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Trust collapse caused by the Changsheng vaccine crisis in China

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ABSTRACT

Background: The public acceptance and implementation of vaccination programs is essential to prevent infectious diseases. However, vaccine adverse events may cause public panic and eventually lead to an increasing number of populations who were hesitant or refuse to participate in these vaccination programs. In 2018, the Changsheng vaccine crisis broke out in mainland China, and 252,600 unqualified DTP vaccines were reported to be used for child vaccination. In this study, we observed media and public reactions toward the vaccine crisis.

Methods: This study conducted Internet surveillance by four mainstream indicators from July 15th to August 7th, including social media (WeChat, Sina Weibo), online news and Baidu search index. We also analyzed the emotional perceptions of people in crisis through an online questionnaire survey.

Results: During the crisis, huge number of articles emerged on Internet, 125,882,894 articles (including forwarding) on WeChat friends circle, 1,877,660 Sina Weibo posts, 648,265 online news and 4,986,521 Baidu search indexes. Most of these articles were negative and expressed the public's weak confidence to the China-made vaccines. Public confidence in vaccines was undermined by the actions of the manufacturer and the government.

Conclusions: The DTP vaccine crisis led to panic about immunization and eroded trust in the immunization program and in the government. Restoring public confidence in Chinese-made vaccines will take a long time, and meticulous management in vaccine production, and strict government regulation will help to alleviate public anxiety about vaccine safety and ultimately restore confidence.

1. Introduction

Vaccines are the primary means of preventing and treating infectious diseases, and they play an important role in reducing disease morbidity [1]. The Chinese government's mandatory vaccines include hepatitis B, BCG, inactivated polio vaccine, oral poliomyelitis vaccine, DTaP, DT, MR, MMR, JE-L, MPSV-A, MPSV-AC, hepatitis A-L. For vaccines to be accepted, public must trust product, including manufacturer and distributer, the regulatory process and the immunization program. There are a number of examples where trust has been undermined because of fault with the vaccine product. In January 1928, Australia's diphtheria vaccine was contaminated with Staphylococcus aureus and 12 vaccinated children were died of sepsis [2]. In December 1974 and January 1975, two fatal accidents occurred among the Japanese children vaccinated with DPT produced by some manufacturers, the acceptance rate of DPT vaccine during the next years maintained very low because the public's confidence once upset and slow to recover [3]. In the 1980s, DPT vaccination caused encephalopathy and brain damage among American children, which brought great panic to parents [4]. China is the region where vaccine crisis occurs at a high frequency: In 2005, more than 200 primary school students in Anhui Province were vaccinated with unqualified hepatitis A vaccines; In 2008, there are 179,900 unqualified rabies vaccines were produced by *Yanshen* Biotech; In 2010, nearly 100 deaths, disability, and serious illness in children in Shanxi Province after vaccination with JE vaccines, and the reason of this incident was unreasonable temperature during the vaccines transportation [5]. The Changsheng Bio-technology vaccine fraud incident that occurred in July 2018 triggered a strong public concern, and public confidence in the country's vaccination management system fell to

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historically low levels. On July 11, 2018, an employee of Changsheng reported to the China Food and Drug Administration (CFDA) that production records for rabies vaccines at the company were forged and the quality of the vaccines had been compromised. Four days later, the CFDA issued a "penalty notice" stating that the company "severe violation of Good Manufacture Practice (GMP) of Medical Products Guidelines" and requested an immediate stop to the manufacturing of its rabies vaccines [6]. A few months ago, the DPT vaccine produced by Changsheng Bio-technology did not meet the standards and were investigated by CFDA in November 2017. According to that notice, 253,338 doses unqualified DPT vaccines were produced by this company, only 186 of them are still in storage, but 252,600 unqualified vaccines have been used in Shandong Province. These cases were first reported and brought to the public's attention on July 2 by *The King of Vaccines*, an article that swept across social media posted online by anonymous writer *Shouye* [6]. The big data of social media and web page help to understand the public's reactions, and the aim of this study was to identify the reactions to this vaccine crisis among Chinese people.

2. Methods

2.1. Study design

The current manuscript analyzes the Chinese public's reaction to this vaccine crisis in two ways. One is to explore the public's reaction on social media by using big data analytics technology, and the other is to find the psychological influence mechanisms of public reaction by using an online survey.

To comprehensively evaluate the public reaction on social media to the vaccine crisis, we used the Internet public opinion monitoring and analyzing system to examine the data from four media: WeChat (China Top1 social APP), Sina Weibo (China Top1 microblogging, like Twitter), online news articles and Baidu search index (most popular search engine in China). Data collection occurred during the peak range of the crisis. The vaccine crisis lasted 24 days, from July 15th, when the China Food and Drug Administration (CFDA) released inspection reports of Changchun Changsheng Bio-technology Company and revoked its "GMP Certificate", to August 7th, when the CFDA issued the re-vaccination plan.

In July 2018, we conducted an online cross-sectional survey among Chinese Internet users to explore the structural effects between psychological factors. The online questionnaire was divided into two parts. Part A is consisted by 17 questions, including the dependent variable, respondents' psychological perceptions of vaccine manufacturers, government regulation, and vaccine anxiety. The dependent variable is the confidence and acceptance of Chinese vaccinations. Respondents were asked to indicate their willingness to vaccinate their children with China-made vaccines. The other items in Part A were measured by a 7-point Likert scale, 1 for complete disagreement and 7 for complete agreement. To ensure the consistency of the evaluation, the negative degrees were adopted to assess the respondents' psychological perceptions to vaccine manufacturers and government regulation, and the part of vaccine anxiety assessed the degree of anxiety of respondents. Part B is the demographic information of the respondents, including gender (two-point measurement), age (4 categories), education (3 categories), presence of children (yes or no), and household income (4 categories).

2.2. Social media data collection

Based on the keywords of "unqualified vaccine", "Changsheng Bio-technology Company", "rabies vaccine" and "DPT vaccine", this study collected the number of original articles on four social media. By semantic analysis software NLPIR, the attitudes of the original articles were obtained and divided into three categories: positive, neutral, and negative [7]. The word2vector improved model was adopted in training the online corpus and automatically extracting the semantic associations [8]. Using the co-occurrence relationship and the Bootstrapping strategy to iteratively generate new emotional words and weights [9]. The emotional words were analyzed and comprehensively judged by the deep neural network.

2.3. Online survey and data analysis

Based on the Sina Weibo account, samples were chosen by random sampling and their participation was convened by email notification. To encourage Internet users to participate in the survey, the research team provided small e-commerce vouchers for participants who completed the questionnaire.

Cronbach's alpha and confirmatory factor analysis were used to evaluate the internal consistency of each construct. The acceptable criterion was Cronbach's alpha >0.7, and each path loading >0.6 [10,11]. The convergence validity of the structural variables was measured by average variance extracted, and the acceptable criterion was AVE >0.5 [11,12]. Establish a structural equation model to measure the path load between the variables, and determine the scope of the impact between the factors. The mediating effects of control variables (social-demographic variables) were tested by the comparison method in structural equation modeling [13]. First, the social-demographic variables are divided into different groups, and the highest group and the lowest group are compared. Then, two models based on the group were created and path variables were assumed to be equal in the different models. Lastly, the confidence of the comparison model was solved and the control effects were determined, and the significant criterion was $p < 0.05$.

3. Results

3.1. Media and the public's response

From the perspective of publics use social media to respond the vaccine crisis of the Changsheng biotechnology in northern China, there were three characteristics: the social media was the mainstream interaction channel, public attentions of vaccine crisis were changed rapidly, and the dominant opinions were negative.

This vaccine crisis has provoked the Chinese people's fragile nerve to the health system and set off a surprising hotspot on social media. The public response to the vaccine crisis on social media in China was shown in Fig. 1. During the research period from July 15th to August 7th, there are 125,882,894 articles (including forwarding) on WeChat friends circle, 1,877,660 Sina Weibo posts, 648,265 online news and 4,986,521 Baidu search indexes about rabies vaccine and DPT vaccine of Changsheng Biotechnology. WeChat is considered to be the most popular social media in China, and the WeChat Friends Circle has the most interactions in this vaccine crisis. The peak day of interaction was July 22, and the maximum number of interactions was 57,205,764 on that day. After the "Google Search" was fully withdrawn from the Chinese market in 2010, Baidu became the most popular search tool in China. During this vaccine crisis, the highest single-day search volume reached 759,829 times on Baidu. It is worth mentioning that Baidu's query volume peaked at the second wave during July 25–29. To alleviate parents' panic about the vaccine crisis, Baidu officially launched the online traceability system for Chinese vaccines on July 25. Parents can check the manufacturer and date of the vaccine by the vaccine batch number. This online system can check if

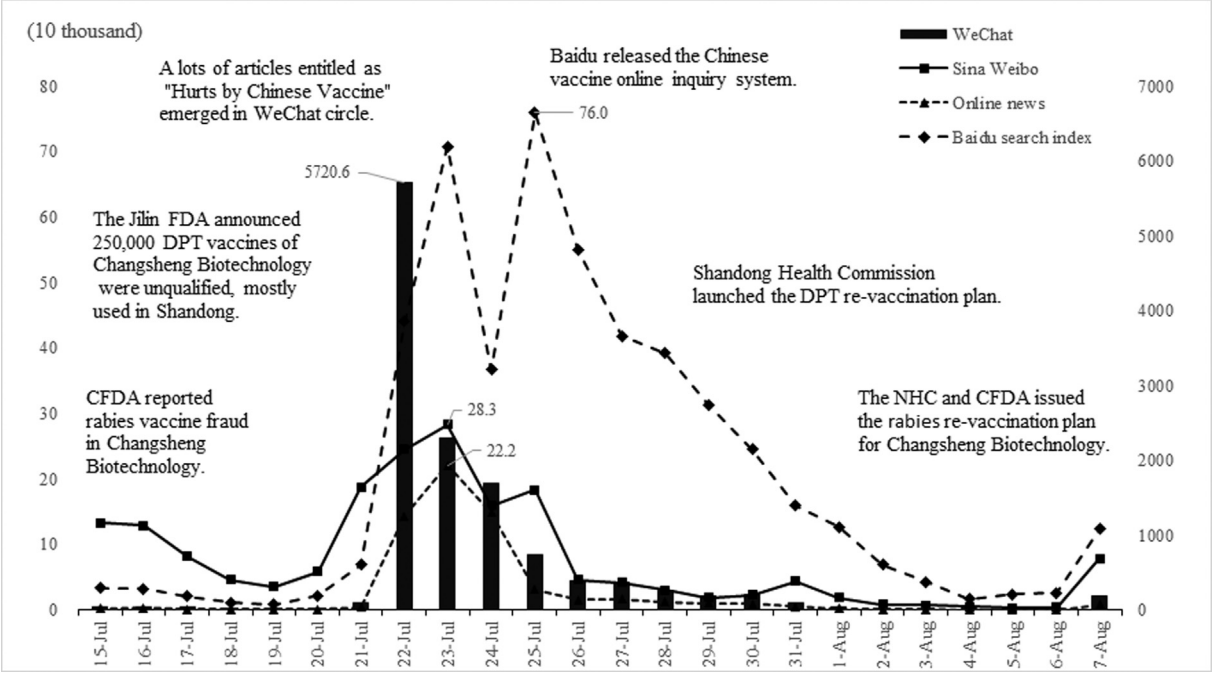

Fig. 1. Media and public reactions during the Changsheng vaccine crisis.

the vaccine is on the recall list. For this reason, Baidu's query volume peaked at the second wave on July 25–29.

Fluctuations in the number of interactions reflect the level of concern about the Chinese population's response to the vaccine crisis. The original articles among online news reports and Sina Weibo reached their peak as 283,324 and 221,549 on the July 22nd (Fig. 1). The public's attention to this vaccine crisis was "suddenly and without warning," and its changing speed of growth and dissipate was unprecedented. For example, Baidu's search volume on the 22nd is 6.35 times on the 21st, and the number of articles forwarded on the WeChat friends circle on the 22nd is 61.5 times on the 21st. In the later stages of the vaccine crisis, the rate of decline in public opinion was also alarming and dramatic. The article forwarding volume of WeChat friends circle on the 25th dropped to only 12.9% of the peak on the 22nd, and fell to 2% on the 31st. From the keyword frequency analysis, the top ten most popular words are as follows: Rabies vaccine, DPT vaccine, Changsheng Biotechnology, Food and Drug Administration, vaccine batch, CDC, fraud, production suspension, recall, investigation. From the source area analysis of netizens, the top five regions are: Jilin, Shandong, Guangdong, Beijing, Anhui.

The analysis of interactive content reflects people's attitude towards this vaccine crisis. From the perspective of the attitude of Sina Weibo's original comments, most of the views were negative, with an average ratio of 75.6%. Especially in the week of July 22nd to 28th, the negative comments reached 86.6%, as showed in Fig. 2. It is clear that most of the public views reflected in all media channels are negative and extreme, especially in the mid-term of the crisis. In the early stages of the crisis, neutral views were mainstream, and the negative views were slightly higher than the positive parts. For example, among the public views on Sina Weibo at July 15th, the ratio of Neutral, Negative and Positive was 45%, 33%, and 22%. As more facts and data about the vaccine issue were exposed, the public's views quickly became paranoid and negative. As more facts and data about the vaccine issue were exposed, the public's views quickly became paranoid and negative. From the 21st to the 25th, the average ratio of Neutral, Negative and Positive was 7%, 87%, and 6%. Under the pressure of public opinion, Chinese President Xi Jinping and Premier Li Keqiang have publicly expressed their strong concern about the incident, and ordered an immediate investigation into the DPT vaccine scandal, just as they did in 2016 [6]. The government's efforts have been effective, and the public's attitude has improved significantly in the latter stages of the vaccine crisis. From August 1st to 7th, the average ratio of Neutral, Negative and Positive was 18%, 68%, and 14%. The public's negative evaluation of the vaccine crisis mainly focused on three viewpoints: the imprecise vaccine manufacturing process (more 500,000 unqualified vaccines in 10 years), too minor punishment (Changsheng Biotech sold 250,000 unqualified vaccines, while the fine is 3,442,900 yuan, only accounting for 0.6% of the company's total profits in 2017), the government's corruption (almost all CDC officials have bribery).

3.2. Psychological factors impact on trust in vaccines

Totally, 3600 participants were invited and 2556 complete samples were collected in the study, and the sample characteristics of online survey are described in Table 1. The number of women among respondents was slightly over-represented (58.1%), and the number of males was 1072. In terms of age, the group of 41–60-years with the most participants (39.0%), the 21–40 years group is the second (36.9%), and the least group is 60 or more years. Participants had a good level of education, with more than 80% of the participants in the Vocational College degree and the Bachelor degree or above. Only 840 participants currently have children dependents, accounting for 32.9%. Most participants under the age of 20 and those over the age of 60 currently do not have any dependent children. Annual household income before tax basically follows a normal distribution, the main options are $15,000–$29,999 (36.0%) and $30,000–$44,999 (38.3%).

Table 2 summarizes the standardized loading for each item of the three constructs, the Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's alpha. All the standardized loadings are greater than 0.7; the values of AVE are greater than

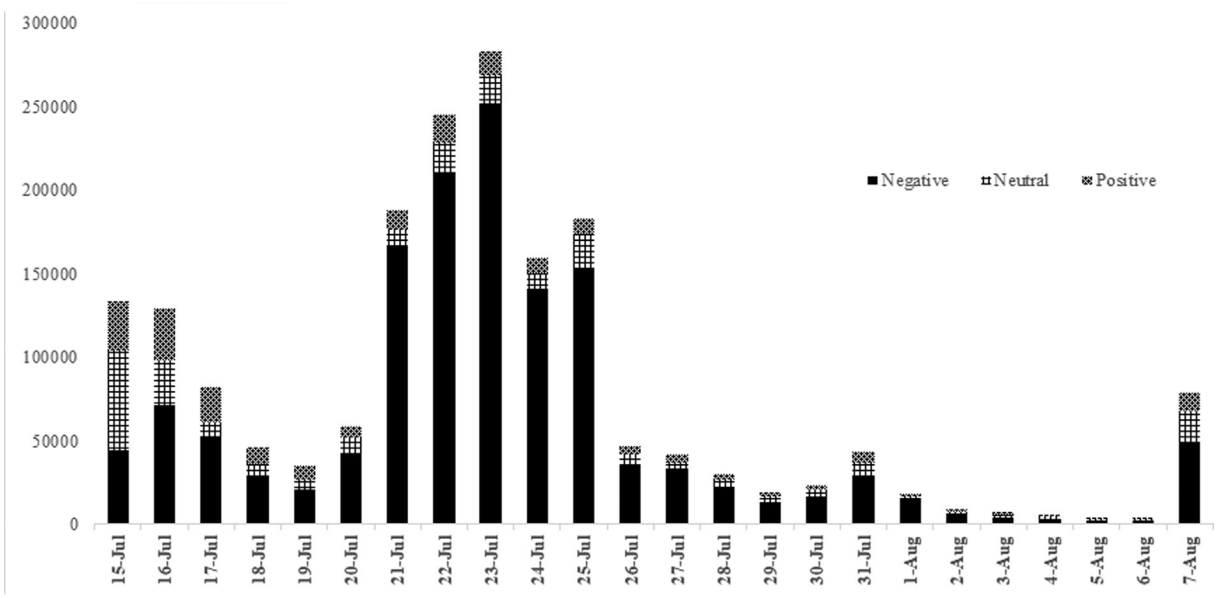

Fig. 2. Sentiment of comments on Sina Weibo.

Table 1
Demographic profile of participant (N = 2556).

Variable	Options	Frequency	Valid percent	Cumulative percent	Mean	SD
Gender						
	Male (1)	1072	41.9	41.9	1.58	0.49
	Female (2)	1484	58.1	100.0		
Age						
	20 and less years (1)	530	20.7	20.7	2.25	0.82
	21–40 years (2)	944	36.9	57.7		
	41–60 years (3)	998	39.0	96.7		
	61 or more years (4)	84	3.3	100.0		
Education						
	High school education or below (1)	420	16.4	16.4	2.26	0.72
	Vocational college degree (2)	1050	41.1	57.5		
	Bachelor degree or above (3)	1086	42.5	100.0		
Dependent children						
	NO (0)	1716	67.1	67.1	0.33	0.47
	YES (1)	840	32.9	100.0		
Annual household income before tax						
	<$15,000(1)	343	13.4	13.4	2.50	0.88
	$15,000–$29,999(2)	919	36.0	49.4		
	$30,000–$44,999(3)	978	38.3	87.6		
	>=$45,000(4)	316	12.4	100.0		

0.5; both values of CR and Cronbach's alpha for constructs are greater than 0.8. These indicators suggest that the measurement model has acceptable structural reliability and convergence validity. The overall fit of the model also meets the requirements of the previous literatures [14,15], and the observations demonstrate that the theoretical model and the data are well matched.

The model was evaluated by examining the significance of the path coefficient (β) among the independent variables and the latent variables (Fig. 3). The results showed that positive relationships for four hypotheses: unsatisfactory with vaccine manufacturers (UVM) was positively related to unsatisfactory with government regulation (UGR) (H1: $t = 14.09$; $\beta = 0.29$; $p < 0.001$); both UVM (H2: $t = 17.86$; $\beta = 0.37$; $p < 0.001$) and UGR (H3: $t = 19.54$; $\beta = 0.42$; $p < 0.001$) were positive determinants of vaccine anxiety (VA); VA was negatively related to confidence in Chinese vaccines (CCV) (H4: $t = -8.25$; $\beta = -0.18$; $p < 0.001$).

Age, Education, Dependent, and Income act as significant mediators among the theoretical model, and the results of moderating effects were shown in Table 3. In the path of "UGR<---UVM", Gender ($p = 0.001$), Dependent ($p = 0.000$) and Income ($p = 0.001$) were acted as significant moderators. Women, parents who need to raise children and participants in low-income families are more likely to convert the unsatisfactory with vaccine manufacturers into unsatisfactory with government regulation. Except to Gender, the other four variables (Age, Education, Dependent, and Income) are significant mediator on the path of "VA <---UVM" and "VA<---UGR". Elder people, participants from lower education levels and low-income families, parents with children to raise, are more likely to have anxiety about vaccine safety because of unsatisfactory with vaccine manufacturers and government regulation. On the most important path "VA--CCV", Gender ($p = 0.000$), Dependent ($p = 0.000$) and Income ($p = 0.000$) are significant mediators.

Table 2
Reliability and convergent validity of measured variables.

Constructs	Variables	Corresponding items	λ	C.R	Cronbach's alpha	AVE
UVM	UVM1	China's vaccine manufacturers are very inefficient.	0.866	0.936	0.936	0.709
	UVM2	The management system of vaccine manufacturers in China is not rigorous.	0.877			
	UVM3	The technological innovation capability of China's vaccine manufacturers is insufficient.	0.828			
	UVM4	The monopoly of vaccine manufacturers in China is unreasonable.	0.839			
	UVM5	The profit margin of China's vaccine manufacturers is abnormal and too high.	0.815			
	UVM6	Chinese vaccine manufacturers are likely to bribe government regulators.	0.824			
UGR	UGR1	The Chinese government's penalties for vaccine fraud are too weak.	0.851	0.949	0.950	0.759
	UGR2	The Chinese government's drug supervision is weak and cannot guarantee vaccine safety.	0.862			
	UGR3	Government officials in China's drug regulation likely be corrupt.	0.871			
	UGR4	It is unreasonable for the mandatory vaccinations in China.	0.891			
	UGR5	The Chinese government does not pay attention to the physical health of children.	0.892			
	UGR6	The Chinese government's information on the vaccine crisis is not neutral and clear.	0.858			
VA	VA1	I am very angry about this vaccine crisis.	0.714	0.847	0.848	0.583
	VA2	I feel very anxious about the vaccination of my child.	0.730			
	VA3	The vaccine counterfeiters should be severely punished.	0.820			
	VA4	The incompetent officials should be severely punished.	0.786			

UVM: unsatisfactory with vaccine manufacturers; UGR: unsatisfactory with government regulation; VA: vaccine anxiety. λ = standardized factor loading; C.R: composite reliability; AVE: average variance extracted.

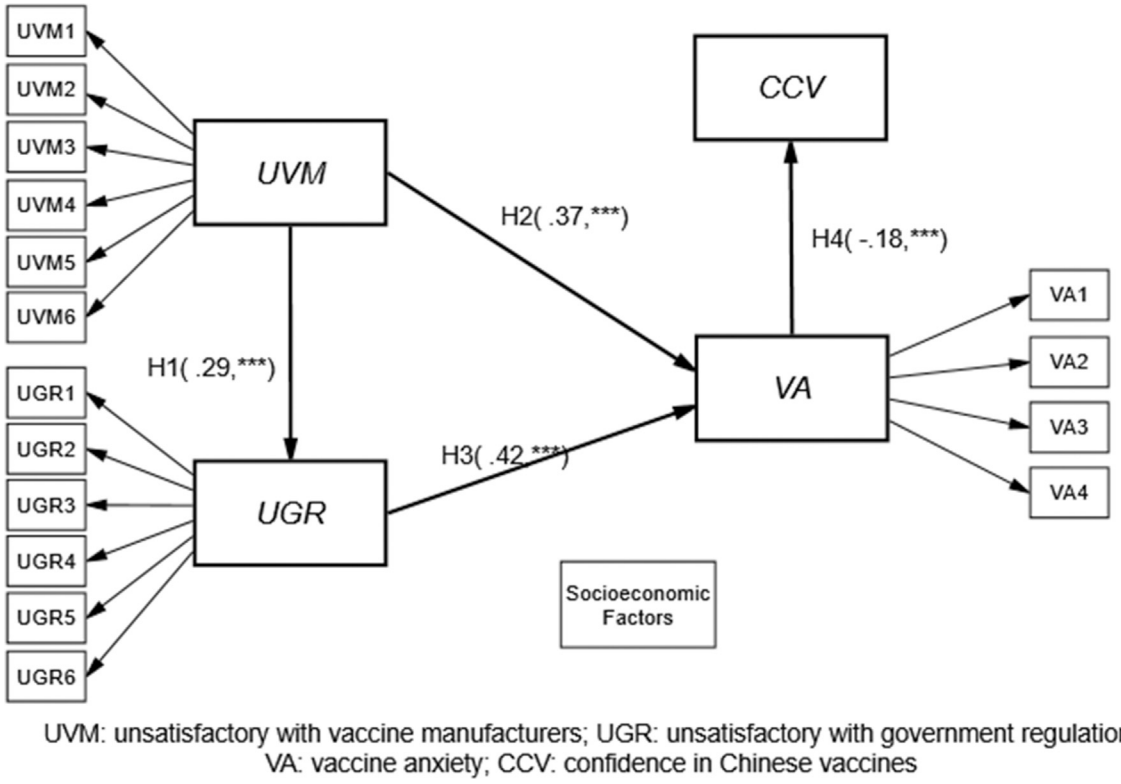

Fig. 3. Structural equation modeling results.

Women, parents with children to raise, and participants from high-income families are more likely to no longer trust Chinese-made vaccines because of anxiety about vaccine safety.

4. Discussion

Big data analytics provides evidence mega social media traffic around this issue lasted 24 days, social media became the mainstream interaction channel, the public attentions of vaccine crisis were increased and decreased very sharply, and the dominant opinions were negative. It is worth mentioning the influence of social media in the public health crisis. Social media is an important tool for promoting relationships with friends, and it is becoming a part of Chinese life [16]. Unlike traditional Internet communication tools, mobile social media have the characteristics of decentralized communication structure, real-time broadcast, and public participation [17]. It is fundamentally different from the traditional media environment, and the rhythm of the hotspot switching on mobile social media is very fast and sudden. In 2004, a large-scale hepatitis B vaccine crisis broke out in northern China, and more than 100 children were paralyzed or killed because of 44 million expired hepatitis B vaccines [18]. This incident did not cause media and public attention until 2005, and it was after 2014 that it gradually withdrew from the public eyes [5]. It will helpful for governments and vaccine manufacturers to take active and effective measures, and then control the further deterioration,

Table 3
Moderating effects testing.

Moderators	Paths											
	UGR<—UVM			VA <—UVM			VA<—UGR			CCV<—VA		
	P-value	$\beta_{(1)}$	$\beta_{(2)}$	P-value	$\beta_{(1)}$	$\beta_{(2)}$	P-value	$\beta_{(1)}$	$\beta_{(2)}$	P-value	$\beta_{(1)}$	$\beta_{(2)}$
Gender	**0.001**	0.194	0.234	0.088	0.329	0.380	0.610	0.379	0.363	**0.000**	−0.069	−0.263
Age	0.538	0.182	0.149	**0.001**	0.296	0.814	**0.000**	0.403	0.841	0.365	−0.155	−0.016
Education	0.390	0.255	0.304	**0.001**	0.473	0.370	**0.000**	0.481	0.339	0.207	−0.153	−0.253
Dependent	**0.000**	0.526	0.327	**0.000**	0.596	0.276	**0.000**	0.525	0.347	**0.000**	0.420	0.058
Income	**0.001**	0.384	0.055	**0.000**	0.294	0.069	**0.001**	0.269	0.090	**0.000**	−0.195	−0.636

Comparison groups of moderators: Gender (1) = "Male", (2) = "Female"; Age (1) = "20 and less years", (2) = "61 or more years"; Education (1) = "High school education or below", (2) = "Bachelor degree or above"; Dependent (1) = "Yes", (2) = "No"; Income (1) = "<$15,000", (2) = ">=$45,000".
P-value is the result of model comparison, which examines every pair of models in which one model of the pair can be obtained by constraining the parameters of the other. If the P-Value is less than 0.05, it means that the moderating effects are significant (in bold).

if they can better understand these new features of social media and public reactions [19]. Previous research has discussed the public's attitude toward the vaccine crisis, and most responses were negative [5,20]. The current study further confirmed this conclusion and Chinese citizens have expressed strong indignation and condemnation to vaccine manufacturers and government regulators during this vaccine scandal.

Unlike previous studies on media's response and public confidence to public health by using statistical analysis, the current research conducted an online survey and structural equation model analysis to explore the influence mechanism of psychological variables and demographic parameters on these views, and some interesting conclusions were found. As the result of the previous literature, anxiety about vaccine safety will eliminate or reduce public confidence of vaccines and ultimately lead their refusal or delay in vaccination [21]. According to the Vaccine Hesitancy Report from the Working Group of World Health Organization Strategic Advisory Group of Experts (SAGE) on in 2014, risk- benefit (scientific evidence e.g. vaccine safety concerns) was the most frequently cited category on the list of reasons [22]. The current research expanded this conclusion and explored two important determinants that contribute to vaccine safety anxiety: unsatisfactory with vaccine manufacturers and unsatisfactory with government regulation. The combination of the two psychological factors led to the public's disappointment and indignation about the vaccine crisis, which triggered a strong reaction on social media. The previous literature has pointed out that restoring public confidence in vaccine safety is extremely difficult and time consuming [23].

The study systematically analyzed the relationship between demographic variables and public confidence on the vaccines, which are new meaningful findings. Women, parents with children have a significantly stronger response to the vaccine crisis, which is consistent with previous studies [24]. The likely reason is that women pay more attention to the physical health of children, and parents with children are more concerned about the safety of vaccines [25]. Young participants and people with low education levels have a higher level of panic about this vaccine accident. Previous research has also shown that these two groups are more likely to listen to others' views on social media than to express their own independent opinions [26]. Due to lack of experience and expertise, they become more helpless in the vaccine crisis and thus lead to extreme psychological perception [17]. It is worth mentioning the impact of total household income. Low-income participants are more likely to turn the disappointment of vaccine manufacturers and government regulation into anxiety about vaccine safety, while high-income people are more likely to translate this anxiety into distrust of Chinese vaccines. This is not a surprising result. There are evidences that high-income households in China were more likely to adopt health services and medicines which imported from developed countries, including vaccines [27,28].

The study highlighted the destructive of the vaccine crisis on public confidence in vaccine safety, which significantly influenced the public's willingness to vaccinate. For government regulators and vaccine manufacturers, it might take a tremendous effort to alleviate public psychological perception of vaccine anxiety and re-establish trust [6]. The Chinese government should develop more stringent regulations and standards for the vaccine industry, including Good Manufacturing Practice (GMP), Good Supply Practice (GSP), Vaccine Circulation and Vaccination Regulations [29,30]. Vaccines must undergo multiple clinical trials before they are marketed, and vaccines with ineffective effects or strong side effects must be prohibited [31]. During the manufacturing process, government regulators should improve GMP monitoring by random checks and strictly enforce GMP regulations. After the vaccine is allowed to use, the CFDA and CDC departments must strengthen strict dual supervision of the vaccine circulation. Nurses responsible for vaccination must undergo rigorous training and will be randomly reviewed by the CDC to ensure the safety of the vaccination process. In response to possible safety issues after vaccination, the Chinese CDC should strictly implement the Vaccine Adverse Event Reporting System to conduct specific investigations into vaccine adverse events and eliminate potential safety hazards [32]. The CDC should work with medical institutions to establish a database for all vaccinated children and to track their physical condition after vaccination [33]. If vaccine manufacturers and medical institutions fail to comply with regulatory requirements, the government should impose severe and heavy penalties under the vaccine regulatory laws [34].There are a few limitations to this study. First, the cross-sectional study design, which limits our ability to infer the length of time among these variables. Second, the study was conducted in the form of Internet big data and online questionnaires, while the findings may not generalize to people who could not reach the Internet. Although the confidence of vaccine safety was considered a decisive reason of the final vaccination decision, we did not measure the actual vaccine selection. Because of China's mandatory vaccination policy and the high cost of imported vaccines, some people who expressed that they have low confidence in Chinese vaccines may eventually choose the free vaccines produced in China.

5. Conclusions

In summary, findings from the present study indicate the public's response to the 2018 Chinese vaccine scandal has three

characteristics: the social media was the mainstream interaction channel, public attentions of vaccine crisis were changed rapidly, and the dominant opinions were negative. Unsatisfactory with vaccine manufacturers and unsatisfactory with government regulation acted as two important determinants impacted public's vaccine anxiety. Our results also indicate that women with children, young participants and people with low education have a significantly stronger response to the vaccine crisis, high-income people are more likely to translate this anxiety into distrust of Chinese vaccines. Our study can help inform government regulators and vaccine manufacturers in re-establishing public trust by stringent regulations and standards for the vaccine industry. Future research should continue to focus on the implementation effectiveness of regulatory measures developed around the public vaccine confidence rebuilt proposed within the discussion group.

Author contributions

MZ, LZ and NK were responsible for the study conception and contributed to the elaboration of the questionnaire. MZ and SQ contributed to data collection and conducted the statistical analyses. MZ and SW modified the manuscript and submitted it. All authors were implicated in the final manuscript preparation and approved the final manuscript. Each author agrees to be personally accountable for the author's own contributions.

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Declaration of Competing Interest

None.

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