

Does parents' socio-economic status matter in intentions of vaccinating against human papillomavirus for adolescent daughters?

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Abstract

Background: The Human Papilloma Virus (HPV) vaccination provides substantial protection, and it is best to be taken before the age of twelve. Taiwan approved HPV vaccines since 2006. However, very few female adolescents have been vaccinated until now.

Objectives: To examine whether the parents' socio-economic status matters in deciding to purchase HPV vaccination for their daughters based on the theory of planned behavior.

Method: A structured questionnaire to collect 394 responses from parents of adolescent girls in Taiwan. Data was coded to categorize relevant socio-economic classes, and was analyzed with SPSS.

Results: The behavior intentions of parents with low (mean = 5.28) and high (5.01) socio-economic status are significantly stronger than the moderate (4.56) in deciding to purchase the HPV vaccination. Socio-economic factor has a slightly negative impact ($B = -0.08$), and attitude (0.68), subjective norms (0.16), and behavior control (0.32) have positive impacts on the parents' intention.

Conclusion: Major impacts on the decision to purchase an HPV vaccination for their adolescent was not due to the parents' socio-economic status but the parent's attitude. As the major predictor of a less complicated decision, attitudes toward the HPV vaccination should be reinforced through continuous communications between service providers and patient-advocate groups.

Keywords: Human Papillomavirus, cervical cancer, theory of planned behavior, vaccination, adolescent

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Introduction

Cervical cancer is the highest threat to the health and lives of women worldwide. It has been estimated that 380,000 new cases were identified each year during the last ten years, and roughly 230,000 women died in one year¹. The World Health Organization (WHO) has suggested vaccinating Human Papillomavirus (HPV) beyond the traditional Pap Smear for at-risk women². Evidence from the literature indicates that cervical cancer vaccination can provide at least five years of protection for at-risk women.

It is an especially effective measure for females before their first sexual intercourse, roughly at the age of the 7th grade or 12 years old^{4,5,6}. In Taiwan, cervical cancer is the second highest cause of death for women, next to breast cancer⁷. Several HPV vaccinations have been approved and launched since 2006, yet the expense is not reimbursed by the compulsory National Health Insurance Policy⁸. Since the HPV vaccination service is expensive in Taiwan, some studies suggest that the price levels significantly affect the parents' intentions. Despite the fact that the current market price is around 12,000 NTD (about 400 USD), an acceptable price would be around 500 NTD (about 17 USD) as the ceiling⁸. Given that the societal barrier is the most challenging factor in implementing P4 medical practices (predictive, preventive, personalized and participatory)^{9,10}, this research aims to explore whether or not the parents' socio-economic status will affect their decisions to purchase this vaccination service for their young teenagers, in the absence of a government subsidy.

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Cervical Cancers

Human Papillomavirus (HPV) is the most common virus found in the victims of cervical cancers¹¹, particularly for those women between the ages of 35 and 45¹², who were of low socio-economic status, had multiple sex partners, inadequate Vitamin A, C, and E levels, and were cigarette smokers, among other factors¹².

The Pap Smear has long been used as a reliable tool to detect cervical cancers in the early stage. This procedure may help patients and physicians to start an effective treatment with good levels of survival. However, to be complete in protecting women's health, an advanced preventive protection treatment is needed before the organ is attacked. HPV vaccination is, thus, suggested as the best approach for preventing this disease¹³.

HPV vaccines

The HPV vaccine effectively prevents women from being attacked by HPV^{6,14}, in particular the HPV16/18; as a result, they may be effectively free from major cervical cancers that are caused by HPV^{11,15}. In 2006, the Federal Food and Drug Administration (FDA) of the United States (US) firstly approved the Gardasil vaccine (a quadrivalent vaccine for HPV 6/11/16/18) to be used in females between 9 and 26 years¹⁶. The Taiwan government also approved Gardasil and Cervarix (a divalent vaccine) in 2006 and 2008, respectively.

Clinical evidence indicated both quadrivalent and divalent vaccines provide superior protection.

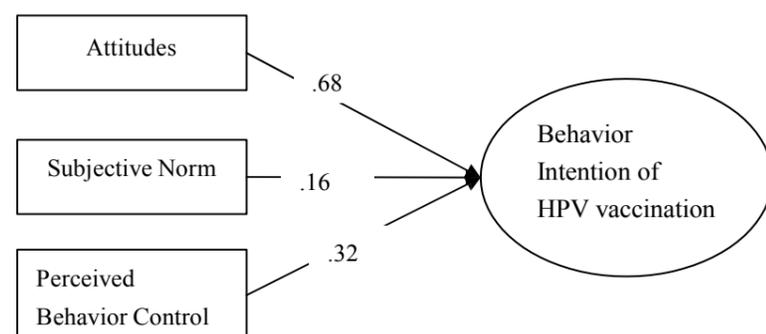
In Taiwan, the regular price for a complete treatment of HPV vaccination is NTD 12,000, or USD 400. The price is fair when compared to other major medical services, such as most major surgeries; yet the price is extremely high when compared to most vaccinations, such as flu or measles or most minor medical services, such as an office visit to a physician. Although local research has revealed that over 90% of the parents are willing to accept the free HPV vaccination¹⁷, that willingness drops dramatically to a 9.4% when the respondents were asked to pay their own expenses for such a vaccination¹⁷.

Theory of Planned Behavior

The theory of planned behavior (TPB) has been widely adopted in numerous research studies. The theory provides a simple and easily-tracked method for health promotion practitioners to shape or influence their clients' behavior by affecting their clients' attitude, or social norms, or perceived behavior control, or both^{18, 19-22}. This is shown in figure 1.

The theory assumes that behavior intention is the major and immediate determinant of a targeted behavior. In the TPB, behavior intention represents the probability of a person to perform the target behavior and that it can be predicted by attitudes (AT), social norms (SN), and perceived behavioral control (PBC). Attitude refers to one's judgment of a behavior as bad or good. Subjective norm means someone's perception of the rules that exist in their social network. The term perceived behavior control is used to scale a person's perception of their ability to accomplish the target behavior. The current research takes the TPB as the theoretical basis.

Figure 1 Research Framework and Results



Source: Ajzen, I. (1989). Attitude Structure and Behavior, In A. Pratkanis, A.R., Breckler, S.J. and A. G. Greenwald, A.G. (Eds.). Attitude structure and function, Hillsdale, N.J.: Erlbaum & Associates, 252.

Given that the socio-economic factor may affect an individual's attitude toward and the perceptions of social norms, as the social cognition theories²³ generally suggest, this research examines whether or not the social and economic status of the parents of the teenage girls can affect their intentions to accept a HPV vaccination²⁵.

The research questions of this research thus included, "Do the parents' intentions differ according to their income levels, occupations, and education?" "Does socio-economic status create differences in deciding to get HPV vaccination?"

Hypotheses to be tested were as follows:

H1-1: Parents' intention to purchase the HPV vaccination will vary from one educational level to another.

H1-2: Parents' intention to purchase the HPV vaccination will vary across different occupations.

H1-3: Parents' intention to purchase the HPV vaccination will vary across different socio-economic statuses.

H2: Parents' attitude, subjective norm, and perceived behavior control can positively affect their intentions to purchase HPV vaccination services for their adolescent girls.

Material and Method

Instruments

As suggested by Ajzen (2006)²⁴, we amended the wordings of the questionnaire to be consistent with the research context. The questionnaire was sent to some academic and medical experts for verification. The questionnaire contained major constructs of the theory of planned behavior, as well as the respondents' demographic factors, such as gender, income levels, education levels, marital status, and types of occupation. The instrument has good reliability at 0.892 of Cronbach's α .

Samples and analytic process

This research investigated the students' parents, since like many other medical treatments, the decision for such a medical vaccination decision was typically made by the parents, rather than by the adolescents,^{17, 24}. Six schools suggested by the local education authori-

ty were selected to reflect the distribution of tribes and geographic distance. The population sample was 2709 (32.57% members of the entire Pingtung area of 15268 people). Samples were randomly selected from 25% of the female students at the school (two schools provided 33% due to their small size), i.e., one out of four, based on the student ID. The minimum sample size from each school was 30. As a result, 677 questionnaires were distributed to the students' parents (either a parent or a fiduciary guardian) through the students' class teachers of 49 classes; of those, 510 were returned for a 75.35% response rate. A data cleaning process was then performed, and 116 questionnaires were deleted after cross-checks of the reverse question. This measure further ensured the survey was free from the problem of common method variance (CMV). Data was analyzed using SPSS with several statistical techniques, such as descriptive and, One-way ANOVA, followed by Scheffe's or LSD (Fisher's Least Significant Difference) for post hoc analysis, cross-tabulation, and regression analysis to reveal valuable insights.

Data analysis and results

Samples Characteristics

Table 1 shows how the samples gathered were distributed.

The discussion of the sample distribution is presented in a later section. Female comprised the major group of parental respondents with 362 responses or 91.9%. Slightly over half (52%) of the respondents were between ages 41-50, and around 85% were between ages 31-50. The average age was roughly 43.45 years old. This denotes that the parents' ages when their teenage girls were born were between ages 28-38, with an average age of 31 years old. This is consistent with the national status, despite that some of extra-ordinary cases when their births may have occurred earlier or later. Education levels properly reflect the current status by showing that nearly 90% of the parents possessed at least a high school diploma, with an average education of 12 years. This means the parents should have had good knowledge of health matters, including of vaccines. Classes with a smaller sample (i.e. $n < 30$) were then integrated into the proximate one to gain a new and meaningful class for further analysis, as shown in Table 1 shows.

Table 1 Sample distribution

Variables	Categories	Re-categorized	
		n	%
Gender	Male	32	8.12
	Female	362	91.88
Marriage	Married	343	87.06
	Divorced &Widow	51	12.94
Age	31-40	128	32.49
	41-50	205	52.03
	51+	61	15.48
average = 43.45			
Education	Junior	46	11.68
	High school	256	64.97
	College	92	23.35
	average = 12.49		
¹ Income (NTD, or 0.0.03USD)	20,000	136	34.52
	20,001-40,000	117	29.70
	40,001-60,000	83	21.07
	60,001	58	14.72
	Average=35,559 NTD.		
¹ Occupation	General labor	90	22.84
	Employer	30	7.61
	State employee / Medicine	83	21.07
	Housewife / Retired	191	48.48
² SE Status	1 Low(1~2)	129	32.74
	2 Middle(3~6)	180	45.69
	3 High(8~12)	85	21.57

N=394; 1NTD = 0.03USD

1 General labor is the category representing employee to any private business contrast to the state employee. Medicine jobs are generally less turnover and better compensation. 2. Socio-economic status is the products of education and income. SE classes are classified based on the sample distribution.

Variations of Theory of Planned Behavior Constructs by Demographic Factors

We then examined the behavior intention (BI) using varied levels of the respondents' demographic factors. BI denotes the probability of a person accepting or performing the target item or behavior.

Education. HPV vaccination intentions varied according to educational levels. As expected, the parents with a college education and above were more likely than their high school graduate counterparts to have their girls receive HPV vaccination. Table 2, ironically, shows that parents with only a high school education have less intent than those parents with junior or primary educations. Similar forms of comparison are also found attitudes toward HPV vaccination, in subjective norms, and in perceived behavior control. This means that promotions for HPV vaccination can more easily reach the highly educated parents and achieve the promotions' goals. However, although the parents who are high school -educated may require more efforts to be persuaded to use this vaccination service, they are, in the meantime, the largest group

that represents the majority of the market.

Occupation. Parents who were retired or whose role was that of a housewife (or a house husband) were far more willing to have their girls receive the HPV vaccination than any other types of occupation. It is interesting to note that the parents who worked as general labor (i.e., blue collar) comprised the group least likely to receive the HPV vaccination, including their intentions, attitude, subjective norms and perceived behavior control. It is also worthy note that state employees are generally characterized with stable and better compensation, and healthcare professionals are generally more knowledgeable about health protections and disease prevention. Yet this research has shown that both state employers and healthcare employees appear to have a weaker willingness (mean = 4.71, s. d. = 1.16) than most other occupations (e.g., mean = 5.18, s. d. = 1.15 for housewives and retired) except but those in the general labor workforce. Finally, it is interesting to note that the strongest intention is found in the housewives (or househusbands) and retired persons groups.

Socio-economic status. The middle range in socio-economic status seems to be the most problematic group of respondents for HPV vaccination promotions. As Table 4 shows, class 2 (mean = 4.56, s. d. =

1.36) is inferior to class 1 (mean = 5.28, s. d. = 1.15) and to class 3 (mean = 5.01, s. d. =1.18), from their intention to their behavioral control of all theory of-planned behavior (TPB) constructs.

Table 2 Analysis of education, occupation, and socio-economic status on intentions

Variables	Cat.	n	Mean	SD	F	Sig.	Scheffe's	LSD
Education ^a	1	46	5.18	.82	4.070*	.018		1>2, 3>2
	2	256	4.76	1.40				
	3	92	5.12	1.10				
Occupation ^b	1	90	4.34	1.46	10.746***	.000	2>1, 4>3, 4>1	
	2	30	5.23	1.35				
	3	83	4.71	1.16				
	4	191	5.18	1.15				
Socio-economic status ^c	1	129	5.28	1.15	12.597***	.000	1>2, 3>2	
	2	180	4.56	1.36				
	3	85	5.01	1.18				

N=394, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

a. 1. Junior and lower, 2.High school, 3.College and above.

b. 1.General labor, 2. Business owner, 3. State employee & Medicine, 4. Housewife & retired.

c. 1. Low, 2. Middle, 3. High.

Test results

As a result of the analysis, hypotheses 1-1, 1-2, and 1-3 support the assertion that intentions are significantly different across different education levels, occupations, and socio-economic status, as shown in table 2.

A cross-tabulation analysis and a hierarchical regression were performed to reveal the associations of theory of planned behavior (TPB) constructs and socio-economic status. Parents with low and high socio-economic status showed high intent (mean= 5.28,

5.01 in table 2 respectively) to purchase the HPV vaccination. It is noteworthy that the moderate category had a comparatively weak intention (mean= 4.56), as Table 3 shows, of which where $\chi^2=24.886$, $df=4$, $p=0.000<0.05$. The socio-economic status appears to have a negative impact on the intention. In general, attitude is the best predictor among TPB variables for intention, followed by perceived behavioral control (PBC) and subjective norm, shown as model 2 in table 4.

Table 3 Cross-tabulation of intentions and socio-economic status

Socio-economic	Intentions				Sum
	Low	Moderate	High		
Low	n	16	79	34	129
	%	12.4%	61.2%	26.4%	100.0%
Moderate	n	67	84	29	180
	%	37.2%	46.7%	16.1%	100.0%
High	n	22	42	21	85
	%	25.9%	49.4%	24.7%	100.0%
Sum	n	105	205	84	394
	%	26.65%	52.03%	21.32%	100.00%

$\chi^2=24.886$, $df=4$, $p=0.000<0.05$

Table 4 Summary of regression analysis

	Model 1	t	Model 2	t
Constant	5.25	29.17***	-0.50	-4.38***
Socio-economic	-0.19	-2.14*	-0.08	-2.89**
AT			0.68	16.81***
SN			0.16	3.05**
PBC			0.32	6.14***
R	.107		.948	
R ²	.012		.899	

Discussion

The parents in this research were substantially well educated and, thus, were expected to be amenable to the concepts of disease prevention and health protection. However, the magnitudes of behavioral intentions, along with the preceding variables, were not aligned with the educational levels. It is notable that the less educated parents, i.e., those with only a junior school or primary education, had stronger intentions to have their girls vaccinated. Parents with better education were expected to be more willing to accept the captioned <?> vaccination, since they may have had much better opportunities to accumulate health knowledge than their less educated counterparts.

However, the research test results provided a different conclusion by showing no significant difference. Behavior intentions also opposed expected directions in terms of other personal demographic factors, as gender, age, income, and occupation. Noteworthy are the healthcare professionals.

They were expected to be more aware of the need for disease prevention, e.g., the HPV vaccines for cervical cancers in this research, and to give a positive response. We conducted several personal interviews with some of the respondents in the study to further enquire the reasons for their responses. The vaccination's expense was the major drawback. The reason that the highest score of intention to vaccinate went to those parents who were housewives (husbands) and retired, was may be due to them being the major healthcare decision makers for the entire family. A wide distribution of health education and continuous public health promotion programs in the past decade may have also significantly equalized the knowledge of disease prevention and health protection.

It is logical to infer that parents who were either low in income or low in education were reluctant to accept

HPV vaccinating, may hold a conservative attitude toward this disease prevention method, were exposed to less positive information regarding HPV vaccination, and appear to have weaker confidence in this new disease prevention approach. Unfortunately, class 2 with scores of 3 to 6, is neither low in education nor in income. To gain a score of 3, a respondent needs to be located in at least the one third level in either education (college or above) or income (40,000 ~ 60,000). Since college education level not correlated with having good intention levels, this means that the income levels again contribute to the major part of this inferior ranking. Intentions are not aligned with income levels.

Recognizing the importance of HPV vaccination in protecting the health of a female citizens, and the relatively high price of such a service, some county governments that, are generally wealthier, have launched free vaccinations to the qualified girls. This may impose a huge pressure on the central government to provide free services as part of national health policy in the near future. However, a free offer program may not guarantee full participation, as the lessons have shown from unsatisfactory participation rates for free cancer scanning for years.

Research suggests that free cancer screening and health promotion programs are significantly affected by the participants' attitudes, subjective norms, and perceived behavior control. This may be also applicable to the HPV vaccination¹⁹⁻²².

Whether or not the expenses are borne by the government or by the beneficiary, the success of this program would greatly depend on how health and educational professionals motivate the parents.

Although Ajzen²⁶ has argued that the effects of independent variables may be varied in different contexts (i.e., types of behavior), the meta-analysis performed by McEachan and colleague¹⁸ have suggested that perceived behavioral control (PBC) is the major predictor for health-associated behavior. The current research gains a different result to show that the PBC is a predictor second only to attitude. A possible reason behind this is the parents' perception of vaccinations.

In general, a vaccination is simple and easily accessible, and the respondents should have acquired sufficient knowledge on the nature of this particular service (except some new immigrants). This has made this issue more a 'why' or 'what' question rather than a 'how'. People may wonder why a HPV vaccination is needed, instead of how or where to receive it. Another possible reason may go to the comprehensive coverage of Taiwan's National Health Insurance Policy. Beyond paying for the majority of medical expenses, the government offers free disease screening programs and some free vaccination services for infants, school children, and aged citizens. As a result, people may take health protection or disease prevention projects for granted; this may explain why respondents of in this research are reluctant to pay for a HPV vaccination. People may perceive that the HPV vaccination should also be offered free to citizens. The fact is that the HPV vaccines are expensive and may not be affordable by the NHIB in the near future, since the health budget of the country is already highly squeezed by the social benefits of some minor-advocacy groups, such as the aged and handicapped.

Conclusions

Behavior intentions and its preceding factors varied along with different socio-economic levels, as the literature generally agreed¹⁸, yet the correlation is not linear. Parents in this research appear to strongly accept the HPV vaccination for their teenage girls, no matter how they differ in education, occupation, and socio-economic status.

Inconsistent with previous studies, this research reveals that attitude is the major predictor of behavior, rather than perceived behavior control (PCB). This may shed additional lights on our understanding of the role that attitude can play as a variable in a theory of planned behavior (TPB) model. Given that vaccinations are popular in many countries, people have been well-edu-

cated about the safety and effectiveness of such preventive medicine. It is a decision that does not involve complicated information. The research study results thus lead to the conclusion that attitude will be the major predictor of a behavior that requires a less complicated decision-making process. In practice, no matter who will be responsible for the payment, a promotional program that continuously persuades adolescents' parents about the need for this vaccine, and an effective method that facilitates communications between service providers and patient-advocate groups are essential⁹. Programs of this kind should focus on enhancing the parents' knowledge or and attitudes toward cervical cancers and the HPV vaccine as a remedy through continuous communications.

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