase the willingness of college students to be vaccinated against the COVID-19, it is recommended to strictly manage public opinion on social media and strengthen the public’s trust in the government.

1. Background

As the global pandemic of COVID-19, the population is still at risk of infection and should not relax their vigilance and take protective measures. In the current situation, vaccination against COVID-19 is recognized as the most effective protective measure against COVID-19 infection, but herd immunity will only be established when at least 70% of the country’s population has been vaccinated. With a total of over 40 million university students in China, the pressure to prevent and control the epidemic in universities is high. For many school students, attitudes towards vaccination are not only shaped by professionals such as doctors and specialists but can also be influenced by information about the epidemic [1].

In recent years, with the development of internet technology, social media has gradually been integrated into people's daily lives. Social media is the most frequently used channel to obtain information about the epidemic among university students during an epidemic [2]. However, outbreak information on social media can be a double-edged sword, with some outbreak information helping to dispel anxiety and motivate individuals to adopt appropriate protective behaviors [3]; conversely, discussions about the safety of vaccination can create anti-vaccination opinions [4], and these vaccine safety opinions can hurt the vaccination intention of some university students, leading to hesitations about vaccination. In this context, how exactly does social media opinion affect university students’ willingness to vaccinate? It is important to explore the impact of social media on university students’ willingness to vaccinate against the COVID-19 for the smooth implementation of vaccination efforts in universities.

Social media first creates awareness of the messages and ideas conveyed by the media, which has an impact on the public's thoughts and behaviors [5]. College students' exposure to information about the epidemic and vaccines through social media creates awareness of the epidemic and vaccines, which subsequently leads to a willingness to vaccinate. Combined with Health Belief Model, perceptions of an epidemic include two main aspects, namely perceived susceptibility and perceived severity of the epidemic; perceptions of vaccines include perceived benefits and perceived barriers to vaccination. When university students are exposed to information about the risks of an epidemic, they develop a high perceived susceptibility and perceived severity of the epidemic. In addition, when college students are exposed to positive information about vaccination on social media and learn about its effectiveness, they will form high perceived benefits of vaccination and thus increase their willingness to vaccinate; however, when college students are exposed to more negative information about vaccines, such as post-vaccination sequelae and anti-vaccine information, they will become skeptical about vaccines and lower their willingness to vaccinate, leading to vaccine hesitation. This means that there may be a mediating role of health beliefs between university students’ social media contacts and their willingness to vaccinate.

In addition, the government played an important role in the outbreak, as the main body of crisis management, making decisions on the emergency management of the outbreak, mainly including specific measures to control the outbreak and develop a vaccine. The government trust, on the other hand, was expressed as a psychological expectation that the government could safeguard its relevant interests, effectively control the epidemic and develop a safe vaccine. After the launch of the COVID-19 vaccine in China, university students are exposed to public opinion on the epidemic and vaccination from social media, and learn about the current situation of the epidemic and the effects and possible hazards of vaccination, etc., forming their perceptions of the epidemic and vaccination. In contrast, university students with a high level of trust in the government will suppress the impact of perceived barriers to vaccination on themselves and their perceived interest in vaccination will be enhanced. At the same time, university students’ trust in the government to control the epidemic will reduce their perceived risk of susceptibility and severity of the epidemic.

There is a large body of foreign research on vaccination, mostly focused on exploring the factors and mechanisms influencing vaccination, with theoretical models such as the Health Belief Model and the Theory of Planned Behavior. However, most of these studies have examined the role of attitudes on
behavioral intention, and there is a lack of attention to the formation of perceptions, other words, how public opinion exposed through social media affects college students' perceptions, and the role of government trust in the formation of college students' willingness to vaccinate.

This paper combines Social Cognitive Theory and Health Belief Model to explore how social media affects vaccination intention and the mediating role of health beliefs and the moderating role of government trust by constructing mechanisms that influence college students' intention to vaccinate against the COVID-19.

2. Theoretical Model And Development Of Hypotheses

Social Cognitive Theory suggests that individual factors and the environment together determine individual behavior [6]. Individuals obtain information about their environment from a variety of sources and then analyze and interpret this information to form their action guidelines. Social media is an important source of information about people and society, and individuals' thoughts and behaviors are influenced by social media messages when they are exposed to them. Health Belief Model was first developed by Hochbaum in 1958 and later modified by Becker [7]. Health beliefs refer to individuals' perceptions of the epidemic and vaccination, mainly including attitudes and perceptions of the severity and susceptibility to the epidemic, and perceived benefits and perceived barriers to adopting vaccination.

As an important theory of health behavior prediction, it is essential to explore the role of health beliefs in the influence of social media contact on the willingness to vaccinate for COVID-19. However, there are relatively few studies in China that have combined Social Cognitive Theory with Health Belief Model to explore epidemic or vaccine information in the field of communication.

2.1 Social Media Contact and Health Beliefs

The public seeks, learns, and shares risk information on social media [8], and this information is extremely important in constructing public perceptions [9]. Discussions about health beliefs permeate social media, so exposure to information on social media may inadvertently be a significant factor in an individual's health beliefs [10]. Based on the social amplification effect of risk [11], the public's use of social media to access information about an epidemic creates a risk perception of the epidemic [12], and the more frequently individuals use social media and the more deeply they are exposed to epidemic and vaccine public opinion, the greater their perceived susceptibility and perceived severity of the epidemic. However, the amplification effect of social networks on information is "two-sided", and different types of information can have different effects when disseminated through social networks [13]. That is, when there is a large amount of public opinion about vaccine safety on social media, the negative information will increase college students' perceived susceptibility, perceived severity, and perceived barriers, while positive information will enhance college students' perceptions of benefits [14]. Therefore, this paper proposes the following hypothesis.

H1a. Social media contact is positively associated with perceived susceptibility.
H1b. Social media contact is positively associated with perceived severity.
H1c. Social media contact is positively associated with perceived benefits.
H1d. Social media contact is positively associated with perceived barriers.

2.2 Social Media Contact and Vaccination Intention

Research on the impact of social media on vaccination intention is controversial. Health information on social media can meet the information needs of the population and increase awareness of outbreaks and vaccines [15]. Conversely, social media can be flooded with anti-vaccine messages and reduce the behavioral willingness of university students to vaccinate. In a survey of factory workers' intention to receive the COVID-19 vaccine, positive information related to vaccination was highly correlated to receiving the COVID-19 vaccine [16]. The findings of Mo also suggested that using social media to access information related to the COVID-19 vaccine increases the intention to receive the vaccine [17]. However, there were also negative messages on social media, and Sallam et al. showed that when the public was exposed to misinformation about vaccines on social media platforms, conspiracy beliefs can be generated which can reduce vaccination intention [18]. Similarly, Ruiz & Bell suggested that individuals who receive information about outbreaks on social media are less likely to be vaccinated [19].

In combination with the strong scientific awareness of the COVID-19 epidemic and the promotion and education of vaccination in China, social media is mostly positive for vaccines. Therefore, the following hypothesis is proposed in this paper.

H2. Social media contact is positively associated with vaccination intention.

2.3 Health Beliefs and Vaccination Intention

According to the Health Belief Model, Becker believed that the individual's susceptibility to disease and the perception of the serious consequences after infection would affect people's willingness to healthy behavior. Lin et al. showed that high public perceptions of the benefits of vaccination and low perceptions of the barriers to vaccination were the two most important factors influencing the clear intention of COVID-19 vaccination [20]. However, in previous studies on the intention to vaccinate against influenza, Mo et al. showed that perceived benefits, perceived susceptibility, and vaccination behavior were positively associated with perceived barriers to vaccination in a group of nurses [21], while Shahrabani & Benzion concluded that the intention to
vaccinate against influenza among employees in the workplace was mainly influenced by perceived benefits and perceived benefits [22]. In summary, this paper proposes the following hypothesis.

**H3a.** Perceived susceptibility is positively associated with vaccination intention.

**H3b.** Perceived severity is positively associated with vaccination intention.

**H3c.** Perceived benefits positively correlated with vaccination intention.

**H3d.** Perceived barriers are negatively associated with vaccination intention.

### 2.4 The Mediating Role of Health Beliefs

The above discussion suggests that social media contact enhances the public's perceived susceptibility and perceived severity of the epidemic, as well as perceived benefits and perceived barriers to vaccination against the COVID-19. Similarly, social media contact indirectly influences the public's willingness to vaccinate by shaping the public's perceived susceptibility and perceived severity of the epidemic and the perceived benefits and barriers to vaccination. Therefore, the following hypothesis is proposed in this paper.

**H4a.** Perceived susceptibility mediates the relationship between social media contact and vaccination intention.

**H4b.** Perceived severity mediates the relationship between social media contact and vaccination intention.

**H4c.** Perceived benefits mediate between social media contact and vaccination intention.

**H4d.** Perceived barriers mediate the relationship between social media contact and vaccination intention.

### 2.5 The Moderating Role of Government Trust

The implementation of government policies is influenced by the public's trust in the government. In particular, public trust in government can weaken negative perceptions and lead to positive behavior in times of public crisis [23].

Due to information asymmetry, the public's perceived risk of the epidemic and the perceived barriers and benefits of vaccination are amplified by the guidance of social media opinion after being exposed to social media, and when the perceived barriers are stronger, the public will form more conservative behavioral decisions out of their interests. The development process of China's COVID-19 vaccine is guided by the government, therefore, when the public's trust in the government is high, the effects of perceived susceptibility, perceived severity, and perceived barriers on willingness to vaccinate will be attenuated, while the effect of perceived benefit on willingness to vaccinate will be enhanced. Therefore, the following hypothesis is proposed in this paper.

**H5a.** Government trust negatively moderates the relationship between perceived susceptibility and vaccination intention.

**H5b.** Government trust negatively moderates the relationship between perceived severity and vaccination intention.

**H5c.** Government trust positively moderates the relationship between perceived benefits and vaccination intention.

**H5d.** Government trust negatively moderates the relationship between perceived barriers and vaccination intention.

### 2.6 The Moderated Mediation

In summary, this study further proposes a mediated model with moderation. College students' health beliefs mediated the effect of social media contact on vaccination intention, but the strength of the effect was moderated by the level of government trust. Perceived trust in government gives university students a stronger sense of security, which is further performed to enhance the intermediary role of perceived benefits and weaken the intermediary role of perceived susceptibility, perceived severity, and perceived barriers. Therefore, this paper proposes the following research hypothesis:

**H6a.** Government trust negatively moderates the mediating effect of perceived susceptibility to social media contact and vaccination intention

**H6b.** Government trust negatively moderates the mediating effect of perceived severity to social media contact and vaccination intention

**H6c.** Government trust positively moderates the mediating effect of perceived benefits to social media contact and vaccination intention

**H6d.** Government trust negatively moderates the mediating effect of perceived barriers to social media contact and vaccination intention

The theoretical framework is displayed in Fig. 1.

### 3. Methods

#### 3.1. Data Collection

The main reasons for this study to adopt the questionnaire method and select university students as the target of questionnaire collection are: 1. university students are socially active and mobile, and once an infection occurs it can spread quickly, so there is a need to actively promote vaccination against the COVID-19; 2. the student population accounts for 21% of internet users in China, and university students have more time and energy to pay attention to
information related to the epidemic and are more influenced by public opinion. Wenjuan.com is one of the leading data collection platforms in China, which has helped 15.84 million users collect over 1.29 billion pieces of data, so this paper collects data through Wenjuan.com. The data was collected from May 6, 2021, and as of May 12, 2021, 389 questionnaires were collected. After eliminating 12 replies with duplicate IP addresses, a total of 377 valid questionnaires were collected, with an effective rate of 96.92%. Among the valid sample questionnaires, 38.7% were males and 61.3% were females; 8.2% were freshmen, 26.5% were sophomores, 36.6% were juniors, 20.7% were seniors and 8.0% were postgraduates and above; 22.0% were medical majors and 78.0% were non-medical majors; 9.0% had the experience of infection in themselves or someone close to them. Those who lived in rural areas accounted for 14.6% and those in urban areas accounted for 85.4%; 1.9% of households have a monthly income of less than 3000 yuan, 13.8% of households with a monthly income of 3000–6000 yuan, 22.0% of households with a monthly income of 6000–9000 yuan, 25.2% of households with a monthly income of 9000–12000 yuan, 23.3% of households with a monthly income of 12000–15000 yuan and 15.6% of households with a monthly income of more than 15000 yuan.

3.2. Measures

Demographics. This study included gender, grade, major, household income, residence, and experience of infection as control variables [24].

Social media contact. The frequency of contact with epidemic information and social media involvement of university students from different social media was measured. The scale of Liu & Yang was used to measure the frequency of contact with epidemic or vaccine information through various social media and the degree of social media involvement [25], the Cronbach's $\alpha$ was 0.786.

Health beliefs. The health beliefs question items were mainly measured by the study of Kocoglu-Tanyer [26]. Perceived susceptibility referred to the assessment of the likelihood of infecting COVID-19, and consists of three questions with a Cronbach's $\alpha$ coefficient of 0.854. Perceived severity included four questions on the fear of contracting the virus, complications after infection, etc., the Cronbach's $\alpha$ was 0.821. Perceived barriers included doubts and concerns about the safety, efficacy, and side effects of vaccination, the Cronbach's $\alpha$ was 0.844. Perceived benefits were based on the effectiveness of the vaccine in preventing infection and the benefits of vaccination for oneself and others, the Cronbach's $\alpha$ was 0.723.

Government trust. Government trust was measured by the Government Trust Scale developed by Roger et al. [27], which consists of 15 question items, and the Cronbach's $\alpha$ was 0.913.

Vaccination intention. Vaccination intention was based on the Lin et al. [28] study and included three questions including “I plan to get vaccinated against the COVID-19”, and the Cronbach's $\alpha$ was 0.780.

3.3. Data Analysis

3.3.1 Common method deviation test

The research data for this study were obtained from the subjects’ self-reports, so the issue of common method bias may arise. In this paper, a Harman's single-factor test was conducted using SPSS 21.0 software, and after bringing all scale items into the exploratory factor analysis, the analysis showed that the explanatory power of the variance of the first factor was 24.38%, which was less than the critical criterion of 40%, and there was no serious problem of common method bias [29].

3.3.2 The Validities for the Scales

To verify the discriminant validity of the factors 'social media contact', 'perceived susceptibility', 'perceived severity', 'perceived benefits', 'government trust', and 'vaccination intention', a validation factor analysis was conducted using AMOS 24.0. The results were shown in Table 1, showed that a seven-factor structural model including social media contact, government trust, perceived barriers, perceived benefits, perceived susceptibility, and vaccination intention fitted well ($\chi^2/df = 1.707, CFI = 0.908, IFI = 0.909, TLI = 0.901, RMSEA = 0.043$).

<table>
<thead>
<tr>
<th>Factor Combinations</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2/df$</th>
<th>CFI</th>
<th>IFI</th>
<th>TLI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 + 2 + 3 + 4 + 5 + 6 + 7</td>
<td>3950.533</td>
<td>860</td>
<td>4.594</td>
<td>0.521</td>
<td>0.524</td>
<td>0.479</td>
<td>0.098</td>
</tr>
<tr>
<td>1 + 2 + 3 + 4 + 5 + 6, 7</td>
<td>3790.409</td>
<td>859</td>
<td>4.413</td>
<td>0.546</td>
<td>0.549</td>
<td>0.523</td>
<td>0.095</td>
</tr>
<tr>
<td>1 + 2 + 3 + 4 + 5, 6, 7</td>
<td>3242.794</td>
<td>857</td>
<td>3.784</td>
<td>0.630</td>
<td>0.633</td>
<td>0.611</td>
<td>0.086</td>
</tr>
<tr>
<td>1, 2 + 3 + 4 + 5, 6, 7</td>
<td>2749.724</td>
<td>854</td>
<td>3.220</td>
<td>0.706</td>
<td>0.709</td>
<td>0.690</td>
<td>0.077</td>
</tr>
<tr>
<td>1, 2 + 3, 4 + 5, 6, 7</td>
<td>2405.927</td>
<td>850</td>
<td>2.831</td>
<td>0.759</td>
<td>0.761</td>
<td>0.744</td>
<td>0.070</td>
</tr>
<tr>
<td>1, 2 + 3, 4, 5, 6, 7</td>
<td>1861.806</td>
<td>845</td>
<td>2.203</td>
<td>0.843</td>
<td>0.844</td>
<td>0.832</td>
<td>0.057</td>
</tr>
<tr>
<td>1, 2, 3, 4, 5, 6, 7</td>
<td>1431.901</td>
<td>839</td>
<td>1.707</td>
<td>0.908</td>
<td>0.909</td>
<td>0.901</td>
<td>0.043</td>
</tr>
</tbody>
</table>

Table 1

Results of the validation factor analysis.

Note: 1 Social media contact; 2 Perceived susceptibility; 3 Perceived severity; 4 Perceived benefits; 5 Perceived barriers; 6 Government trust; 7 Vaccination intention.

4. Results

4.1 Descriptive Analysis
As seen in Table 2, the college student population had generally higher vaccination intention (M = 4.389, SD = 0.600), perceived benefits (M = 4.089, SD = 0.552) and trust in government (M = 4.161, SD = 0.497), and perceived susceptibility (M = 3.220, SD = 1.082) and perceived barriers (M = 3.359, SD = 0.898) were slightly above the median value of 3.

Social media contact was significantly positively associated with vaccination intention (r = 0.344, p < 0.001), significantly positively associated with perceived susceptibility (r = 0.220, p < 0.001), and significantly positively associated with perceived severity (r = 0.235, p < 0.001), significantly positively associated with perceived benefit (r = 0.442, p < 0.001), and significantly positively associated with perceived barriers was significantly positively correlated (r = 0.215, p < 0.001); perceived severity was significantly positively correlated with vaccination intention (r = 0.518, p < 0.001), perceived benefits was significantly positively correlated with vaccination intention (r = 0.206, p < 0.001). This indicates that further regression analysis can be conducted.

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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</thead>
<tbody>
<tr>
<td>(1) Gender</td>
<td>1.387</td>
<td>0.488</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Grade Level</td>
<td>2.936</td>
<td>1.058</td>
<td>0.032</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Major</td>
<td>1.780</td>
<td>0.415</td>
<td>0.002</td>
<td>0.089</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Experience of infection</td>
<td>1.910</td>
<td>0.287</td>
<td>-0.016</td>
<td>0.034</td>
<td>0.257***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(5) Place of residence</td>
<td>1.854</td>
<td>0.354</td>
<td>0.02</td>
<td>0.053</td>
<td>-0.129*</td>
<td>0.027</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(6) Household income</td>
<td>4.032</td>
<td>1.314</td>
<td>-0.003</td>
<td>0.170**</td>
<td>0.067</td>
<td>0.071</td>
<td>0.222***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(7) Social Media Contact</td>
<td>3.939</td>
<td>0.532</td>
<td>-0.089</td>
<td>-0.111*</td>
<td>-0.139**</td>
<td>-0.099</td>
<td>-0.060</td>
<td>0.045</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) Perceived susceptibility</td>
<td>3.220</td>
<td>1.082</td>
<td>0.035</td>
<td>0.002</td>
<td>-0.214***</td>
<td>-0.181***</td>
<td>0.061</td>
<td>0.012</td>
<td>0.220***</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Perceived severity</td>
<td>3.932</td>
<td>0.796</td>
<td>-0.064</td>
<td>0.011</td>
<td>0.009</td>
<td>-0.079</td>
<td>-0.061</td>
<td>0.055</td>
<td>0.235***</td>
<td>0.390***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10) Perceived benefits</td>
<td>4.089</td>
<td>0.552</td>
<td>-0.111*</td>
<td>-0.119*</td>
<td>-0.107*</td>
<td>-0.070</td>
<td>-0.020</td>
<td>0.031</td>
<td>0.442***</td>
<td>0.196***</td>
<td>0.408***</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>(11) Perceived barriers</td>
<td>3.359</td>
<td>0.898</td>
<td>0.001</td>
<td>-0.007</td>
<td>-0.191***</td>
<td>-0.074</td>
<td>0.053</td>
<td>0.097</td>
<td>0.215***</td>
<td>0.509***</td>
<td>0.314***</td>
<td>0.059</td>
<td>1</td>
</tr>
<tr>
<td>(12) Government Trust</td>
<td>4.161</td>
<td>0.497</td>
<td>-0.082</td>
<td>-0.089</td>
<td>-0.075</td>
<td>-0.035</td>
<td>-0.028</td>
<td>-0.043</td>
<td>0.498***</td>
<td>0.132*</td>
<td>0.241***</td>
<td>0.597***</td>
<td>0.02</td>
</tr>
<tr>
<td>(13) Vaccination intention</td>
<td>4.389</td>
<td>0.600</td>
<td>-0.122*</td>
<td>-0.115*</td>
<td>0.01</td>
<td>-0.017</td>
<td>-0.074</td>
<td>-0.03</td>
<td>0.344***</td>
<td>0.042</td>
<td>0.231***</td>
<td>0.518***</td>
<td>-0.2C</td>
</tr>
</tbody>
</table>

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

### 4.2 Testing for Direct Effect

In this study, H1, H2, and H3 were tested using linear regression based on the correlation principle of least squares. The results in Table 3 show that in model 1, the regression coefficient of social media contact on perceived susceptibility was 0.198 (p < 0.001), indicating that the more social media contact college students had, the more susceptible they were to the epidemic, and H1a was supported. In model 2, the regression coefficient for social media contact was 0.228 (p < 0.001), indicating that social media contact positively influenced the perceived severity of the epidemic among university students, H1b was supported; in model 3, the regression coefficient was 0.419 (p < 0.001), H1c was supported; in model 4, the regression coefficient for social media contact was 0.19 (p < 0.001), indicating that social media contacts of college students amplify their perceived barriers to vaccines, and H1d was supported. That is, social media contact positively influences health beliefs, and the more college students are exposed to the epidemic and vaccine-related public opinion, the greater their perceived susceptibility and perceived severity of the epidemic, and the greater their perceived benefits and perceived barriers to vaccination.

Model 5 examined the effects of control variables such as gender, grade, major, infection experience, residence, and household income on vaccination intention; Model 6 examined the effects of the independent variable social media contact on the dependent variable vaccination intention after controlling for demographic variables, and the results showed a regression coefficient of 0.336 (p < 0.001), indicating a significant positive relationship between social media contact and college students’ vaccination intention, H2 was supported. Similarly, in model 7, the regression coefficient of perceived susceptibility on vaccination intention was 0.054, which did not reach a significant level, and hypothesis H3a was not tested; in model 8, the regression coefficient of perceived...
severity was 0.224 (p < 0.001), and H3b held; in the linear regression of model 9, the regression coefficient of perceived benefit was 0.512 (p < 0.001), indicating a significant positive effect of perceived benefits on vaccination intention, and H3c was supported. Similarly, in the regression for model 10, the regression coefficient for perceived barriers to vaccination intention was −0.212 (p < 0.001), indicating a significant negative effect of perceived barriers to vaccination intention, and H3d was supported.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Perceived susceptibility</th>
<th>Perceived severity</th>
<th>Perceived benefits</th>
<th>Perceived barriers</th>
<th>Vaccination intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.048</td>
<td>-0.044</td>
<td>-0.071</td>
<td>0.018</td>
<td>-0.118* -0.090 -0.120* -0.104* -0.063 -0.117*</td>
</tr>
<tr>
<td>Grade Level</td>
<td>0.037</td>
<td>0.029</td>
<td>-0.070</td>
<td>0.012</td>
<td>-0.109* -0.073 -0.109* -0.110* -0.050 -0.110*</td>
</tr>
<tr>
<td>Major</td>
<td>-0.151***</td>
<td>0.046</td>
<td>-0.039</td>
<td>-0.164**</td>
<td>0.016 0.060 0.026 0.013 0.064 -0.024</td>
</tr>
<tr>
<td>Experience of infection</td>
<td>-0.125*</td>
<td>-0.073</td>
<td>-0.019</td>
<td>-0.021</td>
<td>-0.018 0.005 -0.010 0.002 0.006 -0.025</td>
</tr>
<tr>
<td>Place of residence</td>
<td>0.053</td>
<td>-0.053</td>
<td>-0.001</td>
<td>0.022</td>
<td>-0.064 -0.035 -0.066 -0.048 -0.045 -0.063</td>
</tr>
<tr>
<td>Household income</td>
<td>0.004</td>
<td>0.054</td>
<td>0.028</td>
<td>0.094</td>
<td>0.002 -0.030 0.001 -0.015 -0.033 0.026</td>
</tr>
<tr>
<td>Social media contact</td>
<td>0.198***</td>
<td>0.228***</td>
<td>0.419***</td>
<td>0.190***</td>
<td>0.336***</td>
</tr>
<tr>
<td>Perceived susceptibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.054</td>
</tr>
<tr>
<td>Perceived severity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.224***</td>
</tr>
<tr>
<td>Perceived benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.512***</td>
</tr>
<tr>
<td>Perceived barriers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.212***</td>
</tr>
<tr>
<td>R²</td>
<td>0.103</td>
<td>0.069</td>
<td>0.208</td>
<td>0.084</td>
<td>0.032 0.139 0.035 0.081 0.283 0.075</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.086</td>
<td>0.051</td>
<td>0.193</td>
<td>0.067</td>
<td>0.016 0.122 0.016 0.064 0.270 0.057</td>
</tr>
<tr>
<td>ΔR²</td>
<td>0.037</td>
<td>0.049</td>
<td>0.166</td>
<td>0.034</td>
<td>0.032 0.107 0.003 0.049 0.251 0.043</td>
</tr>
</tbody>
</table>

Note: * p < 0.05; ** p < 0.01; *** p < 0.001.

4.3 Testing for Mediation Effect

This paper used the mediation effects analysis method proposed by Hayes [30]. The PROCESS program of SPSS 21.0 was used to test the mediation effects using the Bootstrap method.

To test H4a, gender, grade, major, household income, residence, and experience of infection were used as control variables, social media contact as the independent variable, perceived susceptibility as the mediating variable, vaccination intention as the dependent variable, and model 4 in PROCESS was checked for Bootstrap analysis. The results of the analysis showed that the mediating effect of social media contact on vaccination intention through perceived susceptibility was −0.0031 with a confidence interval of [−0.0309, 0.0221], and the confidence interval of the indirect effect contained “0”. The indirect effect was not significant, indicating that the mediating effect of perceived susceptibility did not exist and H4a was not valid.

After setting perceived severity as a mediating variable, the results showed that the mediating effect of social media contact on vaccination intention through perceived severity was 0.0405 with a confidence interval of [0.0105, 0.0854]; the direct effect of social media contact on vaccination intention was 0.338 with a confidence interval of [0.2263, 0.4496]. The confidence interval for the indirect effect did not contain "0" and the indirect effect was significant; the confidence interval for the direct effect did not contain "0" and the direct effect was significant, indicating that perceived severity was a partial mediating variable in the relationship between social media contact and vaccination intention, and H4b was supported.

After setting perceived benefit as a mediating variable, the results showed that the mediating effect of social media contact on vaccination intention through perceived benefit was 0.2132 with a confidence interval of [0.1413, 0.2998]; the direct effect of social media contact on vaccination intention was 0.1653 with a confidence interval of [0.0559, 0.2746]. The indirect effect and the direct effect were both significant, indicating that perceived benefit was a partial mediating variable in the relationship between social media contact and vaccination intention, and H4c was supported.

After setting perceived barriers as a mediating variable, the results showed that the mediating effect of social media contact through perceived barriers on vaccination intention was −0.0613 with a confidence interval of [−0.1121, −0.0222]; the direct effect of social media contact on vaccination intention was
0.4398 with a confidence interval of [0.3325, 0.5472]. So, the indirect effect and the direct effect were both significant, indicating that perceived barriers were a partial mediating variable in the relationship between social media contact and vaccination intention, and H4d was supported.

### 4.4 Testing for Moderation Effect

The moderating effect was tested by using model 1 in PROCESS. Gender, grade, profession, household income, residence, and experience of infection were used as control variables, health beliefs as independent variables, government trust as a moderating variable, and vaccination intention as a dependent variable. The results of the analysis showed that the regression coefficient of the interaction term of perceived susceptibility and government trust in vaccination intention did not reach a significant level ($\beta = 0.096, p > 0.05$) with a confidence interval of [0.0065, 0.2002], indicating that this moderating effect was not significant and H5a did not hold.

As shown in Fig. 2, the regression coefficient of the interaction term between perceived severity and government trust in vaccination intention reached a significant level ($\beta = -0.1311, p < 0.05$) with a confidence interval of [-0.2474, -0.0148], indicating that this moderating effect was significant and H5b was initially supported. The results of the analysis showed that when government trust was low, the effect of perceived severity on vaccination intention was 0.156 with a confidence interval of [0.0612, 0.2508], indicating that the effect was significant at this time; when government trust was high, the effect of perceived severity on vaccination intention was 0.0257 with a confidence interval of [0.0568, 0.1082], indicating that the effect was not significant at this time. This suggests that the effect of perceived severity on vaccination intention diminishes as the level of trust in government increases. Taken together, H5b was supported.

The regression coefficient of the interaction term between perceived benefits and government trust in vaccination intention did not reach a significant level ($\beta = -0.1187, p > 0.05$) with a confidence interval of [0.2784, 0.0410] containing 0, indicating that this moderating effect was not significant and H5c did not hold.

Finally, as shown in Fig. 3, the regression coefficient of the interaction term between perceived barriers and government trust in vaccination intention reached a significant level ($\beta = 0.233, p < 0.001$) with a confidence interval of [0.1152, 0.3508], indicating that this moderating effect is significant and H5d was initially supported. The results of the analysis showed that when government trust was low, the effect of perceived barriers on vaccination intention was 0.3037 with a confidence interval of [0.4014, 0.2059], indicating a significant effect at this point; when government trust was high, the effect of perceived barriers on vaccination intention was -0.072 with a confidence interval of [0.1394, 0.0047], indicating the effect was significant. However, the absolute value of the effect of perceived barriers on vaccination intention becomes smaller at high values of government trust compared to when government trust is at low levels, suggesting that the effect is greater at lower levels of government trust, the effect of perceived barriers on vaccination intention gradually decreases as the level of government trust increases. Combined with the above analysis, H5d was verified.

### 4.5 Testing for the Moderated Mediation

This paper uses Bootstrap analysis using Model 14 in the PROCESS program to test for mediating effects of being moderated.

In the case of perceived susceptibility, its mediating effect did not exist and H6a did not hold. In terms of perceived benefit, its moderating effect did not exist and H6c did not hold.

Gender, grade, major, household income, residence, and experience of infection were used as control variables, social media contact as the independent variable, perceived severity as the mediating variable, government trust as the moderating variable, and vaccination intention as the dependent variable. The results of the analysis showed that the index of the moderating effect of government trust on perceived severity was 0.3037, with a confidence interval of [0.4014, 0.2059], indicating a significant effect at this point; when government trust was high, the effect of perceived barriers on vaccination intention was -0.072 with a confidence interval of [0.1394, 0.0047], indicating the effect was significant. However, the absolute value of the effect of perceived barriers on vaccination intention becomes smaller at high values of government trust compared to when government trust is at low levels, suggesting that the effect is greater at lower levels of government trust, the effect of perceived barriers on vaccination intention gradually decreases as the level of government trust increases. Combined with the above analysis, H5d was verified.

<table>
<thead>
<tr>
<th>Government Trust</th>
<th>Indirect effects</th>
<th>BootSE</th>
<th>BootLLCI</th>
<th>BootULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-SD</td>
<td>0.0515</td>
<td>0.0286</td>
<td>0.0065</td>
<td>0.1188</td>
</tr>
<tr>
<td>M</td>
<td>0.0283</td>
<td>0.0171</td>
<td>0.0013</td>
<td>0.0683</td>
</tr>
<tr>
<td>M+SD</td>
<td>0.0051</td>
<td>0.0130</td>
<td>-0.0181</td>
<td>0.0357</td>
</tr>
</tbody>
</table>

The results of the analysis using perceived barriers as a mediating variable showed that the index of the mediating effect of government trust on perceived barriers was 0.0775, with a confidence interval of [0.0249, 0.1439], indicating that the mediating effect was significant, and H6d was initially supported. The results are shown in Table 5. When government trust is low, the mediating effect of social media contact through perceived barriers to vaccination is -0.1062, with a confidence interval of [0.1884, 0.0404], indicating a significant mediating effect at this point; when government trust is high, the mediating effect of social media contact through perceived barriers to vaccination is -0.1062, with a confidence interval of [0.1884, 0.0404], indicating a significant mediating effect at this point. The mediating effect of social media contact affecting vaccination intention through perceived barriers was 0.0292.
interval of \([-0.0586, -0.0091]\), indicating a significant mediating effect at this point. However, the mediating effect was smaller for high values of government trust compared to low values of government trust, the effect of social media contact on vaccination intention through perceived barriers decreases as government trust increases. Taken together, \(H_6d\) was supported.

<table>
<thead>
<tr>
<th>Government Trust</th>
<th>Indirect effects</th>
<th>BootSE</th>
<th>BootLLCI</th>
<th>BootULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-SD</td>
<td>-0.1062</td>
<td>0.0382</td>
<td>-0.1884</td>
<td>-0.0404</td>
</tr>
<tr>
<td>M</td>
<td>-0.0677</td>
<td>0.0240</td>
<td>-0.1200</td>
<td>-0.0266</td>
</tr>
<tr>
<td>M+ SD</td>
<td>-0.0292</td>
<td>0.0126</td>
<td>-0.0586</td>
<td>-0.0091</td>
</tr>
</tbody>
</table>

5. Discussion

The frequency of social media contact and involvement of university students had a significant positive effect on their willingness to receive the COVID-19 vaccine. Studies have shown that university students’ willingness to receive vaccinations is higher when they are exposed to information about the epidemic and vaccines through social media such as WeChat and Weibo.

Social media contact had a significant positive effect on health beliefs, and perceived severity, perceived benefits, and perceived barriers were significant predictors of vaccination intention. Perceived severity, perceived benefits, and perceived barriers partially mediated the relationship between social media contact and vaccination intention. The role of perceived susceptibility was not significant, which is consistent with the findings of Al-Metwali [31]. In our context, this may be because the perceived susceptibility of university students to the epidemic is generally low due to the remarkable effectiveness of our epidemic prevention and control.

Government trust acts as a moderator between perceived severity, perceived barriers, and vaccination intention. The higher the government trust, the weaker the effect of perceived severity on vaccination intention and the weaker the effect of perceived barriers on vaccination intention. The moderating effect of government trust between perceived susceptibility, perceived benefits, and vaccination intention did not hold, possibly because university students are generally more educated, have clearer perceptions of the epidemic and vaccine information they are exposed to from social media and have a clear understanding of the benefits that vaccination with the COVID-19 vaccine can bring, so their effect on vaccination intention does not change much regardless of their level of government trust.

Management of social media platforms should be emphasized in the promotion of vaccination. Proper science on the COVID-19 epidemic should be increased on social media so that the public has a correct perception of the susceptibility and severity of the epidemic. In addition, mass discussions on vaccine risks on social media will aggravate the audience's perception of barriers and intensify people's panic, thus creating vaccine hesitation. Therefore, government authorities need to promptly address anti-vaccine messages and rumors on social media platforms, and in addition to presenting more information on the benefits of vaccination, they should also play the role of opinion leaders such as prevention and control experts to make social media users correctly understand vaccine risks and reduce the perception of vaccination barriers.

Strengthen the public's trust in the government. On the one hand, information disclosure is an important guarantee to maintain the trust of the government. By holding press conferences to achieve information disclosure, the current situation of the COVID-19 epidemic and vaccines can be disclosed to the public promptly to enhance the correct understanding of college students about vaccines and help reduce public panic [32]; in addition, authoritative experts can be invited to participate in press conferences to dispel public doubts about vaccines. On the other hand, the government should also strengthen the management in the process of vaccination work. In the process of arranging vaccination work, it should focus on the public interest and consider the problem from the perspective of the public in society, and set up more vaccination mobile vans in schools and communities to reduce the time cost of vaccination, and major universities should also strengthen the publicity of vaccination to enhance university students’ perception of the benefits of vaccination and increase their willingness to receive the vaccination.

5. Limitations And Implications

First, this study uses mainly cross-sectional static data, with all variables measured at the same period, and is therefore not conducive to clarifying causal relationships. It is recommended that data be collected in different periods to improve the accuracy of the study. Next, as the sample of this study was mainly university students, the applicability of the findings to other groups needs to be further tested. It is suggested that future studies should expand the scope and number of samples, as well as conduct research and analysis by region and occupation to improve the applicability of the findings. Finally, although this study explored the mediating mechanisms of health beliefs and the moderating role of government trust in social media contact affecting vaccination intention, there is room for further expansion of the study. This study did not consider the impact of the content characteristics of social media and the interaction between various health beliefs on vaccination intention. Therefore, future research could further examine the effects and pathways of their interactions on vaccination intention to further improve the accuracy of this study’s findings.

6. Conclusions

This study proposes and validates the mechanism of action of social media contact among university students in influencing vaccination intention for COVID-19, and identifies the mediating role of health beliefs between social media contact and vaccination intention and the moderating role of government trust.
between perceived severity, perceived barriers, and vaccination intention.

**Abbreviations**

COVID-19: Coronavirus Disease 2019

**Declarations**

**Acknowledgements:** Not applicable.

**Author Contributions:** H.Z.: project administration, supervision, and writing—review & editing. Z.W.: data curation, investigation, methodology, visualization, and writing—original draft. D.T.: supervision and writing—review & editing.

All authors have read and agreed to the published version of the manuscript.

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**Ethics approval and consent to participate:** Not applicable.

All methods were carried out in accordance with relevant guidelines and regulations.

**Consent for publication:** Not applicable.

**Competing interests:** Not applicable.

The authors declare that they have no competing interests.

**References**


**Figures**
Figure 1
Hypothesized model.

Figure 2
Moderating effect of government trust on perceived severity and vaccination intention.
Figure 3

Moderating effect of government trust on perceived barriers and vaccination intention.