



Female college students' perspectives on self-paid human papillomavirus vaccination based on the theory of planned behaviour

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ABSTRACT

To explore the perspectives of female college students on self-paid human papillomavirus vaccination based on the theory of planned behaviour. Cross-sectional studies were used to investigate female college students (from freshman to senior) in the Hualien district of Taiwan as the study population. A total of 315 questionnaires were released. The number of valid questionnaires received was 299, and the response rate was 94.92%. Multiple regression analysis revealed significant predictability ($R^2 = 0.579$) in the sample's attitudes, subjective norms, perceived behavioural control, and intent towards self-paid vaccination. Regarding promotion, only 50% of the sample population agreed to receive vaccination at their own cost, and such a percentage increases to 70% or even 80% when vaccination can be offered with a discount or at no cost. Therefore, competent authorities are recommended to promote financial aid programmes, or include HPV vaccination in government-paid vaccination programmes, to increase vaccination rates.

Keywords: Theory of planned behaviour (TPB), human papillomavirus (HPV), human papillomavirus vaccination (HPV vaccine)

INTRODUCTION

Cervical cancer is one of the major cancers from which females suffer worldwide. Compared with other cancers, cervical cancer can be diagnosed and treated in an earlier phase, and the 5-year survival rate is higher than that of any other cancer; therefore, prevention policy against cervical cancer is a critical public health concern. Because the attachment rate of cervical cancer is an index of a particular nation's medical level and the quality of its preventive care, monitoring the level and fluctuation of the mortality rate can serve as an objective of health policy for competent health authorities. The crude death rate of cervical cancer in Taiwan is 5.72 per 100,000 women, which is 39.33% of the nation's cancer mortality rate amongst women, ranking sixth amongst major cancers that affect women. By contrast, the crude cancer incidence rate is 15.64 per 100,000 women, and the incidence rate ranks cervical cancer fourth amongst cancers affecting women [1]. Based on the concept "prevention is better than a cure", the government's prevention policy includes a Papanicolaou smear and preventive human papillomavirus vaccination (HPV vaccine).

The HPV vaccine, which is the most effective measure against contagious disease contracted through human papillomavirus (HPV), is intended to produce immunity in a person being vaccinated for HPV, to prevent any precancerous lesions resulting from HPV infection, and to prevent further cervical cancer [2]. Relevant studies have revealed that receiving HPV vaccination against diseases and cervical cancer contracted through HPV is highly cost effective [3]. A study confirmed that contracting high-risk HPV is the carcinogenic factor in contracting cervical cancer. Evidence of high risk HPV is found in 99.7% of cervical cancer tissues [4]. The prevalence of infection for women in Taiwan is approximately 20% [5]. The launch to market of the HPV vaccine in 2006 is considered the

most crucial medical breakthrough of the twenty-first century [6-7]. Injection of the HPV vaccine is the first stage of prevention, which greatly reduces health care burdens for women. If younger women received the HPV vaccine and a Papanicolaou smear at the age of 30, then cervical cancer would no longer be the most fatal disease contracted by the nation's female population.

The Ministry of Health and Welfare of Taiwan approved the launch of the first preventive HPV vaccine in October 2006. Currently, two types of vaccine are in the market: Gardasil and Cervarix; both are appropriate for women between the ages of 9 and 26 years. The effect lasts for 5 years or more from the time of vaccination, and the maximal rate of control is 70%. The long-term effects of the vaccines and the need for a booster shot are still under observation worldwide.

According to relevant literature, women have little knowledge about HPV [8-14]. The factors that affect their intent to receive vaccination include their awareness and knowledge of HPV vaccines [11,14-19], age [18,21], marital status [18], education of their parents [17-18,20], household income [18,22], insurance coverage [23], family history of cervical cancer [9,22], number of sex partners [15,23], history of contagious disease, awareness of the seriousness of cervical cancer and condyloma acuminata [23-24], expense [13,22,25-27], and attitudes towards vaccine [9,13,15-16,18,22-23].

This study sought to determine the relationship between the direct and indirect factors that affect acceptance of self-paid HPV vaccination, based on the theory of planned behaviour. These factors include female college students' awareness of cervical cancer and HPV vaccines, sources of HPV vaccine information, attitudes towards vaccination, subjective norms regarding vaccination, perceived behavioural control, intent to be vaccinated, and the influence of self-paid HPV vaccination. The findings of this study can serve as a future reference for the health authority's promotion of HPV vaccination.

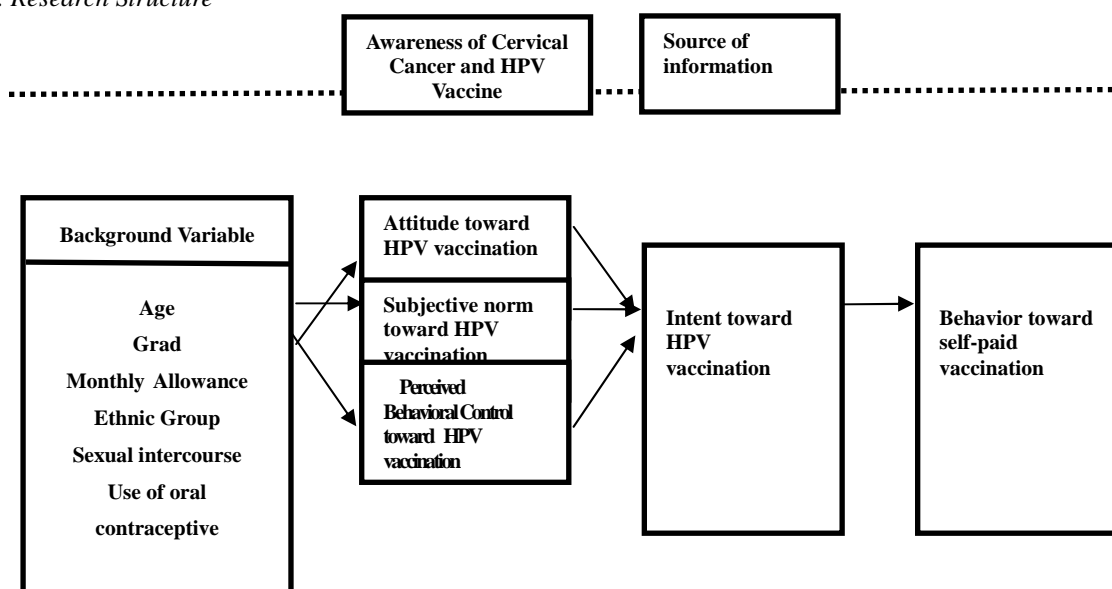
EXPERIMENTAL SECTION

Research Method

1. Design and Object of Research

Cross-sectional studies were used in this study to investigate female college students (from freshman to senior) in the Hualien district of Taiwan as the study population. Stratified random sampling was employed by stratifying the total number of female students, by accounting for the college year they were currently enrolled in, and using 35% of the total as samples. A total of 315 questionnaires were released.

2. Research Structure



3. Research Tool

A structured questionnaire was employed, and literature relevant to this study was referenced as criteria for the questionnaire design. The questions were developed according to the structure of the study. Five experts in the fields of health care, public health, health care administration, and health promotion were invited to evaluate the questionnaire's validity, to rate the importance, appropriateness, and clarity of the questions, and to modify

inappropriate question statements and terms. The content validity index (CVI) lay between 87% and 98% with an average of 95.8%.

The results of the reliability test of this study are as follows: nine questions were related to attitude ($\alpha = 0.835$); seven questions were related to subjective norm ($\alpha = 0.934$); six questions were related to perceived behavioural control ($\alpha = 0.895$); five questions were related to intent ($\alpha = 0.878$); and two questions were related to behaviour ($\alpha = 0.944$). The reliability of each scale was more than 0.80, indicating considerable internal consistency amongst all evaluation variables.

The variables and scales in the questionnaire are described as follows: (1) Variables of personal background comprised age, the year of the student, residence condition, allowance, ethnic group, sexual intercourse experience, oral contraceptives, and smoking; there were eight questions in total. (2) Awareness of cervical cancer and HPV vaccine comprised risk factors, source of information on HPV vaccines and degree of awareness; there were 10 questions in total, including three questions in reverse order; each question was awarded one point, and the highest number of achievable points was 10. (3) Source of information on HPV vaccines; (4) a Likert five-point scale was employed for the scales of attitude, subjective norm, perceived behavioural control and intent towards HPV vaccination, and for the scale of self-paid HPV vaccination. Scale 1 means strongly disagree; Scale 2, disagree; Scale 3, no comment; Scale 4, agree; and Scale 5, strongly agree. The attitude dimension includes the individual's positive or negative opinion about HPV vaccination, containing nine questions in total. The subjective norm dimension includes the individual's awareness of the social pressure originating from his/her family members' or friends' perspectives of HPV vaccination, containing seven questions in total. The perceived behavioural control dimension includes how much an individual knows about the degree of the ease of participating in HPV vaccination, containing six questions in total. The intent dimension includes an individual's subjective judgment about HPV vaccine, which can be considered reflective of his/her behavioural intent, containing five questions in total. Finally, the behaviour dimension addresses the possibility of an individual planning and attempting to receive HPV vaccination, containing two questions in total.

4. Data Analysis

The valid questionnaires were coded and documented in a database by using statistics software (SPSS) for Windows 20.0 (Chinese version). Statistical analysis was performed to describe the frequency distribution, percentages, means, and standard deviations of all of the variables, such as the background data of the samples in statistical analysis, awareness of cervical cancer and HPV vaccines, and sources of information on HPV vaccines. The Pearson correlation analysis was employed to analyse the correlation amongst behaviour, attitude, subjective norm, and perceived behavioural control. Linear regression analysis (LRA) was used to verify the predictive effect of each variable on self-paid HPV vaccinations.

RESULTS AND DISCUSSION

1. Distribution of Demographic Data

In this study, 299 valid questionnaires were received. The valid response rate was 94.92%. The average age of the samples was 20 years old. Most of the valid responses were from freshmen, 93 women (32.4%), followed by juniors with 79 women (26.4%). A large proportion of women had received a monthly allowance ranging from 3,001 to 5,000NTD, with a total of 126 women (42.4%) receiving a monthly allowance in this range; 93 (31.3%) women receiving a monthly allowance of less than NT\$3,000. Most of the participants belong to the ethnic group of southern Fujian people with a total of 213 women (72.0%). Most of the study participants had not had sexual intercourse, with a total of 266 women (89.6%). More than 90% of the participants had not taken any oral contraceptives, with a total of 268 women (90.2%).

2. Awareness of Cervical Cancer and HPV Vaccines (Table 1)

Regarding the study participants' awareness of cervical cancer and HPV vaccines, the average number of points of each sample was 7.46 (10 questions in total, with each question awarded 1 point). More than 50% of the participants have correct answers to 9 of the 10 questions. One question was answered correctly by only 33.6% of all of the participants. These statistical data show that the study participants in general had good awareness of cervical cancer and HPV vaccines, but 66.6% of the participants provided the incorrect answer to the question concerning whether cervical cancer is contracted mainly through sexual intercourse. The top three questions that the participants understood regarding their awareness of cervical cancer and HPV vaccines were (in descending order of percentage): (1) a Papanicolaou smear is unnecessary after HPV vaccination (95%); (2) a woman who has sexual intercourse needs an HPV vaccination (90%); and (3) the participant feels that she has passed the age of HPV vaccination (88.9%). The questions with the lowest correct answer rate were (in ascending order of percentage): cervical cancer is mainly contracted through sexual intercourse (33.4%) (which corresponds with the results of research on young

women's awareness of HPV vaccination) [17, 22-23]; the chance of contracting cervical cancer increases with the frequency of sexual intercourse (58.5%); and people with numerous sexual partners tend to contract cervical cancer easily (68.2%).

Table 1 Study Samples' Awareness of Cervical Cancer and HPV Vaccine (N=299)

Question	Right answer	Wrong answer	% of right answer	Avg. Score	order
Papanicolaou smear is not necessary after HPV vaccination	283	15	94.6	0.95	1
HPV vaccination is only necessary for those who have sexual intercourse	268	30	89.6	0.90	2
Do you feel you have past the age for HPV vaccination	265	33	88.6	0.88	3
Have you heard about HPV vaccine (Yes)	250	46	84.5	0.85	4
HPV vaccine can prevent Human Papillomavirus infection	252	47	84.3	0.84	5
The earlier one has sexual intercourse, the more likely for her to contract cervical cancer	223	76	74.6	0.75	6
Person whose sexual partner contracts venereal disease has more chance to contract cervical cancer	209	89	69.9	0.70	7
Person with more sexual partner contracts cervical cancer more easily	204	94	68.2	0.68	8
Person who has more experiences in sexual intercourse has more chance to contract cervical cancer	175	123	58.5	0.59	9
Cervical cancer is contracted mainly through sexual intercourse	100	198	33.4	0.33	10
Average Score				7.46	

Scoring method: One right answer is awarded with one point. Maximum score is 10 points and minimum score, 0 point.

3. Distribution of Source of Information on HPV Vaccines (Table 2)

Regarding the sources of information on HPV vaccines, most of the participants were aware of HPV vaccines (84.5%). Most of the participants (195) had received such information from TV, which corresponds with a result found in the literature [28]. The sources that received the next highest scores were posters, newspapers, magazines, websites, and teachers, which corresponds with a study result found in the literature [22].

Table 2 Distribution of Study Samples' Source of Information about HPV Vaccination (N=299)

Source	No. of Responders	%	order
No source	46	15.50%	
Heard	250	84.50%	
TV	195	78.00%	1
Promotion poster	111	44.40%	2
Newspaper and Magazine	81	32.40%	3
Website	79	31.60%	4
Teacher	78	31.20%	5
Healthcare professional	75	30.00%	6
Students and friends	55	22.00%	7
Parents	54	21.60%	8
Ad pamphlet	37	14.80%	9

4. Correlation of Attitudes, Subjective Norms, Perceived Behavioural Control, and Intent Towards HPV Vaccination Amongst Various Background Variables (Table 3)

The study participants' attitudes and intent towards HPV vaccination show a significantly positive correlation ($r = 0.653^{**}$, $p < 0.01$); subjective norm and intent towards HPV vaccination show a significantly positive correlation ($r = 0.702^{**}$, $p < 0.01$); perceived behavioural control and intent towards HPV vaccination show a significantly positive correlation ($r = 0.798^{**}$, $p < 0.01$); and intent and behaviour regarding HPV vaccination show a significantly positive correlation ($r = 0.687^{**}$, $p < 0.01$). These results show that the participants tended to demonstrate a more positive behaviour regarding self-paid HPV vaccination when they had higher scores in attitude, subjective norm, perceived behavioural control, and intent towards HPV vaccination.

Table 3 Pearson Correlation Analysis (N=299)

	Attitude	Subjective Norm	Perceived Behavioral Control	Intent	Behavior
Attitude	1.000				
Subjective Norm	.650**	1.000			
Perceived Behavioral Control	.663**	.784**	1.000		
Intent	.653**	.702**	.798**	1.000	
Behavior	.651**	.635**	.675**	.687**	1.000

** $p < 0.01$

5. Linear Regression Analysis of Each Variable of Study Samples Regarding HPV Vaccination (Table 4)

The overall result of the linear regression analysis of self-paid HPV vaccination shows that the coefficient of expansion of each variable lay between 2.037 and 3.858. In general, the collinearity amongst variables was not excessively negative ($VIF < 10$). Amongst the factors listed, the overall explanatory power of attitude ($\beta = 0.253^{***}$), perceived behavioural control ($\beta = 0.200^{**}$), and intent ($\beta = 0.287^{***}$) towards HPV vaccination was excellent. The adjusted R^2 was 0.573. This study model can thus properly explain the factors that affect the behaviour of accepting self-paid HPV vaccination.

Table 4 Linear regression analysis for the influence of factor variable on HPV vaccination (N=299)

Variable Name	Non-standardized coefficient		Standardized coefficient β distribution	t-value	P-value	VIF
	B estimated value	Standard error				
Individual's attitude toward HPV vaccination	.387	.085	.253	4.556***	.000	2.037
Individual's subjective norm toward HPV vaccination	.138	.076	.119	1.815	.071	2.823
Individual's perceived behavioral control toward HPV vaccination	.222	.085	.200	2.617**	.009	3.858
Individual's intent toward HPV vaccination	.329	.078	.287	4.224***	.000	3.045

$R^2=.579$ Adjusted $R^2=.573$ F Value=95.356***

** $p < 0.01$ *** $p < 0.001$

CONCLUSION

This study shows that female college student participants scored low on receiving relevant information on HPV vaccines from teachers. It is thus suggested that seminars or courses on this topic be provided on campus to increase female college students' awareness of cervical cancer and HPV vaccines. The importance of vaccination in preventing cervical cancer can be emphasised through mass media. The information covered to increase vaccination rates should include information that increases knowledge of the risk factors related to cervical cancer, as well as the safety and efficacy of vaccines. Moreover, nearly 30% of the study participants were willing to accept vaccination at their own cost, and such a percentage would increase further to 80% if discounted or if free vaccination were offered. Therefore, it is suggested that competent health authorities promote financial aid programmes or include HPV vaccinations in government-paid vaccination programmes, to increase vaccination rates, to reduce the inequality in receiving health care services, and to reduce the number of questions or concerns that the public has regarding the efficacy and safety of vaccination. This study also shows that some of the student participants might have had sexual intercourse, but did not report it because of embarrassment. Therefore, the result may be underrated. Relevant literature shows that a woman should be vaccinated before having sexual intercourse; therefore, selecting younger study samples or including parents of the students in the research may be considered when conducting future studies. Furthermore, the samples obtained in this study were mainly students in the eastern region of Taiwan. The results of the study may not apply to other parts of Taiwan because female college students of different cultural backgrounds may vary in their willingness to receive an HPV vaccine.

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