Journal of the Arkansas Academy of Science

Volume 70 Article 28

2016

Evaluation of Education and Other Influential Factors on the Perceptions of Influenza Vaccinations

S. D. Mills
University of Central Arkansas

S. R. Charlton
University of Central Arkansas, scharlton@uca.edu

B. M. Rowley
University of Central Arkansas, browley@uca.edu

Evaluation of Education and Other Influential Factors on the Perceptions of Influenza Vaccinations

S.D. Mills, S.R. Charlton* and B.M. Rowley**

Department of Psychology and Counseling, University of Central Arkansas, Conway AR 72035
Department of Biology, University of Central Arkansas, Conway, AR 72035

*Correspondence: scharlton@uca.edu
**Correspondence: browley@uca.edu

Running Title: Education and Other Influential Factors on the Perceptions of Influenza Vaccinations

Abstract

Influenza is a potentially deadly contagious viral infection that attacks the respiratory system. The 1918 influenza pandemic infected approximately 1/3 of the world's population and resulted in an estimated 50 million deaths globally. Research has led to the production of influenza vaccinations. Unfortunately, there continues to be influenza epidemics that are responsible for killing numerous people annually. One reason for the continued death toll from influenza is the lack of people receiving a yearly flu vaccination. In order to gain more public acceptance for influenza vaccinations, it is important to understand the factors influencing the choice to be vaccinated. A study was conducted on 191 undergraduate general psychology students at the University of Central Arkansas to test if specific factors determine the predictability of vaccination acceptance. Education and positive influential factors toward flu vaccinations are two important factors presented in the study that have influence on participants receiving the vaccine. The study results are beneficial in understanding why people reject flu vaccines and what can be done to reverse those decisions.

Introduction

Influenza is a communicable disease that causes high morbidity and relatively high mortality rates that occur at both local and global levels (Frew et al. 2013, Lawrence 2014, Seike et al. 2016). The disease severity can range with symptoms including fever, coughing, sore throat, runny or stuffy nose, headaches, muscle or body aches, fever, and fatigue (CDC 2016b). In the United States, many different variables can determine the severity of these symptoms and can lead to other diseases or complications (CDC 2016a). These variables include the strain of the virus that is circulating, the timing of the season, how well the vaccine is working, and how many people get vaccinated (CDC 2016a, and 2016b). Although studies have shown that seasonal influenza immunizations decrease these rates, there are still large numbers of people not receiving yearly vaccinations (Frew et al. 2013).

In the 2014-15 influenza season, it was predicted that influenza vaccinations prevented around 67,000 influenza-associated hospitalizations (Cohen et al. 2015). 1.9 million illnesses and 966,000 medical visits were also estimated as being prevented by influenza vaccinations (Cohen et al. 2015). Influenza vaccinations were estimated, over 6 influenza seasons, (2005-2011) to have averted 13.6 million illnesses, 5.8 million medical visits, and 112,900 influenza-related hospitalizations (Kostova et al. 2013).

Despite several studies resulting in high influenza vaccine effectiveness, many people are still not receiving yearly vaccinations. According to many studies, the young adult population, ages 18-49, has the lowest influenza vaccination rates compared to other groups (Lawrence 2014, Ravert et al. 2012, Poehling and Katherine 2012, Ramsey and Merczinski 2011, Nichol et al. 2005, Cohen et al. 2015). Colleges, which typically encompass adults in this age group, are a concern. A survey in fall 2009 found that only 15.8% of US university students intended to get vaccinated against influenza. Similar surveys carried out on college students in Italy, Israel, and Turkey indicated less than 25%, 13.9%, and 7.2% (respectively) reported intentions of getting vaccinated against influenza infection (Ravert et al. 2012). Since college students are exposed to different social settings, they have increased chances of becoming infected with and spreading diseases such as influenza. Having the lowest acceptance of influenza vaccination, increase in illnesses, hospitalization and deaths from the disease become more likely as well (Ravert et al. 2012, Van et

al. 2010). The lack in vaccination acceptance is a significant problem leading to elevated death rates caused from influenza each year. Therefore, it is very important to understand the factors influencing the choice to be vaccinated in order to gain more public acceptance for the vaccine.

A study done at Northern Kentucky University found that 50% of participants believed themselves to be healthy individuals (Ramsey and Merczinski 2011). These students consequently believed they would not be at risk for becoming seriously ill if they were to contract the H1N1 influenza virus. This led the students to not get vaccinated as they thought it to be unnecessary. Other studies similar to this one focus on perceived susceptibility and prior seasonal influenza vaccination as two main factors determining influenza vaccination acceptance (Ramsey and Merczinski 2011, Gidengil et al. 2012, Xu and Peng 2015).

A study performed at a large Midwestern university reported that vaccine efficacy and safety concerns were predictors for college students' intentions to accept H1N1 influenza vaccinations (Ravert et al. 2012). A similar study in the United Kingdom found that seasonal changes in influenza vaccine composition cause uncertainty and distrust (Gidengil et al. 2012). This resulted in low influenza vaccination uptake by the participants in the study.

Misconceptions and lack of education both tend to be more of a determining factor over other variables (Ward and Raude 2014). Many people without a biology or immunology background have trouble understanding why influenza vaccinations are beneficial and why they are necessary to repeat yearly. This leaves many people vulnerable to accepting unreliable information which may keep them from receiving the annual influenza vaccination.

The objective of this study was to examine factors that may influence students' perception on receiving influenza vaccinations. Several studies have attempted to analyze the arguments that adults use when describing their perspective on the need for influenza vaccinations. The Prospect Theory and Health Belief Model have both been used, but have been unable to yield consistent results across different studies (Frew et al. 2013, Ravert et al. 2012). Other studies focus on one to two factors. Varied results from study to study could be due to the different views coming from different geographical locations (Prati et el. 2011). It is important to understand characteristics of seasonal influenza epidemic patterns, as well as acceptance of vaccination against influenza in different areas, in order to implement better educational and preventative measures (Seike et al. 2016). This study, unlike others to date, focuses on understanding these characteristics in students specifically at the University of Central Arkansas.

Methods and Materials

One hundred ninety-one undergraduate psychology students (154 females; 36 males; mean age = 20.56, SD = 3.39) participated in these experiments for extra course credit. There was no significant difference in ages between genders ($t(186) = 0.47$, $p = 0.64$). One participant failed to offer gender data.

The study was completed through Qualtrics.com. Participants first had to agree to participate by a digital informed consent letter, after which they completed an online survey. The survey began with demographic questions asking for the participant's age and gender. Next, participants answered questions regarding their history including their past associations with influenza vaccinations. This section included questions asking if they had ever had an influenza vaccination. If they had, they were next asked if they had received an influenza vaccination in the last year and if they receive them yearly. Then, the students were asked whether or not they had been vaccinated the year of the study. If they had not been vaccinated, they were asked if they planned to get the influenza vaccine.

Next, students were given a pre-test including 5 multiple choice questions to assess their knowledge on background influenza information. "What is the flu?", "During the 1918 pandemic, about how many people died globally from the flu?", and "How does the flu spread?" are examples of the questions in this section.

The participants were then given 16 statements and asked to rate them on how/if the statements influenced their decisions on getting the influenza vaccination in the past. They rated them by selecting one out of five options. They rated them as strongly or somewhat influential to not get the vaccination, neutral, or as strongly or somewhat influential to not get the vaccination. Examples of the statements include: "being a normal healthy adult", "parents or guardians", and "pain of the shot".

Next, the students went through a tutorial that consisted of 15 slides that instructed them on the basics of the influenza vaccination. Slides 1-3 explained what the flu is and that getting the flu shot each year is the best way to prevent the flu from spreading and attacking. Slides 4-6 reviewed the signs, symptoms, epidemics, and pandemics that have been or are caused by the flu. Slides 7-8 discuss how the flu spreads,

https://scholarworks.uark.edu/jaas/vol70/iss1/28
DOI: 10.54119/jaas.2016.7020

higher risk groups, and who is able to receive the flu vaccination. Slides 10 and 11 described the importance of the yearly flu shot through an immunologic view point. Slides 12-15 explained other prevention/treatment methods, the cost for a flu shot for students at the University of Central Arkansas, and further resources for more information.

Then the participants were asked the same 5 multiple choice questions as in the pre-test about the background flu information. Students were also again asked if they planned to get a flu vaccination this year. Finally, the students were sent to a screen with a debriefing letter.

All analyses were conducted in SPSS 22.0. A t-test was used to compare the age differences in males and females. In pre and post-test comparison, 2 questions were eliminated because they were answered correctly by 95% of participants on both the pre and the post test. T-tests with Bonferroni adjusted p-values to correct for multiple comparisons (critical $p = 0.05/4 = 0.0125$) were used to look at pre/post differences for questions 1, 2, 3, and the total score. An ANOVA was used to compare differences in the vaccine influence scale based on reported plans to get the vaccine before and after the tutorial (yes/yes, no/no, and yes/no). Post hoc testing used Tukey's multiple comparisons.

Results

Table 1 represents the counts of students' yes or no answers to plans to get their flu vaccination this year before and after the educational tutorial. Participants were asked if they planned to get their influenza vaccination the year of the study once before and after the tutorial. 81 participants chose yes before taking the tutorial and then yes after. 21 participants chose no before taking the tutorial, then yes after (12.5%). 66 participants chose no before taking the tutorial, then no after. The last 23 participants who already had their vaccination the year of the study did not answer this question.

Table 1: Counts of students yes and no answers to receiving the flu vaccination before and after the educational tutorial.

		After Tutorial		
		Yes	No	Total
Before Tutorial	Yes	81	0	81
	No	21	66	87
	Total	102	66	168

Figure 1 represents the mean pre and post-test student scores on 5 multiple-choice questions. The data was separated by students' yes or no answers on whether to be vaccinated this year based before and after the exposure to the educational tutorial. Out of the 5 multiple-choice questions, 2 had a low variation from the pre-test to the post-test, having more than 95% of the participants who answered correctly in both sections. Therefore, only the other 3 multiple choice questions were considered to assess what was learned by participants from the tutorial.

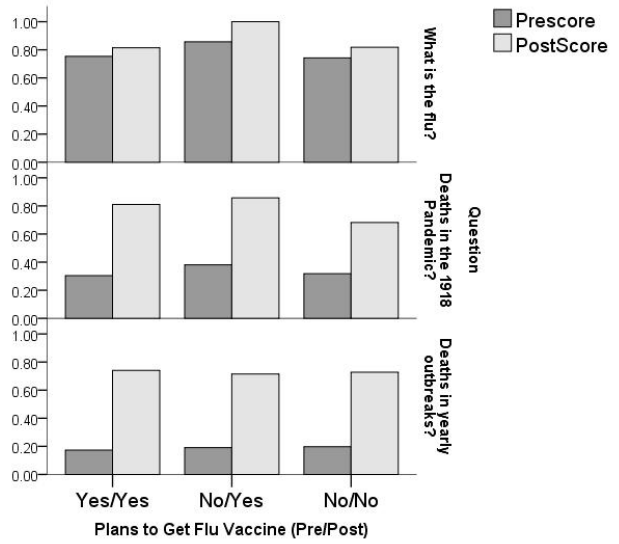

Figure 1: Post-test scores were significantly higher than the pre-test scores in each group based on students' plans to get the flu vaccination this year ($t(187) = -13.937$, $p < 0.001$).

The multiple choice questions were analyzed by marking the 3 answers that were incorrect as 0 and the one answer that was correct as 1. For the first multiple choice question, 77% of the participants answered correctly for the pre-test, and 84.3% of participants answered correctly for the post-test. For the second multiple choice question, 31.4% of the participants answered correctly for the pre-test, and 77% of participants answered correctly for the post-test. For the third multiple choice question, 19.9% of the participants answered correctly for the pre-test, and 74.3% of participants answered correctly for the post-test.

The total questions answered correctly from the pre-test, then the post-test, were calculated by using the sum score for questions 1, 2, and 3 with a range of 0-3 questions. The mean pre-test total score was calculated (m =1.30 questions answered correctly, SD = 0.68).

Then the mean post-test score was calculated (m = 2.37 questions answered correctly, SD =0.87. Overall, the mean post-test score was significantly higher than the pretest ($t(187) = -13.937$, $p < 0.001$).

Figure 2 represents average scores students received from ranking statements on influence factors. Participants selected one of five different options for each of the 16 statements regarding possible influential factors. The statements chosen as neutral were considered as 3; therefore, a score of 3 was standardized to be 0. The statements chosen as strongly influencing against influenza vaccination were given a score of -2. The statements chosen as somewhat influencing against getting influenza vaccinations were given a score of -1. The statements chosen as neutral were given a score of 0. The statements chosen as somewhat influencing for getting influenza vaccinations were given a score of 1. The statements chosen as strongly influencing for getting influenza vaccinations were given a score of 2. Overall, the mean influence score was 0.14, meaning that most of the statements were influential towards receiving the influenza vaccination. Participants that chose yes on planning to get the influenza vaccination both before and after the tutorial had a mean influential score of 0.34, SD = 0.62. These participants were overall influenced positively by the different factors towards getting the vaccination. Participants that chose no on planning to get their vaccination before the tutorial then yes after the tutorial had a mean influential score of 0.20, SD = 0.54. These participants were also overall influenced positively by the different factors towards getting the vaccination. Participants that chose no on planning to get their vaccination both before and after the tutorial had a mean influential score of -0.17, SD = 0.38. These participants were overall influenced negatively by the different factors against getting the vaccination.

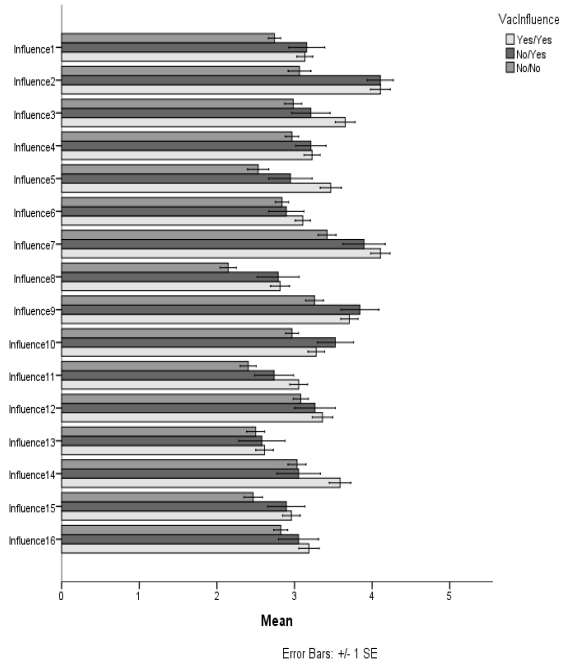

Figure 2: Average influence score based on students' plans to get the flu vaccination this year.

Discussion

One of the main probable factors that influence people on whether or not to obtain a seasonal influenza vaccine is education. This was tested in the study by giving participants a pre-test before a basic influenza vaccination tutorial and then giving them the same test after the tutorial. Next, students were asked both before and after the tutorial if they planned to get their vaccination the year of the study. The results indicated a significant correlation between education and influenza vaccinations. Overall, the students scored higher in the post-test compared to the pre-test. This suggests that they learned basic influenza vaccination information from the tutorial that they previously did not know. The results also indicated that a significantly higher amount of students planned to get their vaccination after gaining basic influenza vaccination information from the tutorial.

Other probable factors were also tested to determine predictability of vaccination acceptance. For the participants that planned to get the influenza vaccination both before and after the tutorial, the factors seemed to have had an overall positive influence towards them getting the vaccination. For the participants who at first did not plan to get the vaccination, but planned to get the vaccination after the tutorial, the factors seemed to also have had an overall positive influence towards them getting the vaccination. For the participants who planned to not get the vaccination both before and after the tutorial, the factors seemed to have an overall negative impact against them getting the vaccination. Therefore, participants who were already positively influenced by the different factors to get vaccinated were more likely to plan to get vaccinated after being educated from the tutorial. The participants who were already negatively influenced by the different factors to not get vaccinated were less likely to plan to get vaccinated after being educated from the tutorial.

Globally, there is a public health challenge of gaining effective communication and engaging with

https://scholarworks.uark.edu/jaas/vol70/iss1/28
DOI: 10.54119/jaas.2016.7020

members of the general public in order to increase vaccination rates (Liao et al. 2014, Davis et al. 2015). Unfortunately, many factors have been linked to an abundance of individuals resisting to get the flu shot (Frew et al. 2013, Ravert et al. 2012, Gidengil et al. 2012, Ward and Raude 2014). Basic influenza education and positive influential factors toward getting influenza vaccinations are two important factors presented in the study that have great influence on whether participants decide to receive the vaccine. The study results here and in the related studies are beneficial as they can be used to help understand ways of increasing influenza vaccine acceptance rates. Increased influenza vaccine acceptance will result in a decrease in the number of deaths that result yearly from influenza and relieve the amount of health services that is being taken up in response to the disease (Tjon-Kon-Fat et al 2016).

One method that this study points to as being effective could be to first educate more people on the basics of influenza vaccinations. In order to educate, the information needs to be approachable by the general public and not just to those with science, biology, or immunology backgrounds. Another method would be to utilize influential factors that are positive toward receiving the vaccine. Education had less of an effect when students already had negative perceptions from influential factors about the vaccine. Putting more positive influential factors in the public's eye could have a large impact by increasing influenza vaccination acceptance rates.

Studies performed to date on this topic have conflicting results showing varying factors as being more significant in one area over the next. This means that it could be important to gain knowledge through local studies to determine the best way to reach out to people in that specific area. Although this study had a low amount of participants compared to others, no other influenza vaccination acceptance study has been done in Arkansas. This study will add to the others like it from different geographic areas to further show the similarities and differences in studies performed locally versus globally. This study also is focused on college students which have been determined to have the lowest flu shot acceptance rate (Lawrence 2014, Ravert et al. 2012, Poehling and Katherine 2012, Ramsey and Merczinski 2011, Nichol et al. 2005, Cohen et al. 2015). This is an important aspect to consider as an increase in college student influenza vaccination reception can have a more positive impact on increasing herd immunity and decreasing influenza illnesses, hospitalizations, and death rates.

Literature Cited

Xu J and **Z Peng**. 2015. People at Risk of Influenza Pandemics: The Evolution of Perception and Behavior. PloS one 10.12

Liao Q, BJ Cowling, WW Lam, DM Ng and **R Fielding**. 2014. Anxiety, worry and cognitive risk estimate in relation to protective behaviors during the 2009 influenza A/H1N1 pandemic in Hong Kong: ten cross-sectional surveys. BMC Infectious Diseases 14(1), p.169.

Davis MD, N Stephenson, D Lohm, E Waller and **P Flowers**. 2015. Beyond resistance: social factors in the general public response to pandemic influenza. BMC Public Health 29;15(1):1.

Frew PM, S Zhang and **DS Saint-Victor**. 2013. Influenza vaccination acceptance among diverse pregnant women and its impact on infant immunization. Human Vaccines and Immunotherapeutics 9(12):2591-2602

Lawrence HY. 2014. Healthy Bodies, Toxic Medicines: College Students and the Rhetorics of Flu Vaccination. The Yale Journal of Biology and Medicine 87(4):423.

Ravert RD, LY Fu and **GD Zimet**. 2012. Reasons for low pandemic H1N1 2009 vaccine acceptance within a college sample. Advances in Preventive Medicine. 2012: 242518.

Poehling KA, J Blocker, EH Ip, TR Peters and **M Wolfson**. 2012. 2009–2010 Seasonal Influenza Vaccination Coverage Among College Students from 8 Universities in North Carolina. Journal of American College Health 60:541–547.

Ramsey MA and **CA Marczinski**. 2011. College students' perceptions of H1N1 flu risk and attitudes toward vaccination. Vaccine 29(44):7599-601.

Gidengil CA, AM Parker and **BJ Zikmund-Fisher**. 2012. Trends in Risk Perceptions and Vaccination Intentions: A Longitudinal Study of the First Year of the H1N1 Pandemic. American Journal of Public Health 102(4):672-679.

Prati G, L Pietrantoni and **B Zani**. 2011. Compliance with recommendations for pandemic influenza H1N1 2009: the role of trust and personal beliefs. Health Education Research 1;26(5):761-9.

Van D, ML McLaws, J Crimmins, CR MacIntyre and **H Seale**. 2010. University life and pandemic influenza: attitudes and intended behaviour of staff and students towards pandemic (H1N1) 2009. BMC Public Health 14;10(1):1.

Tjon-Kon-Fat R, T Meerhoff, S Nikisins, J Pires, D Pereyaslov, D Gross and **C Brown**. 2016. The potential risks and impact of the start of the 2015-2016 influenza season in the WHO European 2016. Region: a rapid risk assessment. Influenza and other respiratory viruses.

Nichol KL, SD Heilly and **E Ehlinger**. 2005. Colds and influenza-like illnesses in university students: impact on health, academic and work performance, and health care use. Clinical Infectious Diseases. 1;40(9):1263-70.

Seike I, N Saito, S Saito, M Itoga and **H Kayaba**. 2016. Average income has an influence on epidemics of seasonal influenza. Japanese Journal of Infectious Diseases PMID: 26902220

CDC 2016a. Centers for Disease and Prevention [web application]. Atlanta, Georgia. Available http://www.cdc.gov/flu/about/disease/burden.htm. (accessed February 2016)

CDC 2016b. Centers for Disease and Prevention [web application]. Atlanta, Georgia. Available http://www.cdc.gov/flu/about/disease/symptoms.htm. (accessed March 2016)

Appiah GD, L Blanton, T D'Mello, K Kniss, S Smith, D Mustaquim, C Steffens, et al. 2015. Influenza activity-United States, 2014-15 season and composition of the 2015-16 influenza vaccine. MMWR. Morbidity and mortality weekly report 64(21):583-90.

Kostova D, C Reed, L Finelli, PY Cheng, PM Gargiullo, DK Shay, JA Singleton, et al. 2013. Influenza illness and hospitalizations averted by influenza vaccination in the United States, 2005–2011. PloS one 19;8(6):e66312.

Ward J and **J Raude**. 2014. Understanding influenza vaccination behaviors: a comprehensive sociocultural framework. Expert Review of Vaccines 13(1):17-29.

https://scholarworks.uark.edu/jaas/vol70/iss1/28

DOI: 10.54119/jaas.2016.7020