

Research Article

Reflections on HPV Vaccination Behavior and Health Information Dissemination among Female University Students

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***Corresponding author:** Hang Yuan-yuan, Department of Public Health, Dalian Medical University, China**Received:** April 15, 2022; **Accepted:** May 13, 2022;**Published:** May 20, 2022**Abstract**

Cervical cancer is one of the common gynaecological tumors and the HPV vaccine plays an important role in early prevention. With the rapid development of the Internet, new media has gradually become a hot spot and development trend of health communication. It is worthwhile to study in-depth how to promote the combination of health education and new media to better play the role of health communication. Based on the theory of planned behavior, the concepts related to the perceived risk theory and the new parallel process theory model were cited to construct a model of factors affecting vaccination behavior and willingness to vaccinate, and to investigate the situation of HPV vaccination among female university students. A total of 420 valid samples were recovered. The data were processed using Amos 24.0 software, and the reasons for not receiving HPV vaccination were analysed. The results showed that: Perceived value, perceived severity, and social expectancy had a positive effect on attitude toward behavior; perceived value, social expectancy, perceived behavioural control, and attitude toward behavior had a positive effect on behavioural intentions, which in turn had a significant effect on their actual behavior. The results of the study will facilitate the development of intervention programmers and the use of online media for HPV-related education and communication activities; the development of vaccination policies that are appropriate to the national context; the strengthening vaccine safety supervision; and the increasing awareness of the HPV vaccine among women.

Keywords: HPV vaccine; Behaviour; willingness and attitudes to vaccination; Health communication; Media

Introduction

With the development of the economy and the advancement of technology, the public's concept of health is constantly changing and their health needs are included in the rise. Enhancing the dissemination and education of health knowledge, targeting and guiding the public to change old unhealthy behaviors and promoting the adoption of new healthy behaviors, has a positive effect on improving the health literacy of the whole population. With the rise of the Internet and media technology, new media has come into the public eye as a form of communication, making the dissemination of health information diversified and comprehensive in scope, greatly enhancing the influence of health information dissemination [1-2].

Cervical cancer is part of the malignant tumors in gynecology, and persistent infection with High-Risk Human Papillomavirus (HPV) is the main cause of cervical cancer. It can also cause rectal cancer, genital cancer, condylar, and several diseases of the mucous membranes of the oropharynx and eyes, such as tonsil cancer and oral cancer [2-3]. To fundamentally interrupt the spread of HPV, protect susceptible people and reduce mortality and morbidity from cervical cancer, experts and scholars have successfully developed an HPV vaccine for the early prevention of cervical cancer, which may also become the first malignancy to be prevented and eliminated

through early screening and vaccination. With the popularization of the HPV vaccine in various countries, research studies on public awareness and vaccination status of preventive HPV vaccine have been gradually conducted by researchers and scholars. The author searched the CNKI and Wan Fang databases using "HPV", "HPV vaccine" and "vaccination intention" as keywords and combed through the publications in the related fields. The author found that the overall level of HPV awareness among Chinese women is low, with only 15.5% of women have heard of HPV, related knowledge [5]. Compared to other countries, the vaccination rate is weak, and the willingness to be vaccinated is less strong. Currently, China is in the early stage of introducing the HPV vaccine to the market, and the universal immunization programmer has not yet been implemented; young women are the main targets of HPV vaccination, and female university students make up a large proportion of this group. In this paper, we surveyed female university students in selected universities to understand their HPV vaccination status, attitudes and perceptions, and analysed the factors influencing vaccination behavior. This paper explores health communication strategies suitable for female university students in China, aiming to improve the willingness to receive HPV vaccine and vaccination behavior of women of the right age in China through targeted intervention programmers and to provide a theoretical basis for the promotion of HPV vaccine health

communication in China.

Research Methods

Research frameworks

Health communication is based primarily on the Knowledge, Attitude Practice (KAP) and the Health Belief Model (HBM). Belief Model” to examine the effect of health information promotion and media communication, focusing on the change of health beliefs in health education. Scholars at home and abroad have studied the HPV vaccine in depth through models such as the Theory of Planned Behaviour (TPB) and found that people’s attitudes influence their health behaviors. This type of research has mainly focused on the influence of attitudes on behavior, but there is a lack of attention to how attitudes influence behavioural intentions.

Technology Acceptance Model (TAM): The study analysed users’ intention to use new systems and technologies, and the factors that influence intention, and found that perceived usefulness and ease of use affect users’ attitudes through modelling; meanwhile, behavioural intention is influenced by attitude to use and ultimately affects actual behavior. In this study, perceived value (PV) was used as one of the factors influencing female university students’ attitudes towards HPV vaccination, mainly including perceived usefulness and perceived ease of use.

Extended Parallel Process Model (EPPM): An important theoretical framework for the study of health communication is founded on two theories, the Protection Motivation Theory (PMT) proposed by Rogers in 1983 and the Parallel Process Model proposed by Leventhal in 1970. The EPPM model proposed by Witte mainly contains the core concepts of threat perception (PT, Perceived Threat) and efficacy judgment (PE, Perceived Efficacy), where threat perception includes perceived severity and perceived susceptibility [6]. When the perceived threat level increases, the audience will be more receptive to the risk information and will further evaluate the effectiveness of the measures within the information to prevent the risk, which will lead to a change in their attitude, intention and behavior towards the risk information [7]. Perception of Susceptibility (POSU) refers to people’s subjective perceptions of the likelihood of contracting the disease.

Perception of Severity (POSE) refers to the degree to which people perceive the severity of various threats posed by their illness, including an assessment of the medical and social consequences [8]. In this paper, we refer to female university students’ perceptions of the severity of the possible consequences of HPV infection.

Perceived Risk: Raymond A. Bauer of Harvard University extended the concept of perceived risk from the field of psychology and proposed the theory of perceived risk (PR, Perceived Risk) [9], which was further defined by Peter and Ryan as an individual’s subjective perceived judgment of the expected loss of the outcome of the target behavior [10]. Related scholars and experts have also researched this aspect, for example, Ren Cong [11]. Studied perceived risk from five perspectives: privacy risk, functional risk, time risk, psychological risk and legal concerns, and explored the impact of users’ trust in mobile health services. The perceived risk in this paper refers to female university students’ expected evaluation of the consequences of HPV vaccination.

Theory of Planned Behavior (TPB): It is often used to predict the behavior of individuals, and the core idea is that an individual’s behavior is the result of careful thought and planning. The main components are subjective norms, behavioural intentions, perceived behavioural control, behavioural attitudes and actual behavior; the factors influencing attitudes in TPB can be divided into two dimensions: behavioural beliefs and outcome evaluations, and subjective norms can be divided into normative beliefs and motivation to follow [12].

Studies by Sun Xining [13] and Qu Xianguo [14] have shown that health consciousness and social influence positively influence behavioural attitudes and subjective norms of behavior, respectively, and indirectly influence behavioural intentions; the three factors of health behavioural attitudes, perceived behavioural control of health behavior and subjective norms can jointly explain individuals’ health behavioural intentions.

In this paper, Attitude toward Behaviour (ATB) refers to female university students’ attitudes towards HPV vaccination and is measured by five main indicators: perceived value, Perception of susceptibility, Perception of the severity, perceived risk and normative belief. Social Expectancy (SE) refers to the extent to which female undergraduates perceive that those who have a significant influence on them believe they should receive the HPV vaccine. This dimension is similar to the “subjective norms” in TRA and TBP [15], i.e. the norms of HPV vaccination among female students, measured by CM (Conformity Motivation) and NB (Normative Belief).

In this paper, the behavioural intention refers specifically to the willingness of female university students to receive the HPV vaccine. The actual behavior (AB, Actual Behaviour) refers to their actions to receive the HPV vaccine.

Someone who perceives that they have more resources and opportunities at their disposal and encounter fewer obstacles when performing a behavior will result in stronger cognitive behavioural control, which is perceived behavioural control, and in this paper, inoculation behavioural control in female university students.

Construction of a Research Model

Based on the above theories, the relationship between perceived behavioural control, subjective norms and behavioural attitudes respectively, and the behavioural intention was studied; based on TPB as the theoretical foundation, the key factors in TRA, HBM, EPPM, perceived risk theory and TAM, three variables of perception of susceptibility, perception of severity, and perceived risk were added to construct a theoretical model of female university students’ HPV vaccination intention and factors influencing vaccination behavior (Figure 1), and the hypotheses of this paper were put forward (Table 1).

Figure 1 Model of factors affecting vaccination behavior and vaccination willingness.

Design the Questionnaire

The questionnaire was designed concerning relevant literature. The questionnaire consisted of two parts: (1) Basic information on the respondents, including their age, education, per capita household income, monthly disposable income, knowledge of HPV and HPV

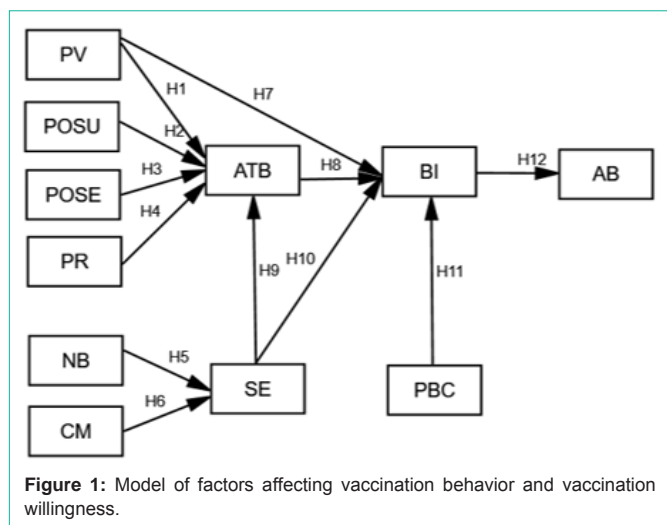


Figure 1: Model of factors affecting vaccination behavior and vaccination willingness.

vaccine-related knowledge [2]. 10 variables in the study hypothesis and a total of 46 variable measurement questions were designed. A 5-point Likert scale was used, ranging from “very unlikely to meet” (1 point) to “very likely to meet” (5 points).

Data Collection and Analysis

From April to May 2021, an online questionnaire was collected from female university students, with 450 respondents. After the questionnaires were collected, missing data and large duplicate questionnaires were excluded, leaving 420 valid questionnaires, with an effective rate of 93.33%. Excel was used for data entry and for Amos 24 and M and 7.4 software was used for statistical analysis. Descriptive statistics, confidence validity analysis and structural equation modelling was performed on the data. Maximum likelihood was used for parameter estimation; the Harman one-way method was used for the testing process. The full set of question items used for modelling was subjected to exploratory factor analysis, which revealed that 10 factors with a characteristic root greater than one could be analysed, and the first common factor had an explanation rate of 18.42% (<40%), indicating that there were no serious common method bias issues in this study.

Results Analysis

Demographic Characteristics

More than half of the respondents had heard of HPV (59.76%) and its vaccine (71.90%); however, in the follow-up questions about HPV knowledge, most of the respondents did not know much about HPV carriers, the vaccine and vaccination. Apart from that, about 17.6% of people in this survey had received HPV vaccination.

Validity and Reliability Analysis

Validity and reliability can evaluate the goodness of a survey questionnaire. The validity analysis method in this paper uses validation factor analysis, and the reliability index uses Cronbach alpha coefficient, when the co-efficient is greater than 0.7, the reliability of the questionnaire is good; convergent validity can be evaluated by the Average Variance Extracted (AVE value) and the Combined Reliability (CR), when CR is greater than 0.7 and AVE>0.5, the convergent validity of the questionnaire is good (Convergent Validity).

Table 1: Research Hypothesis.

Assumption summary	Path direction
"Perceived value" is positively correlated with "attitude toward behaviour"	PV→ATB
"Perception of susceptibility" is positively correlated with "attitude toward behaviour"	POSU→ATB
"Perception of severity" is positively correlated with "attitude toward behaviour"	POSE→ATB
"Perceived risk" is negatively correlated with "attitude toward behaviour"	PR→ATB
"Normative belief" is positively correlated with "social expectancy"	NB→SE
"Conformity Motivation" is positively correlated with "social expectancy"	CM→SE
"Perceived value" is positively correlated with "behavioural intention"	PV→BI
"Attitude toward behaviour" is positively correlated with "behavioural intention"	ATB→BI
"Social expectancy" is positively correlated with "attitude toward behaviour"	SE→ATB
"Social expectancy" is positively correlated with "behaviour intention"	SE→BI
"Perceived behavioural control" is positively correlated with "behaviour intention"	PBC→BI
"Behaviour intention" is positively correlated with "actual behaviour"	BI→AB

NOTE: PV: Perceived Value; POSU: Perception of Susceptibility; POSE: Perception of Severity; PR: Perceived Risk; NB: Normative Belief; CM: Conformity Motivation; PBC: Perceived Behavioural Control; ATB: Attitude toward Behaviour; SE: Social Expectancy; BI: Behaviour Intention; AB: Actual Behaviour; 1: not inoculated; 2: inoculated; the same below.

The reliability analysis revealed that the coefficients α were all-greater than 0.7 and that the CFA model had a good fit. (Table 2) shows that the validity and reliability of each dimension are good.

Hypothesis Testing and Structural Equation Modelling

As the actual behavior (V63) is a dichotomous variable, it was defined as a categorical variable in M plus using the “categorical=V63;” syntax, allowing the logistic regression to be integrated into the structural equation analysis. The analysis showed that the model fitted well, with $\chi^2=1204.245$, $df=957$, $\chi^2/df=1.258$, CFI=0.936, TLI=0.931, RM SEA=0.025 and SRMR=0.048. All hypotheses were supported by the empirical data, except for hypotheses H2 and H4. (Figure 2) $^{**}p<0.01$, $^{***}p<0.001$. (Figure 2) Standardized coefficient model.

Discuss Results

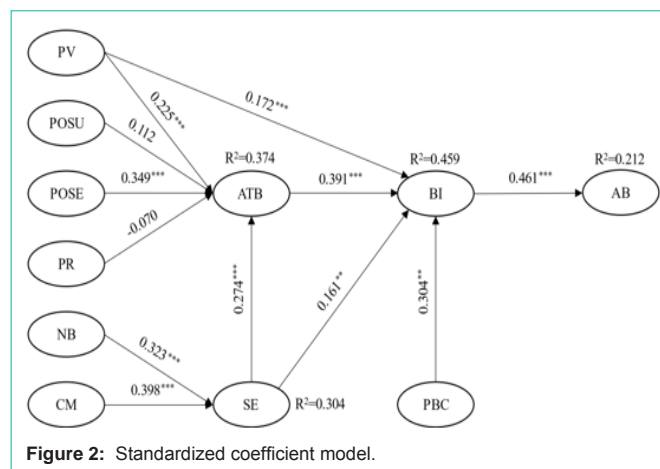
“Perception of susceptibility” and “perceived risk” do not have a significant impact on “attitude toward behavior”

Although the HPV vaccine was launched in the US in 2006, information about HPV and its vaccine is not well communicated. The lack of knowledge about diseases such as cervical cancer and the lack of knowledge about the HPV vaccine and vaccination has led to low awareness and acceptance. Another reason is that previous generations have generally not been vaccinated against HPV and have not contracted related diseases, which makes it less likely that the public will assess their infection with HPV in the future, leading to a weak crisis awareness among female university students in this regard. Therefore, a non-significant relationship was observed between HPV infection and attitudes towards vaccination behavior.

The contemporary advanced medical standard, while the government continues to standardize the market regulatory system for vaccines and other pharmaceutical products and strengthen supervision; information on the production, storage

Table 2: Reliability and validity analysis results.

Dimension	Item	p	Cronbach α	CR	AVE	Standardized Factor loading
PV	V18	<0.001	0.877	0.879	0.548	0.821
	V19					0.813
	V20					0.708
	V21					0.744
	V22					0.671
	V23					0.67
POSU	V24	<0.001	0.797	0.802	0.576	0.682
	V25					0.851
	V26					0.734
POSE	V27	<0.001	0.792	0.796	0.568	0.723
	V28					0.847
PR	V29	<0.001	0.883	0.884	0.606	0.681
	V30					0.863
	V31					0.744
	V32					0.819
NB	V33	<0.001	0.802	0.802	0.504	0.75
	V34					0.706
	V35					0.697
	V36					0.685
CM	V37	<0.001	0.831	0.837	0.563	0.715
	V38					0.741
	V39					0.755
	V40					0.745
SE	V41	<0.001	0.832	0.835	0.505	0.826
	V42					0.657
	V43					0.671
	V44					0.635
PBC	V45	<0.001	0.863	0.865	0.562	0.783
	V46					0.792
	V47					0.773
	V48					0.738
ATB	V49	<0.001	0.795	0.808	0.518	0.76
	V50					0.713
	V51					0.762
	V52					0.75
BI	V53	<0.001	0.908	0.909	0.628	0.779
	V54					0.526
	V55					0.79
	V56					0.813
AB	V57	<0.001	0.908	0.909	0.628	0.833
	V58					0.828
	V59					0.802
	V60					0.821
	V61					0.821
	V62					0.638



and transportation of vaccines is gradually standardized and made public, and the verifiability of information on manufacturers, batches and authenticity of vaccines has reduced public doubts about the safety of the vaccine market. Another reason is that China’s public health service system has excelled in the management of new crown epidemics, and the capacity and level of grassroots public health services have been improved. Both in terms of drug safety and vaccination risks, this has given the public confidence. Therefore, there is also a non-significant relationship between the perceived risk consequences of HPV vaccination and attitudes towards vaccination behavior.

”Attitude toward Behaviour” and “Perceived Behavioural Control” Are the Most Effective Channels to Influence “Behaviour Intention”

The four elements of “perceived value”, “social expectancy”, “perceived behavioural control” and “attitude toward behaviour” had a positive effect on “behaviour intention”, with the coefficients of 0.172, 0.161, 0.304 and 0.391 respectively. “There were significant correlations between these four variables and behavioural intentions, i.e. the stronger the perceived value, Social Expectancy, behavioural attitudes and perceived behavioural control, the stronger the vaccination intentions of the respondents. In other words, if respondents perceive that the more actionable, they are to get the HPV vaccine, the better the prevention effect after completing the vaccination, and the more friends and relatives around them rate the vaccine highly or the more people get vaccinated, the stronger their intention to get vaccinated. When respondents had a positive attitude towards the act of getting vaccinated and the intention to get the HPV vaccine, the more likely they were to go for the HPV vaccine.

Influencing “Attitude toward Behaviour” Through “Perceived Value”, “Perception of Severity” And “Social Expectancy”

“Perceived Value”, “Perception of severity” and “Social Expectancy” had a positive effect on female university students’ behavioural attitudes towards HPV vaccination, with path coefficients of 0.225, 0.005 and 0.274 respectively. The path coefficients of “normative beliefs” and “motivation to comply” on “Social Expectancy” were 0.323 and 0.398, respectively. The results suggest that female university students’ perceived benefits of vaccination and their recognition of the usefulness of the vaccine can, to a

Table 3: Hypothesis test.

Hypothesis	Path	Standardization factor	SE	Z	p	Result
H1	PV→ATB	0.225	0.050	4.462	0.000	Established
H2	POSU→ATB	0.112	0.057	1.947	0.052	Invalid
H3	POSE→ATB	0.349	0.055	6.349	0.000	Established
H4	PR→ATB	-0.070	0.054	-1.301	0.193	Invalid
H5	NB→SE	0.323	0.054	5.942	0.000	Established
H6	CM→SE	0.398	0.054	7.408	0.000	Established
H7	PV→BI	0.172	0.047	3.678	0.000	Established
H8	ATB→BI	0.391	0.054	7.298	0.000	Established
H9	SE→ATB	0.274	0.048	5.742	0.000	Established
H10	SE→BI	0.161	0.049	3.263	0.001	Established
H11	PBC→BI	0.304	0.045	6.768	0.000	Established
H12	BI→AB	0.461	0.072	6.419	0.000	Established

certain extent, directly influence their behavioural attitudes, while the acceptance and recognition of the HPV vaccine are enhanced when people around them are encouraging, such as support from friends and relatives, recommendations from professionals, media promotion and government policy support. Similarly, interpersonal dissemination of information can also have a significant impact on the attitudes and behavioural intentions of female university students towards the HPV vaccine, so health information dissemination efforts should be targeted at all age groups, not just the age-appropriate vaccination population.

Insights and Recommendations

The results of this study show that although most female university students have a positive attitude towards HPV vaccination, the information they receive does not meet their actual health needs and their knowledge of the vaccine is low and misleading. As HPV infection is becoming younger and younger, the following recommendations were made to develop a HPV vaccine information dissemination intervention for the young female population, represented by female university students.

Health Communication Should Focus On Intervening In Individual Health Beliefs

To raise the level of public awareness and conduct education on the relationship between HPV infection and cervical cancer, the current situation of the prevalence of cervical cancer and HPV infection, the ways of HPV transmission and the consequences of HPV infection. Enhance public awareness of the incidence of cervical cancer in China, epidemiological trends, and susceptible groups. To arouse the audience's fear and perceive the potential seriousness of the HPV virus, thereby raising public awareness of the susceptibility and the seriousness of HPV infection and related diseases, and weakening discouraging factors such as the perception that HPV vaccination is unnecessary because one is healthy.

Enhance positive social impact and better interpersonal communication. Encourage the public who have been vaccinated to share it externally to drive acceptance of the vaccine among those around them. On the other hand, involve health care professionals or professionals in public education activities and provide advice on

relevant issues; deliver and popularize HPV knowledge blind spots to the public, so that they can receive health information in greater depth and increase the public's acceptance of HPV vaccine and intentional vaccination rate.

Optimizing Communication Content for the Audience

Combining the popularity of the Internet, new media and other media among the young population, innovative ways and means of propaganda and education are available. The dissemination of HPV-related knowledge and the promotion of the HPV vaccine can be carried out through online media such as microbiology, WeChat public numbers and self-media platforms. As the main target group of the HPV vaccine is young women, especially female university students, schools should also take up the responsibility of HPV vaccine knowledge dissemination. It is suggested that teachers of relevant course can appropriately expand their knowledge outside the textbook when teaching HPV content.

It is recommended that teachers in the relevant course should expand their knowledge of HPV beyond the textbook when teaching the subject. They should also help the target population to know the best time to be vaccinated so that they do not hesitate and miss the ideal time to be vaccinated.

Strengthen Regulatory Efforts and use Authoritative Sources of Information

Given the interactive, timely and diverse nature of new media communication, information regulators should establish a strict market monitoring mechanism. The majority of new media disseminates are non-professional healthcare professionals, whose medical knowledge is limited, which largely affects the content and effectiveness of the dissemination. The use of authority figures such as medical professionals, experts and scholars, as well as official channels to disseminate health information, can be used to increase the trust of audiences in HPV vaccine information.

The media should be educated on their social responsibility and should be made more aware of their social responsibility to provide correct guidance and scientific propaganda on health knowledge and be responsible for the authenticity of the content they write and publish. The corresponding regulatory bodies should strictly enforce the regulatory censorship system and screen and verify the content involving HPV vaccine information and science popularization before publishing and promoting it.

Enhancing the Role of Positive Government Guidance

The government and relevant departments strengthen supervision and management of vaccine quality and safety to increase confidence in the safety of the HPV vaccine and eliminate or alleviate concerns about issues related to vaccination. The government establishes a reasonable cost-sharing mechanism through price subsidies and inclusion in health insurance and formulates HPV vaccination policies that are appropriate to national conditions to increase HPV vaccination rates.

Conclusion

This study adopts the theory of planned behaviour and adjusts the structure and entries of the questionnaire by reviewing the literature to investigate the willingness and behaviour of female

university students to receive HPV vaccination and analyses the main influencing factors. The results of the study suggest that improving the awareness level and acceptance attitude of female university students is the key to enhancing their willingness to be vaccinated and that the government and health departments should play a leading role in health information dissemination, do a good job of macro-regulation of HPV vaccine knowledge dissemination, expand the sources of HPV knowledge for university students through new media platforms, and do a good job of health communication and health education. Intervention in the awareness of reproductive safety among people at high risk of HPV infection to improve public health awareness and health literacy. Improve the monitoring system to ensure the safety and efficacy of the vaccine and control the authenticity and credibility of the content of new media, health communication messages, which will help promote and popularize the HPV vaccine among university students. Implementing a vaccination policy that is in line with national conditions, controlling the price of the vaccine and improving the convenience and accessibility of vaccination will help to increase the HPV vaccination rate among female university students. Localities should develop vaccination programmers that have adapted to the actual situation, thus facilitating the smooth implementation of HPV vaccination.

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