

RESEARCH ARTICLE

Cross-sectional, quantitative research on the perception of pharmacy students from the University of Santo Tomas and their parents toward vaccination

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Abstract

Background: Vaccine hesitancy is a global concern wherein contributing factors are lack of vaccine confidence, mistrust, alternative parental beliefs, and inadequate information. **Methods:** This study assessed and compared vaccine-related perceptions of pharmacy students and their guardians in the Philippines through a cross-sectional design survey using the 5C scale (confidence, complacency, constraints, calculations, and collective responsibility). Recruitment was stratified to ensure findings are equally represented. Bivariate non-parametric tests and linear regression analyses were applied. **Results:** Findings revealed that students were more confident towards vaccines ($p = 0.035$), and more socially responsible ($p = 0.023$), while parents were more likely to seek vaccine-related information ($p = 0.013$). Students were less complacent ($p = 0.014$) to immunity and less likely to be hindered in getting vaccinated. Predictors of good vaccine-related behaviours were determined to affect the perceptions of students and parents. Higher health literacy has a positive impact on perceptions of vaccination. **Conclusion:** This study identified a significant intergenerational difference in vaccine perception, which prompts vaccine-related information dissemination to be more targeted.

Introduction

Vaccination has prevented over three million deaths worldwide by giving immunity to the human population (Larson, 2018). It is responsible for the decreased spread of infectious diseases, both in adults and children, and the eradication of polio in America, the Western Pacific, and Europe, among others (Remy *et al.*, 2014). Vaccination is a proven intervention in improving public health outcomes. However, the fluctuation in vaccination coverage from 1990 to 2016 has resulted in a measles outbreak and the re-emergence of polio in the Philippines.

The public health system in the Philippines remains challenged due to dramatic fluctuations in public confidence in vaccines (Dayrit *et al.*, 2020). According to

the London School of Hygiene and Tropical Medicine, vaccine confidence of Filipinos declined from 93% in 2015 to 32% in 2018 (Larson, 2018). In the Philippines, vaccine hesitancy resulted in a considerable decline in vaccination coverage because of reduced public confidence in the national vaccination programmes. Due to a sharp decline in vaccination coverage, the measles outbreak, despite having been resolved over the last two decades, has resurfaced (Hotez *et al.*, 2020).

COVID-19 vaccination can protect individuals from sickness, hospital stay, and even death. It is also confirmed that vaccination prevents virus transmission to others. Statistics show that people have hesitancy in getting the vaccine. Parents who are hesitant about vaccines need counselling. Reasons are somewhat complex and encompass not just knowledge deficit

(Shen and Dubey, 2019). Vaccine hesitancy has become one of the top ten global health threats as the trend of having low vaccine confidence is becoming prevalent (Larson *et al.*, 2015). High vaccine hesitancy can be seen in many countries in the Southeast Asia region, including the Philippines, due to numerous factors such as some incidents and the spread of online misinformation (Hotez *et al.*, 2020). Lack of health education and trust in the public health system, previous vaccine experiences, and parents' influence in decision-making may also contribute to a negative perception of vaccines.

Most studies reported that parents or older people, in general, have negative perceptions of vaccination. Factors such as health literacy and sociodemographic determinants may contribute to these differences.

To further understand how vaccine hesitancy and acceptance develop, some studies have identified the factors that affect the perception of the vaccine. These are the 5C's: confidence, complacency, constraints, calculations, and collective responsibility.

Betsch and colleagues (2018) defined these five categories as follows: Confidence is the trust in the effectiveness and safety of vaccines, the system that delivers them, and the motivations of policy-makers; Complacency is when perceived risks of vaccine-preventable diseases are low, and vaccination is considered unnecessary; Constraints are the presence of any issue concerning the physical availability, affordability, geographical accessibility, and ability to understand; Calculations refer to individuals' tendency to extensively seek information regarding vaccinations; Collective responsibility is the willingness of individuals to protect others by one's vaccination.

Studies have found that generational differences may play a part in the pharmaceutical benefit-risk perceptions. However, limited studies have been conducted to compare the perception of students and their parents or guardians regarding vaccination. This study determined the perception of young future healthcare providers toward global immunisation independently from their parents. This study, therefore, aimed to (1) compare confidence, complacency, constraints, decision-making, and sense of collective responsibility of students and parents; (2) identify sociodemographic determinants; (3) assess the impact of health literacy; (4) determine perceptions among students from different year levels.

Methods

This study used a cross-sectional, quantitative approach, wherein previously validated surveys were used online. Two (2) experts in the field validate the

instrument. Suggestions and recommendations by the experts were included. The instrument had undergone pilot testing wherein thirty-four student-parent pairs participated in the pilot testing of the questionnaire. The Cronbach alpha (α) values for the items Confidence ($\alpha = 0.813$), Complacency ($\alpha = 0.781$), Constraints ($\alpha = 0.777$), Calculations ($\alpha = 0.718$), and Collective Responsibility ($\alpha = 0.936$) were all acceptable ($\alpha > 0.7$). The overall value of Cronbach alpha of all the items combined is 0.867, indicating that this questionnaire tool used in this study is reliable and internally valid.

The study enrolled 273 pairs of student-parent respondents at the University of Santo Tomas with year-level stratification among the students. The sample size was determined using the simple random sampling with replacement (SRSWR) formula and adjusted based on the total number of BS Pharmacy students and the expected non-response rate (90%). An informed consent form was given to the participants before answering the survey. A pilot study among a population of students from another health-related programme (BS Medical Technology) was completed prior to the deployment of the scales in the questionnaire. Approval of the Faculty of Pharmacy – Ethics Review Committee was sought before starting the study.

The questionnaire is comprised of three parts: (1) sociodemographic questions; (2) a series of statements regarding the variables confidence, complacency, constraints, calculations, and collective responsibility (5Cs), which were assessed on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree); (3) a brief set of questions to assess subjective health literacy as used in a similar study. Total scores of respondents in each subscale in the second and third parts of the questionnaire were reported as means.

Descriptive results from sociodemographic data were reported as percentages, means, and standard deviation, as deemed appropriate.

Wilcoxon Signed-Rank Test was done to determine differences between the vaccine-related perceptions of students and parents and differences among year levels. It also assessed confidence, complacency, constraints, calculations, and collective responsibility.

A linear regression analysis of the 5C scale was done to determine sociodemographic variables that significantly affect vaccination perception. Statistical significance was considered at $p < 0.05$.

Results

Overall, 546 responses were collected, 273 from the

students and 237 from the parents or guardians. Out of the total responses, 36 were excluded since the students' corresponding parent/guardian failed to complete the questionnaire. The overall response rate

was 72.9%.

The sociodemographic characteristics of students and parents are presented in Tables I and II.

Table I: Sociodemographic characteristics of student respondents

Sociodemographic characteristics		Percentage (%)	SE	95% CI	
Sex	Male	22.5	0.03	0.18	0.28
	Female	77.5	0.03	0.72	0.82
Age	≤ 20 years	72.8	0.03	0.67	0.78
	21-29 years	27.2	0.03	0.22	0.33
Area of Residence	Rural	38.1	0.03	0.32	0.44
	Urban	61.9	0.03	0.56	0.68
Religion	Catholic	86.1	0.02	0.81	0.90
	Iglesia ni Cristo	0.4	0.004	0.0005	0.03
	Christian (Other denominations)	12.2	0.02	0.09	0.17
	Muslim	1.3	0.008	0.004	0.04
Past/present serious illness	Yes	5.6	0.02	0.03	0.09
	No	94.4	0.02	0.91	0.97
Sources of vaccine related information	Health professional	49.9	0.03	0.44	0.56
	Social networks	23.6	0.03	0.19	0.30
	Media and others	26.5	0.03	0.21	0.32

Table II: Sociodemographic characteristics of parent respondents

Sociodemographic characteristics		Percentage (%)	SE	95% CI	
Sex	Male	25.0	0.03	0.20	0.31
	Female	75.0	0.03	0.69	0.80
Age	≤ 20 years	5.1	0.01	0.03	0.09
	21-29 years	3.1	0.01	0.01	0.07
Area of Residence	Rural	40.9	0.03	0.34	0.48
	Urban	42.3	0.03	0.36	0.49
Religion	Catholic	8.7	0.02	0.06	0.13
	Iglesia ni Cristo	40.8	0.03	0.34	0.48
	Christian (Other denominations)	59.2	0.03	0.52	0.66
	Muslim	85.6	0.02	0.80	0.90
Past/present serious illness	Yes	0.6	0.005	0.001	0.03
	No	11.8	0.02	0.08	0.17
Sources of vaccine related information	Health professional	1.5	0.009	0.005	0.05
	Social networks	0.5	0.005	0.0006	0.03
	Media and others	9.6	0.02	0.06	0.14
Experience in health care	Yes	30.4	0.03	0.25	0.37
	No	69.6	0.03	0.63	0.76
Monthly income (php)	< 5,000	3.4	0.01	0.02	0.07
	5,000-10,000	5.7	0.02	0.03	0.10
	10,000-15,000	3.4	0.01	0.02	0.07
	15,000-20,000	8.4	0.02	0.05	0.13
	> 20,000	79.1	0.03	0.73	0.84

Comparison of vaccine-related perception among students and parents

Overall, a significant difference was found between the responses of the students and parents in all the five subscales. Students were found to be more confident towards immunisation (5.16 vs 5.03; $p = 0.035$) and had higher collective responsibility scores (5.37 vs 5.14; $p = 0.023$). However, parents and guardians tended to have higher complacency (2.02 vs 1.85; $p = 0.014$), constraints (2.04 vs 1.71; $p < 0.001$), and calculations (5.47 vs 5.39; $p = 0.025$).

Sociodemographic predictors of vaccine-related perception

The linear regression analysis comparing vaccine-related perception among students from different year levels showed that age and religion had significant effects on student complacency towards immunisation. Roman Catholic students are more complacent than non-Roman Catholic students. Regarding age, students 20 years old or younger were more complacent than those over 20 years old.

Table III: Results of Wilcoxon Signed-Rank test

	Mean score		p-value (Wilcoxon signed-rank test)
	Parent	Student	
Confidence	5.03	5.16	0.035
Complacency	2.02	1.85	0.014
Constraints	2.04	1.71	<0.001
Calculations	5.47	5.39	0.025
Collective Responsibility	5.14	5.37	0.023

The absence of past or present severe illness had a positive effect on student calculation, wherein those who did not have past or present severe illness were more likely to weigh the benefits and risks before deciding ($p = 0.013$).

The results confirmed that parents who completed a high school education or a vocational programme only tended to have lower confidence in immunisation, more constraints towards getting vaccinated, and a lesser sense of responsibility in terms of the health of others in comparison to parents or guardians who had a postgraduate degree.

Impact of health literacy on vaccine-related perception

The results showed that students with high health literacy on vaccines had higher confidence and lower constraints regarding vaccination and higher calculations on the benefits and risks of receiving a vaccine. Meanwhile, parents with high health literacy tended to have higher confidence, lower complacency, and lower constraints in their perception of vaccines.

Students ($p = 0.044$) and parents ($p = 0.001$) who had higher health literacy scores were more likely to have higher confidence ($p = 0.044$ and $p = 0.001$, respectively) and lower constraints ($p = 0.002$). In addition, parents who had higher literacy scores were more inclined to be less complacent in terms of getting vaccinated, and students who had higher health literacy scores were more likely to be more calculating.

Discussion

Overall, a significant difference was found between the responses of students and parents in all five subscales, i.e. confidence, complacency, constraints, calculations, and collective responsibility towards immunisation ($p \leq 0.05$). Pharmacy students would have a more positive outlook compared to their parents.

There was a substantial difference in the confidence level of students and parents towards immunisation. A higher mean score reflected confidence in a higher number of students than their parents regarding the

safety and effectiveness of vaccines. In terms of vaccine confidence, the results vary from the findings of other studies (Larson *et al.*, 2014; Wang *et al.*, 2016), showing that older adults tended to be more confident and had lesser constraints toward vaccination. Our results confirmed that a higher understanding of healthcare students on vaccines and immunisation helped them perceive vaccines as effective and safe. Conversely, parents, most of whom were not health professionals, received insufficient information from unreliable sources, which affected their perception of vaccination, resulting in contradicting opinions (Diaz-Crescitelli *et al.*, 2020).

Regarding complacency, parents and guardians were more likely to rely on their own immune systems for immunity. This result is congruent with previous findings, imputing this observation to the increasing healthism belief, in which parents believe that a natural lifestyle and better hygiene are enough (Harmsen *et al.*, 2013; Badur *et al.*, 2020). Some parents also believe that it is better for a child to contract a preventable disease to acquire immunity, or they do not perceive preventable diseases as severe or threatening and think these can be treated easily (McKee & Bohannon, 2016).

Students were less information-seeking about vaccination, consistent with previous findings showing that parents or adults in Australia sought more information regarding vaccines than younger adults (Wang *et al.*, 2016). A study reported that too much calculation or information-seeking could negatively affect vaccine intake, where high calculation scores were negatively correlated with knowledge, indicating that excessive information-seeking led to less proper knowledge (Betsch *et al.*, 2018). Although the internet and social media play a huge role in accessing vaccine information, they also serve as platforms for wrong information or anti-vaccination movements (Badur *et al.*, 2020; Wilson & Wiysonge, 2020).

In contrast with our results regarding collective responsibility, a study found that parents are aware that vaccination plays an essential part in determining the overall immunity of a community (Quadri-Sheriff *et al.*, 2012). However, other studies reported contradicting data, showing that parents solely base

their vaccination decision-making on personal benefit. This finding suggests the importance of effectively explaining the concept of herd immunity, using different mechanisms, depending on the target population, as found that this effectively increases vaccine uptake (Betsch *et al.*, 2018).

Sociodemographic traits influence the five antecedents and thus affect student decisions toward vaccination (Gowda *et al.*, 2012). This study could precisely identify the association between sex, year level, age, area of residence, religion, and past/present severe illnesses of students and their vaccine acceptance behaviour. Results confirm that age and religion have significant effects on the complacency of students to vaccination. A significant relationship was also found between calculations and the absence of past/present illness. Roman Catholic students were more complacent than non-Roman Catholic students. Regarding age, students 20 years old or younger were more complacent than those over 20 years old. Aside from age, Roman Catholic students had a higher vaccine complacency as opposed to students of other faiths. Religion influences vaccine decisions (Pelcic *et al.*, 2016).

The safety, necessity, and morals of vaccines have been disputed by Catholics, as reported previously (Carson & Flood, 2017), which may have contributed to the concerns of Catholic students who did not see vaccination as a means of disease prevention.

Our results suggest that students with past/present illnesses have fewer calculations. This finding is consistent with the claims of a previous study (Weston *et al.*, 2017) showing that when vaccines are provided, individuals with chronic illnesses are more likely to get vaccinated or take the vaccine with no further pause than those without chronic illnesses.

Parents with postgraduate degrees showed to be more confident, more socially responsible towards the health of others, and have fewer constraints. The decrease in confidence scores among those with lower educational attainment may be caused by their negative attitude toward vaccination, especially as they are more prone to misinformation and conspiracies due to their lack of education. High constraint scores of those with lower educational attainment may indicate that they are more likely to experience issues that may hinder vaccination, such as affordability. Higher collective responsibility scores of those with postgraduate degrees may be due to their level of knowledge and access to information, which are generally superior compared to parents or guardians with a lower level of education. Similar findings were previously reported in 18 European countries (Hadjipanayis *et al.*, 2020), where parents who had elementary or high school education were more likely to pose vaccine hesitancy

than parents with a university degree. In contrast, a study (Opel *et al.*, 2011) identified that parents with a higher level of education are four times more likely to be worried about the safety of vaccines in comparison to parents with lower levels of education.

This study revealed that parents who only completed a high school degree or a vocational programme had more constraints ($p=0.005$) towards getting vaccinated than those with postgraduate degrees, with average constraint scores 0.92 points higher than those with a postgraduate degree, indicating more hindrances towards getting vaccinated.

Regarding health literacy, a study stated that adults with low health literacy were less likely to take preventive care services (vaccination) (Biasio *et al.*, 2020). Similarly, health literacy in parents increases confidence and reduces complacency and constraints related to vaccination. Open-minded parents are also more likely to look for more information; they are less affected by social norms and show less hesitancy toward vaccination (Damjanović *et al.*, 2018).

Oppositely, a study demonstrated that high health literacy leads to a lower turnout in vaccination compliance among parents (Aharon *et al.*, 2017). A possible explanation could be that parents who can afford to obtain medical information from a wide variety of sources are overwhelmed or have difficulty synthesising and judging the validity of such sources. Additionally, parents who have low perceived freedom levels have higher tendencies to adhere to social norms.

Limitation

This study assessed and compared vaccine-related perceptions of BS Pharmacy students of the University of Santo Tomas and their parents. The findings of this study are limited only to the said population and would be inappropriate if it were to be extrapolated to a larger community (e.g. the whole university). More so, this study should not be treated as a comparison of the perception between or among other variables (i.e. sex, age, and gender), aside from that of the students vs their parents since the sample was not such purpose other than that. Instead, the sociodemographic factors were only assessed on their possible effect on vaccine-related perceptions

Conclusion

This study concludes that the pharmacy students at the University of Santo Tomas of the Philippines had a more positive attitude towards vaccines than their parents or

guardians. Students also had more confidence in vaccine safety and effectiveness, were less likely to restrain themselves from being vaccinated, had a lower complacency about positive health outcomes, were more likely to seek vaccine-related information, and had more willingness to be vaccinated for the welfare of others. Regarding the effects of proposed predictors on vaccine perception, sex and religion affected the vaccine complacency of students, and the absence of past/present illnesses also influenced their likeliness to seek vaccine-related information. Educational attainment was associated with vaccine confidence, constraints, and the collective responsibility of parents. Health literacy was also related to the perception of vaccines, where a higher health literacy indicated more confidence, lesser constraints, and a higher probability of performing risk-benefit analysis among students; higher health literacy among parents denoted higher confidence and lower complacency and constraints towards vaccination. The positive role of information sources and valid vaccine-related information was also emphasised. Higher health literacy had a positive impact on the perception of vaccination. This study identified a significant intergenerational difference in vaccine perception, which confirms that vaccine hesitancy is due to a lack of information and, therefore, prompts vaccine-related information dissemination counselling to be more targeted.

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Conflict of interest

The authors declare no conflict of interest.

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