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EFFECTS OF EDUCATION ON CORRECTING MISCONCEPTIONS AND ACCEPTANCE OF THE INFLUENZA VACCINATION AMONG A COLLEGE CAMPUS

By

Travis Edward Fairbanks

DNP PROJECT

Submitted to
Northern Michigan University
In partial fulfillment of the requirements
For the degree of

DOCTOR OF NURSING PRACTICE

School of Nursing

July 27, 2022

SIGNATURE APPROVAL FORM

EFFECTS OF EDUCATION ON CORRECTING MISCONCEPTIONS AND ACCEPTANCE OF THE INFLUENZA VACCINATION AMONG A COLLEGE CAMPUS

This DNP Scholarly Project by Travis Fairbanks is recommended for approval by the student's Faculty Chair, Committee and Department Head in the School of Nursing

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ABSTRACT

Educating patients on the influenza vaccination is an important goal for health care providers. It fosters a working relationship between provider and patient and allows patients to make an informed decision on their health care needs. The percentage of individuals who receive the influenza vaccine in the United States has been consistently below goals set by the committee for Healthy People 2020. This DNP scholarly project aimed to determine whether the introduction of education was effective at increasing individuals' choice to vaccinate against the influenza virus among college campus students. The study was a non-experimental, non-randomized control trial that utilized a simple random sample of students attending a Midwestern college. The theoretical framework utilized for this scholarly project is Pender's health promotion model. A modified version of the College Student's Perception of Influenza Vaccine and Childhood Immunizations survey was used utilizing a Likert scale which assessed responses to 22 questions before and after viewing an educational video created by this researcher. After the data was collected, a *t*-test and logistic regression were used to compare differences in the distribution of responses, and *p* values were used to determine the statistical significance while comparing the participants' answers before and after education and vaccination status. The study found statistical significance to indicate that educational intervention improved participants' knowledge/understanding surrounding the influenza vaccine and childhood vaccinations.

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TRAVIS EDWARD FAIRBANKS

July 27, 2022

Dedication

This scholarly project would not have been possible without the support of my family and fiancé. I thank my parents for thinking it was possible for me to achieve a level of education which, at times, seemed impossible. I thank my mother, Margo Fairbanks and father, David Fairbanks, for allowing me to once again live with them and for feeding me while completing clinical hours away from home.

Most importantly, I thank my beautiful and intelligent fiancé, Jamie Laurie, for supporting me through all my challenges in school and in our lives. Without her, receiving this degree would not have been possible. Jamie, you helped me from the very beginning of this adventure and stuck by my side no matter what obstacles came our way. I will never forget the sacrifices you have made in order for me to obtain this degree and I share this honor with you. I love you and I look forward to spending the rest of my life with you, maybe just not writing papers.

Contents

Chapter 1

Influenza, or "the flu," is an acute respiratory tract infection caused by influenza virus A or B (Alberti, 2021). The disease is typically self-limiting but can cause death in patients of any age group. Mortality is highest among those aged 65 and above, with about 36,000 deaths yearly from influenza or its complications in the United States, and an estimated 250,000 – 350,000 deaths annually worldwide (Alberti, 2021; Torner et al., 2018). Vaccination is the primary method to prevent an influenza infection and is recommended for all persons six (6) months of age and older who do not have any contraindications (Alberti, 2021).

Influenza vaccination coverage varies among age groups, with yearly rates consistently below 45% among adults (Lutz et al., 2019). Estimates for the 2017-18 season were lower than in previous years, with rates among adults aged ≥ 65 years (65.3%), aged 50-64 (45.4%), and aged 18-49 (33.6%) (Lutz et al., 2019). The 2019-2020 influenza season showed a 98% decrease overall influenza cases, most likely due to the COVID-19 pandemic, which resulted in differences in health-seeking behaviors, physical distancing, mask-wearing, and attention to personal hygiene (de St. Maurice, Martin-Blais, & Halasa, 2021). In addition, vaccination rates for the 2021-2022 flu season remained low in adults ≥ 65 years (65.0%), those aged 50-64 (43.4%), and especially in those aged 18-49 (29.0%) (Centers for Disease Control and Prevention [CDC], 2022). These numbers fall short of the immunization goal set forth by the Healthy People 2020 revision of 70% among non-institutionalized adults 18 years and older (Office of Disease Prevention and Health Promotion [ODPHP], n.d.; Rogers, Bahr, & Benjamin, 2018). Increasing influenza vaccination rates is an important goal for health

care. It contributes to lower financial strain on businesses, due to lost productivity, while reducing hospital length of stay and overall mortality. The United States influenza vaccination rates are similar to findings across the globe, with only 41% of adults receiving the influenza vaccination, representing only a 3% increase in coverage over the past seven years (Rogers et al., 2018).

Individuals who choose not to vaccinate themselves or their children often cite concerns about the safety and efficacy of the vaccine. Achieving higher influenza vaccination rates can be challenging as the amount of misinformation provided through social media and other multimedia sources grows. Some of the primary beliefs among the unvaccinated include: vaccines are unsafe and can cause autism, vaccines can cause the illness they are preventing, and vaccines are ineffective at preventing disease (Nyhan & Reifler, 2015). The World Health Organization Strategic Advisory Group of Experts (WHO SAGE) describes the concept of vaccine hesitancy as the acceptance of vaccines on a continuum from demand and no demand and ranging from accepting all vaccines to accepting no vaccines (MacDonald, 2015). Vaccine hesitancy, in other words, is a delay in acceptance or refusal of vaccinations despite the availability of vaccination services. It is complex and suggests that barriers to vaccine uptake vary in regard to the vaccine and the disease in focus (Schmid, Rauber, Betsch, Lidolt, & Denker, 2017). However, despite these difficulties, healthcare providers should be encouraged to stress the importance of the influenza vaccination and provide quality evidence-based information to increase acceptance of the influenza vaccine while at the same time empowering their patients to make educated choices about their health.

Background and Significance

Researchers have identified multiple variables associated with a decrease in influenza vaccination coverage among the public. Factors identified by Bekkat-Kerkani and Romano-Mazzotti (2018) are the belief that influenza is not a *severe* illness, could be self-managed, and does not pose a significant threat. Contradictory to this belief, the influenza virus kills an estimated 12,00-56,000 individuals annually in the United States alone. It is associated with increased complications such as pneumonia; inflammation of the heart, brain, or muscle; multi-organ failure; and sepsis (Bekkat-Kerkani & Romano-Mazzotti, 2018). Another study found that the top three reasons for not being vaccinated were time, inconvenience, and pain/side effects (Luz, Johnson & Brown, 2017). Inconvenience may emerge because the individual's attitude is not firmly against or in favor of vaccination, leading to the belief that the vaccination is not enough to actively overcome barriers such as lack of access, cost, or travel time (Schmid et al., 2017). Higher vaccine uptake was observed among individuals who had the vaccine offered at their workplace, perceived fewer barriers, and had higher income (Luz et al., 2017). Another study found that individuals who had a better understanding of the influenza vaccine had significantly higher vaccine uptake rates (Sagor & AlAteeq, 2018).

Social media and the internet have increased the amount of information available to the public, which can be seen as a positive and a negative contribution. On college campuses, mass media campaigns correlated to an increase in influenza vaccine uptake and a significant positive correlation between media reporting and vaccination rates among the public (Chen & Stoecker, 2020). However, Chen and Stoecker (2020) also found that media coverage of deaths occurring after flu shot administration caused an

80% decrease in vaccinations in Italy. This sharp decline was also seen in the measles, mumps, and rubella (MMR) vaccinations after the now-debunked publication that linked MMR and autism (Chen and Stoecker, 2020). Roger et al. (2018) found a significant correlation between receiving the influenza vaccine and when the individual had last visited a medical provider. These examples demonstrate the power of mass media in swaying people's decisions to receive vaccinations and the importance of providing information and easy access to these vaccinations.

Statement of Purpose

The purpose of this Doctor of Nursing Practice (DNP) scholarly project was to determine whether the introduction of education provided to a college-based audience will increase acceptance of the influenza vaccine compared to previous years when education was not provided. Researchers have found that U.S. medical students' and residents' influenza vaccination rates were around 48% to 58%, while students outside medical-related fields were around 8% to 30% (Rogers et al., 2018). Influenza has the potential to spread quickly through the student population due to ease of transmission and the proximity of learning and living conditions (Rogers et al., 2018). Providing education to individuals entering college is a simple, low-cost step that can increase future acceptance of the influenza vaccine for students and their families. Increased vaccination acceptance paves the way for higher vaccination coverage, leading to the decreased spread of the flu, reduced rate of hospitalizations, deaths, and costs associated with this viral disease.

Methods

This project was implemented at a Midwestern university campus with roughly 7,300 students. Posted university statistics indicated the majority of the student population is white (85%), with others identifying as two or more races (5%), Hispanic (4%), unknown (3%), black (2%), American Indian/Alaskan Native (1%), and Asian (1%).

Breakdown of University Diversity

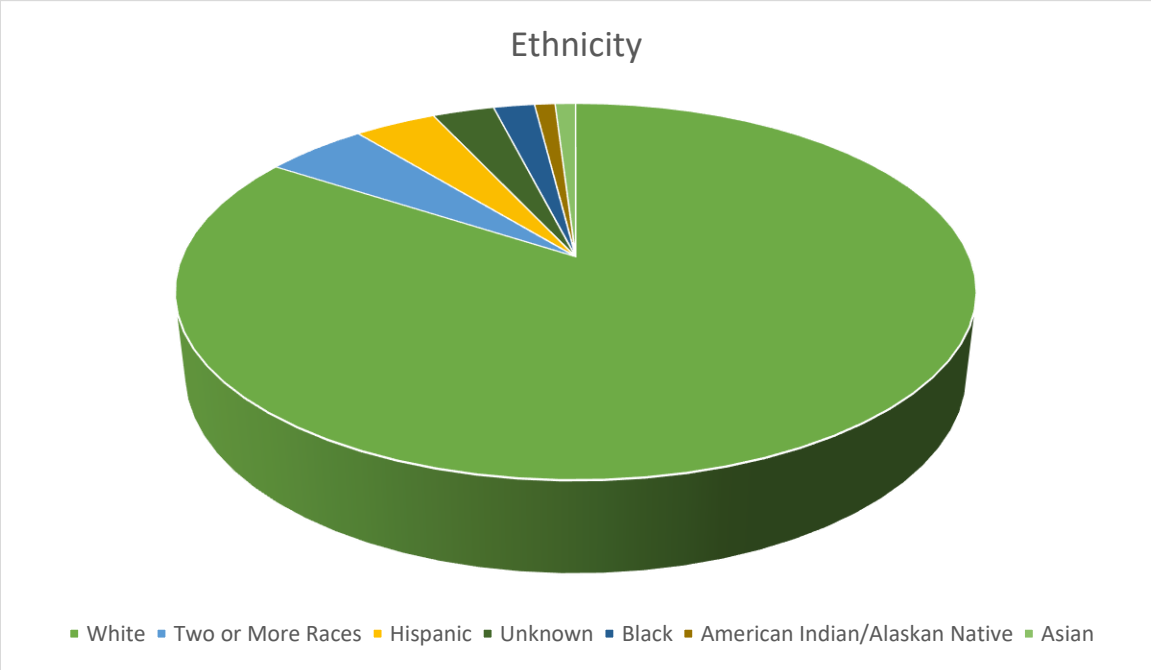


Figure 1.

This project's inclusion criteria consisted of students with an active university email address. An email was sent to 20% of enrolled students at a Midwestern university, with participants randomly selected from the population. This process was repeated a second time to increase the number of participants. Initially, 165 participants accessed the online survey; 90 completed both pre-and post-education surveys, two (2) participants were not 18 years of age, and three (3) participants declined to participate.

Participants were asked to provide demographic information in the pre-survey and then rate different vaccine statements from "1-Strongly Disagree" to "6-Strongly Agree." Following completion of the survey, participants then viewed a YouTube video regarding the need for an annual influenza vaccine, an overview of the mutation of the virus, and why the influenza vaccine is required every year (see Appendices F and G). After viewing the video, participants were administered the same questionnaire again using the same scale. Participants' answers to survey questions were compared before and after viewing the education that was provided to assess increased knowledge regarding the influenza vaccine and increased likelihood of receiving the vaccine.

Theoretical Framework

The theoretical framework utilized for this scholarly project was Nola Pender's *health promotion model* (HPM). This model was initially proposed in the 1960s to explain why some people who are illness-free will seek preventative health measures while others will not (Pender, Murdaugh, & Parsons, 2006). Reluctance to tuberculosis screening, Pap smears, immunizations, and other preventative measures were widespread at this time and the model had the potential to explain this behavior and suggest interventions that might increase resistant individuals to engage in preventative behavior (Pender et al., 2006). Pender's HPM is based on major assumptions reflecting both nursing and behavioral science perspectives. These assumptions outline that individuals seek to establish conditions in which they can express their unique health potential and desire to stabilize their behavior (Pender, 1996). Individuals are transformed by the environment and have the capacity for reflective self-awareness, the ability to assess their competencies, and value growth in directions they view as positive (Pender, 1996).

Finally, health professionals may exert influence throughout an individual's life span but self-initiated alteration of personal patterns is essential to behavioral change (Pender 1996).

Pender's model illustrates that individuals interact with many factors as they pursue health while being motivated by a desire to enhance their well-being and actualize human potential (Sakraida, 2014). Complex biopsychosocial processes motivate an individual to engage in behaviors directed toward enhancing health (Sakraida, 2014). When initially applying the HPM, prior behaviors related to the desired change must be assessed to understand that each person has unique biological, psychological, and sociocultural factors (Pender et al., 2006). The perceived benefits of an action will increase the likelihood that an individual will commit to health-promoting behavior while perceived barriers, whether real or imagined, will constrain the commitment to the behavior (Pender et al., 2006). Perceived barriers are influenced by both effect toward a behavior and perceived competence to execute a behavior (Pender et al., 2006). Positive affect toward behavior results in greater perceived self-efficacy, which results in fewer perceived barriers (Pender et al., 2006). Interpersonal and situational influences along with perceived barriers and benefits influence an individual's commitment to a plan of action (Pender et al. 2006). Once an individual has committed to a plan, immediate competing demands or competing preferences must be addressed or removed to increase the likelihood that a health-promoting behavior will be carried out successfully (Pender et al., 2006)

Pender's theoretical framework ties in directly with the objectives of this scholarly project. The project aims to gather demographic and qualitative information to

assess prior behaviors and beliefs about vaccinations. The purpose of the education was to erase some of the perceived barriers of the individual and emphasize the benefits derived from vaccinations to increase positive attitudes towards vaccination. As health care professionals, encouraging an individual and providing easy access to receive the vaccination can eliminate competing demands and increase their commitment to vaccinate. Providing education to individuals and involving them in their personal health care decisions can motivate patients and better ensure that they become invested and strive to increase their well-being and overall health. Education comes in many forms (i.e., written, video, presentations, pamphlets, etc.); deciding when and where education is applied can increase the retention and overall understanding of what is being taught. Providing education to college-aged students about vaccinations should increase the influenza vaccine uptake and align with the primary purpose of this scholarly project. Ideally, educated individuals will make wise medical decisions for themselves, encouraging this behavior to continue throughout adulthood, where they can positively influence their well-being and those around them.

Chapter 2

Throughout history, science has provided many ways for humanity to extend a population's average life expectancy. Providing clean drinking water, adequate sewage disposal, and quality healthcare that incorporates scientific research and best practice are just a few of these interventions. Vaccinations are included in these successful scientific breakthroughs and allow us to combat disease before it has a chance to invade the host. Despite the proven success of vaccinations, the number of vaccine-preventable disease (VPD) cases worldwide has been steadily rising, with a child dying every 20 seconds from a VPD (Papachrisanthou & Davis, 2019). This increase in cases is not due to new strains of vaccine-preventable diseases or inefficiencies of the vaccines themselves but to the increasing number of individuals who either choose not to vaccinate themselves and their children or are delaying vaccinations received (Papachrisanthou & Davis, 2019). Opposition to healthcare is nothing new; however, those who oppose vaccines or "anti-vaxxers" have created an environment in which misconceptions and inaccurate data about the safety and efficacy of vaccines have decreased the population's vaccination rate to a dangerous point that is allowing formerly eradicated diseases to return (Papachrisanthou & Davis, 2019). Due to this "anti-vax" movement, the World Health Organization (WHO) has labeled anti-vaxxers as one of the top ten threats to global health in 2019 (World Health Organization [WHO], n.d.). Why would someone choose to contract a disease rather than get vaccinated? This literature review will focus on morbidity and mortality rates for seasonal influenza, the safety and efficiency of the influenza vaccine, barriers to vaccine uptake, common misconceptions leading to vaccine refusal, and

investigations into the effectiveness of education on an individual's intent to receive the vaccine.

Morbidity and Mortality

Since the 1700s, there have been approximately twelve pandemics involving the influenza A virus (Taubenberger & Morens, 2008). These differ from the typical seasonal influenza in both severity and percentage of the population affected for that season. In 1918, the world saw its worst pandemic of influenza A with almost 546,000 deaths in the United States (U.S.) and nearly 50 million deaths worldwide (Taubenberger & Morens, 2008). Every year, there are approximately 36,000 deaths and 226,000 hospitalizations in the U.S. due to seasonal influenza (Li & Freedman, 2009). In 2020 there were 53,544 influenza and pneumonia deaths, making it the ninth leading cause of death overall (Murphy, Kochanek, Xu, & Arias 2021). Individuals at the highest risk for influenza complications include those aged 65 years and older, children younger than two (2) years old, and those with pre-existing medical conditions (Foradori et al., 2020; Li & Freedman, 2009). Complications associated with the influenza virus include pneumonia, dehydration, encephalopathy, and myocarditis (Foradori et al., 2020; Li & Freedman, 2009). In the 2017-2018 flu season, 48,000 hospitalizations and 179 pediatric deaths were recorded (Foradori et al., 2020). Most of these deaths occurred in unvaccinated children and half occurred in children with at least one chronic medical condition (Foradori et al., 2020). Even though asthma is among the top chronic conditions contributing to an increased risk of influenza complications and death, only 63% of children with asthma are vaccinated against influenza (Foradori et al., 2020).

Preventing the Flu

The influenza vaccination effectively prevents contracting the influenza virus and decreases morbidity and mortality (Abbas et al., 2018). Influenza vaccination coverage among adults 18 years and older remains consistently below the Healthy People 2020 initiative, with 43.3% of eligible Americans receiving the vaccine during the 2016-2017 influenza season (Abbas et al., 2018). Vaccination rates are similarly low among college students across the United States, with an estimated 12% to 30% yearly vaccination against influenza (Benjamin & Bahr, 2016). These low annual percentage rates have led to an increase in individuals contracting this disease and passing the infection to others. Annually, influenza epidemics are estimated to cost the United States $10.4 billion in direct medical expenses and $16.4 billion in lost potential earnings (Li & Freedman, 2009). This increased strain on healthcare and the economy has led many to question what can be done to increase vaccination compliance while allowing individual freedoms. COVID-19 further highlights the importance of providing quality information to reduce healthcare costs and promote healthy, individualized choices.

The CDC (2021) recommends that all six (6) months and older individuals receive an influenza vaccine yearly. Multiple vaccines exist, including inactivated influenza vaccine (IIV), recombinant influenza vaccine (RIV), or live attenuated influenza vaccine (LAIV) (Center for Disease Control and Prevention [CDC], 2021). The CDC (2021) has not expressed a preference for any influenza vaccine over others and suggests each individual discuss which is best for them with their health care provider. The influenza vaccine prevents millions of illnesses and flu-related doctor's visits population-wide each year (CDC, 2021). During the 2017-2018 season, flu vaccinations prevented an estimated 6.2

million cases, 3.2 million influenza-associated medical visits, 91,000 hospitalizations, and 5,700 deaths (CDC, 2021). During seasons when the vaccine contains genetic material similar to the circulating virus, vaccines have been shown to reduce the need to seek a healthcare provider by 40% to 60% (CDC, 2021). Vaccinations have also decreased the severity of influenza-associated symptoms in those who contract the virus. A 2017 study assessed the protection against severe influenza symptoms in those infected with the influenza virus despite being vaccinated (Arriola et al., 2017). Their findings showed that the proportion of deaths among the unvaccinated was higher ($p < 0.4$), the number of cases admitted to the intensive care unit (ICU) was higher ($p \leq 0.01$), and a diagnosis of pneumonia was more likely ($p = 0.01$) [Arriola et al., 2017]. The length of stay in the ICU was also longer ($p = 0.03$) [Arriola et al., 2017]. Additional research showed a 26% reduction in odds of (ICU) admission, a 31% reduction in odds of death, and a 4.1-day reduction in length of stay for those vaccinated against the influenza virus when compared to the unvaccinated (Ferdinands, Thompson, Blanton, Spencer, Grant and Fry, 2021; Thompson, Pierse, Huang, Prasad, Duque, Newbern… McArthur, 2018).

Safety and Efficacy of the Influenza Vaccine

Individuals can report an absence of side effects to minimal side effects. The side effects of the influenza vaccination are typically mild. They can include any of the following: soreness, redness, swelling at the injection site, mild headache, fever, nausea, muscle aches, and fatigue (CDC, 2022). Life-threatening allergic reactions to vaccine components have been observed, but these are rare (CDC, 2022). Guillain-Barre syndrome has also been associated with the influenza vaccine but generally occurs in fewer than 1 or 2 cases per million people vaccinated (CDC, 2021; CDC, 2022.).

Research supports that the severity and likelihood of adverse effects are considerably lower when weighed against the potential benefits observed through vaccination (CDC, 2021; Ferdinands et al., 2021; Thompson et al., 2018).

Controversy Surrounding the Flu Vaccine

In the United States, each state controls the exemptions that allow an individual to refuse a vaccine. Some states make it easier to refuse a vaccine than other states. These grounds for exemption vary from religious, medical, or personal/philosophical reasons. A refusal due to personal or philosophical reasons is being accepted in fewer states as a valid reason not to receive a vaccine. Some states are considering tighter restrictions on vaccination laws as outbreaks of vaccine-preventable diseases, such as measles or mumps, are rising (WebMD, 2019). Exemptions for current VPD have not changed due to the COVID-19 pandemic; however, California and Louisiana are the only states requiring children to receive the COVID-19 vaccine for school entry in 2022 (National Conference of State Legislatures, 2022).

Current Vaccine Exemptions are Broken Down by State

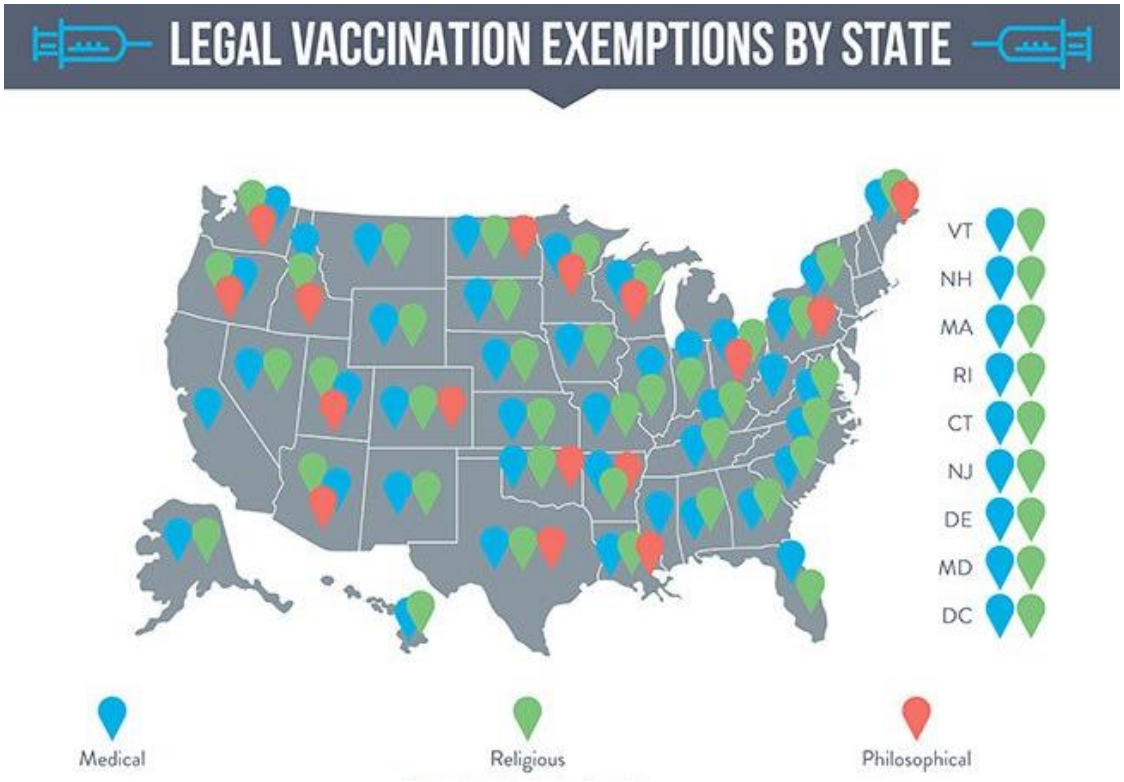


Figure 2. Reprinted with permission (See Appendix K) from: What are the rules of vaccine exemptions?, by WebMD, 2019, (https://www.webmd.com/children/vaccines/what-are-the-rules-on-vaccine-exemptions)

The controversy surrounding vaccines stems from many misguided places, including fear, lack of education surrounding prevention, and the dissemination of false information. The anti-vaccination movement received a boost after publishing work conducted by Andrew Wakefield in 1998 (Hussain, Ali, Ahmed, & Hussain, 2018). He investigated and reported a correlation between the measles, mumps, and rubella (MMR) vaccine and autism (Hussain et al., 2018). Since that time, several studies have been published, disproving the relationship between the MMR vaccine and autism, the

retraction of Wakefield's work by The Lancet, and the barring of Wakefield from practicing in the United Kingdom (Hussain et al., 2018). Unfortunately, the information was already released and highly circulated by the media, which potentiated its effects and continues to do so even in present-day conversation about vaccinations.

Technology and the Spread of Information

Information known primarily by only medical professionals is now readily available to any individual through the internet. This idea of "patientcenteredness" has allowed patients to become more involved in their health care decisions, thus permitting patients to make the best decisions for themselves and ultimately receive a higher quality of care (Fineout-Overholt, Long, & Gallagher-Ford, 2019). Although the increase in readily available information has been beneficial in some ways, the information found on the internet can also have adverse effects detrimental to an individual's health (Hussain et al., 2018). "When it comes to vaccines, the false information is plentiful and easy to find" (Hussain et al., 2018, p. 3). An analysis of YouTube videos about immunization found that 32% of videos that opposed vaccination had higher ratings and more views than pro-vaccination videos (Hussain et al., 2018). After searching for "immunization" through Google, one study concluded that 43% of websites were anti-vaccination themed, including the top 10 most visited sites (Hussain et al., 2018).

Online anti-vaccination authors use numerous tactics to increase their exposure and viewing. These tactics include but are not limited to skewing science, shifting hypotheses, censoring opposition, attacking critics, claiming to be "pro-safe vaccines" and not "anti-vaccine," and claiming that vaccines are toxic or unnatural (Hussain et al., 2018, p. 2). A study conducted by Kortum et al. (2008) examined the quality of

information that is provided through search engines, such as Google, and the ability of individuals to decipher that information. It was found that 55% of the first two pages of search results provided inaccurate information, with 65% of the first page of results containing skewed, false, or incomplete data (Kortum et al., 2008). Student assessment of the validity of the sites indicated that 59% of participants thought the information provided by all sites was accurate (Kortum et al., 2008). These findings were consistent with another study conducted by Pew Research, which found that 52% of individuals believe almost all or most of the information is correct when visiting a health website (Kortum et al., 2008).

Misconceptions Surrounding the Influenza Virus

A study by Benjamin and Bahr (2016) further assessed the fears and misconceptions among college-aged students. They found that among those who were not vaccinated, 41.6% believed that receiving the flu shot would give them the flu and that vaccines have dangerous side effects. The belief that there was no danger of contracting the flu was also high at 39.6% (Benjamin & Bahr, 2016). This study identified fear of side effects, lack of vaccine information, lack of perceived risk, and inconvenience as some of the most substantial barriers to the acceptance of the vaccine (Benjamin & Bahr, 2016).

A study conducted by Ratnapradipa, Norrenberns, Turner, and Kunerth (2017) consisting of 184 individuals attempted to identify fears, misconceptions, benefits, personal or individual preferences, and family preferences that correlated with receiving the influenza vaccine. They found that for those who had not yet been vaccinated, the odds of a family member's intention to vaccinate were 26 times greater among those who

intended to receive the vaccine (95% CI = 5.89-114.82). Past vaccination behavior was also significant (OR = 10.33; 95% CI = 4.27-24.99) as was greater perceived susceptibility (OR = 1.32; 95% CI = 1.04-1.68), benefits (OR = 1.43; 95% CI = 1.52-2.47), availability (OR = 1.43; 95% CI = 1.25-1.63, and lower perceived barriers (OR = 0.77; 95% CI = 0.68-0.87). Findings revealed that individuals are more likely to be vaccinated if they have been vaccinated previously, their family members are vaccinated, have fewer perceived barriers, or believe they might catch the flu (Kini et al., 2022).

In the United States, low vaccination rates (33.6% for ages 18-49, 45.4% for ages 50-64, and 65.3% for 65 and older) (Lutz et al., 2019) are seen among adults. One study of 4,597 respondents found that the perceptions of influenza vaccination safety and effectiveness were high across all age groups (Lutz et al., 2019). This research suggests that even though individuals believe the vaccine to be safe and effective, another element still prevents them from being vaccinated. Safety concerns still appear to reflect persistent misconceptions surrounding vaccines that are very difficult to correct. A study conducted by Nyhan and Reifler (2015) found that corrective information significantly reduced beliefs in myths about the vaccine and its safety. However, providing information to individuals with increased concerns about vaccination side effects further decreased their intent to receive the vaccine (Nyhan & Reifler, 2015). These findings suggest that correcting misperceptions about vaccinations may be ineffective for some and can even make misconceptions more prevalent due to people's motivation to defend their prior beliefs (Nyhan & Reifler, 2015).

The Impact of Education on Attitude Towards the Flu Vaccine

Education continues to be the primary tool used in the struggle to promote adherence and increase vaccination rates among the public. As demonstrated above, the information found during lay people's general search queries is often misleading, incorrect, and dangerous for adults and the children under their care. Zingg and Siegrist (2012) sought to develop a knowledge scale about vaccinations with questions relevant to decision-making related to vaccinations in general and not only to one vaccine. Their study found an association between an individual's general vaccination knowledge, and the decision to vaccinate, with a resulting correlation coefficient of $r = -.23$ ($p < .01$, N = 1,063) (Zingg & Siegrist, 2012). Providing information to the public or individuals is no small task (Zingg & Siegrist, 2012). They must be interested in receiving the data and trust that it comes from a reputable source (Zingg & Siegrist, 2012).

Healthcare workers' knowledge and attitudes have positively correlated with higher vaccination coverage rates, with parents citing healthcare professionals as the most important factor influencing their decision (Cvjetkovic, Jeremic, & Tiosavljevic, 2017). One study explored the knowledge and attitudes of medical students toward the influenza vaccination and compared their knowledge to their peers studying law and electrical engineering. They found that the attitude scores of students in the law and electrical engineering colleges were considerably lower compared to those enrolled at the medical college (Cvjetkovic et al., 2017). They also identified that knowledge and attitude scores for first-year students were lower than those of second-year students and considerably lower than students in their fifth year (Cvjetkovic et al., 2017). The study also identified that personally knowing someone who had a negative experience with a vaccination

showed a negative association score (beta = -0.24, $p < 0.001$), leading to attitude scores that were considerably lower than their peers (Cvjetkovic et al., 2017).

Health care workers must first understand the barriers that individuals perceive to change attitudes about vaccination (Benjamin & Bahr, 2016). After this is accomplished, education to combat misconceptions about vaccinations may be more readily absorbed. This education results in a greater self-efficacy for individuals who, in turn, will perceive fewer barriers to specific health behaviors. Studies have shown that misconceptions are barriers to receiving vaccinations, and those with more knowledge about vaccinations remove those barriers and choose to vaccinate themselves and their children (Sakraida, 2014; Benjamin & Bahr, 2016; Nyhan & Reifler, 2015; Shmid et al., 2017). Changing the climate surrounding vaccines by modeling health-promoting behaviors, providing assistance, and support through education will help healthcare move forward towards a society of healthier individuals.

Chapter 3

Methods

Purpose

The DNP scholarly project aimed to determine whether the introduction of influenza vaccine information and education was effective at increasing vaccine uptake in college-aged students who had not previously received the influenza vaccine.

Sample and Setting

The inclusion criteria included students enrolled at a rural Midwestern university with an active university or student email on file with the university. Due to university policy, a limit of 20% of student population could be emailed at a time. During the first round of data collection, an email was sent to 20% of enrolled students of a Midwestern university, with participants being randomly selected from the entire campus population. The following semester, during the second round of data collection, an email was sent to 20% of first-year students to reduce duplication of participants. Initially, 165 participants accessed the online survey; two (2) participants were not 18 years of age, and three (3) declined to participate. Of the remaining 162, a sample size of 90 participants completed both pre-and post-education surveys and was included in the data analysis.

A modified survey (see Appendix A) was created based on another survey titled, College Students' Perception of Influenza Vaccination and Childhood Immunizations (see Appendix B) [Czyz, Miller, Muniz, Abraham, and Gillum, 2019]. Dr. Abraham approved the modification and use of this survey (see Appendix C). Due to COVID-19 and limited interaction with students during the pandemic, the survey tool was uploaded into the university Qualtrics system to be electronically distributed.

Project Approval

This research project was approved by the Institutional Review Board (IRB) at the Midwestern university to conduct human subjects research (see Appendix D). The IRB also approved sending emails using the university's mass email system for data collection periods (see Appendix E). Data was collected during two separate periods; February 15, 2021 through March 5, 2021 and September 25, 2021 through October 12, 2021. Participation in the study was voluntary, with participants choosing to respond to the survey received through an email (see Appendix F). Consent was obtained before participation by posing the first question of the survey as the consent form to participate, which was created by the student researcher (see Appendix G). Before implementation of the study, consent wording was approved through the IRB process.

Design and Randomization Procedure

This study was a non-experimental, non-randomized controlled trial. Participants completed a modified version of the survey tool created by Czyz et al. (2019) before and after the educational intervention. The original survey assessed college students' perceptions of influenza and childhood vaccinations. Permission to use the survey was obtained from Dr. Abraham (see Appendix C). Simple random sampling was used through the university's mass email system. This email system randomly chose 20% of emails from all current students during the first round of sampling, which ran between March 15, 2021, and April 5, 2021. The second round of sampling was sent to 20% of emails belonging to first-year students to avoid duplicate responses with sampling running between September 22, 2021, and November 13, 2021. The participants were

invited to participate in a study assessing their vaccination knowledge and willingness to receive the influenza vaccine after education was provided.

Procedures

Before implementing the scholarly project, an educational video was created using an iPad and the Procreate (Version 5.2.6) graphics app. The video was uploaded to YouTube for ease of access (https://www.youtube.com/watch?v=AplKUnXgs-Q) [Fairbanks, 2020]. Appendix H and I contain the transcript and slides from the created educational video. Information for the video was synthesized from research articles and simplified for the layperson's understanding with approval from the committee chair. The video briefly covered the need for an annual influenza vaccine, an overview of the mutation of the virus, why the vaccine is required every year, and some information about the vaccine.

After gaining permission to use the university's mass email system, an email was generated by the student researcher explaining the purpose of the study and inviting students to participate (see Appendix E). Due to university restrictions placed on the percentage of students (20%) that could be emailed simultaneously, a limited number of responses were obtained and recorded through the Qualtrics survey tool.

The survey for this scholarly project was modified from the survey created by Czyz et al. (2019) with the addition of (a) prefer not to answer to gender; (b) prefer not to answer to ethnicity; (c) age ranges 28-30, >30, and prefer not to answer to age; and removal of (d) "*Class,*" and replaced with "*What is the highest level of school you have completed or the highest degree you have received?"* The legitimacy of the original survey tool was tested using face validity when it was evaluated by two peers and two

faculty members from the College School of Nursing where the survey was conducted (Czyz et al., 2019). Face validity generally means the findings look and feel right, and any observations that appear to be true would be said to possess face validity (Royal, 2016). The modified survey was not tested for either reliability or validity.

The modified survey included a demographic section where respondents were asked to answer questions about gender, age, race, education level of self and parents, the household's income growing up, and if they had received recommended childhood vaccinations and the influenza vaccination the previous year. A six (6)-point Likert-type scale was used to assess the responses with items ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Participants were asked to rate statements regarding their perspectives and beliefs on vaccinations before and after viewing the educational video. See Table 1 below for survey questions.

Table 1

Survey Questions on the Influenza Vaccine and Childhood Vaccinations

Survey Item	Question
1	The influenza (flu) vaccine protects me from getting the flu
2	The influenza (flu) vaccine protects me against the different types of flu
3	My faith impacts my decision in receiving the influenza vaccine
4	The cost of the vaccine keeps me from receiving the influenza vaccine
5	I do not receive the influenza vaccine unless it is required
6	The influenza vaccine should only be given to the elderly and children
7	The influenza vaccine gives me the flu
8	I feel knowledgeable about the influenza vaccine
9	I do not feel in danger of contracting the flu
10	The flu is a serious infection
11	Influenza can be deadly in any person
12	Childhood immunizations should be given according to the recommended CDC schedule
13	Childhood immunizations prevent disease
14	Many of the illnesses that childhood immunizations prevent are severe
15	Society and media encourage childhood immunizations
16	Childhood immunizations keep the rest of society safe from diseases
17	Children receive more shots than needed
18	Childhood immunizations have severe side effects
19	Childhood immunizations cause autism
20	All childhood immunizations are safe
21	I am well informed about childhood immunizations
22	If I have children in the future, I will have them immunized

At the end of the survey was a section where participants were encouraged to give open-ended responses about their vaccination beliefs. They were asked to provide answers, in their own words, to (a) “What do you believe about the influenza vaccination?”, (b) “What do you believe about childhood immunizations?”, (c) “Any other beliefs about vaccinations in general?” The comments were documented (See Appendix J), and generalized themes were noted in the qualitative section of this project’s findings. Finally, participants were asked if they were willing to receive the influenza vaccine for the upcoming flu season as a result of participating in the study. Due to restrictions placed during the COVID-19 pandemic, data could not be obtained

from the health clinic on the number of influenza vaccines distributed while this study was conducted.

Completed surveys were housed through the online Qualtrics system, which was password protected. No participant identification was provided or recorded when accessing or completing the survey. All the research materials and data will remain in the Qualtrics system and be destroyed after seven (7) years.

Data Analysis

The R-engine and tidyverse programs were utilized to analyze the data (R Core Team, 2020; Wickham et al., 2019). A statistician was consulted for the scholarly project. The *t*-test and logistic regression were two statistical techniques used to analyze the collected data. The survey responses were first aggregated so that each participant was left with a pre-education and post-education score. This process was intended to measure a hidden, or latent, variable that represents the respondent's overall knowledge and views about vaccinations compared to conducting multiple individual hypothesis testing for each survey response. Each question response was converted to a numeric value so that Strongly Agree would be a six (6) while Somewhat Agree would be a four (4), and Strongly Disagree would be a one (1) while Somewhat Disagree would be a three (3). At the same time, the desired response from Table 3 was similarly coded from either agree or disagree to a numeric value. Participants' responses for each question were then subtracted from the desired response score, which gave a distance away from the desired response. The further away the participant's answer from the desired response, the larger the numeric value assigned to that response. These distances were totaled for each participant's pre-education and post-education answers, leaving a reasonably

interpretable value. The greater a participant's final score, the further away their responses were from the desired response – the "ideal" final score would be zero while the most undesired score would be 110 (a distance of 5 away from the desired response for all 22 questions).

_t_-test

Using a two-sided *t*-test, the *t*-test was used to compare the mean of the differences in aggregate survey scores for the vaccination questions between the pre-education and post-education surveys. In terms of hypotheses, the null hypothesis is the difference in true means is zero or there is no association between education and the difference in aggregate survey scores. The alternative hypothesis for this analysis is the difference in true means is not equal to zero, or that there is an association between the education provided and the difference in aggregate survey scores. A *t*-statistic was calculated and then compared to a *t*-distribution assuming the null hypothesis is true to determine if the observed data is unusual. The *t*-statistic provides a way to quantify the difference between an observed value, in this case, the mean of the differences in aggregate survey scores, and a known or hypothesized parameter (i.e., the hypothesized true mean of the differences in aggregate survey scores). The *t*-distribution represents all the possible *t*-statistics that could be observed if the study was repeated forever, with no difference in aggregate scores before and after the implementation of the educational video. If there is truly no association between mean aggregate scores after the implementation of the educational video, there would likely be no difference in the means, meaning zero would be the most common *t*-statistic. When comparing the observed *t*-statistic to the *t*-distribution, the further the observed *t*-statistic is from zero,

the more evidence against the null hypothesis of there being no difference between pre-survey and post-survey scores.

Additionally, *t*-statistics further away from zero provide evidence of an association between the implementation of the educational video and aggregate survey scores. Extreme values of the observed *t*-statistic provide more evidence against the null hypothesis that the true mean of the differences is equal to zero. A *t*-test requires several assumptions, namely normality of the measurements. These assumptions will be discussed with the results.

Logistic Regression

To analyze the potential impact of education on vaccination plans, a generalized linear model (GLM), specifically a logistic regression was used. Much like linear regressions, using a GLM over a contingency table and chi-square test allows for the testing for the presence of an effect and estimating individual effects. Ordinary linear regression models cannot handle yes-no response variables; therefore, the need to use a logistic regression. In the case of the yes/no answers to the plan to vaccinate question, the response is binary and can be considered either a success (a “yes” answer) or a failure (a “no” answer). With different types of response variables, the estimated effects differ in their relationship to the response variable. For a GLM with a binary response variable, which is usually called logistic regression, estimated effects on the response are measured in the odds or probability of success. Odds ratios are ratios of two odds and represent the strength of association between the two events represented in the odds that make up the odds ratio. An odds ratio of one (1) would occur when two events have the same odds of happening. If the odds ratio is greater than one (1), then the odds of the control affecting

the outcome is larger than the odds of the treatment, and the opposite for an odds ratio smaller than one (1). Odds ratios are statistics that explain, in terms of a multiplicative effect, the difference in an event occurring (choosing to receive the vaccine after the study) based on their previous vaccination status and change in aggregate survey scores. Odds and odds ratios will be used to investigate the results from the GLM as the primary interest was a comparison between groups.

Chapter Four

Results

This DNP scholarly project aimed to determine whether the introduction of education was effective at increasing individuals' understanding of the influenza vaccine. Furthermore, the project sought to explore if education affects the participant's choice to vaccinate. Three main questions were investigated to assess the impact of the project:

Question 1: Does the provided education affect the overall understanding of participants in regards to the influenza vaccine and childhood vaccines?

Question 2: Does an increase in understanding significantly correlate to an increased likelihood of subjectively reporting receiving the vaccine?

Question 3: Is there a difference in understanding of those who receive the influenza vaccine and those that don't both prior to and after education?

The *t*-test was used for Question 1 to compare survey data before and after the educational video, while logistic regression was used for Question 2 to determine if prior vaccination and a change in respondents' survey results impacted whether they would receive the influenza vaccine. Tables and data plot figures are also used to visualize results. Means and standard deviations were used to analyze trends in participant answers. The summary and interpretation of the analysis are delineated below.

Demographic Results

The study sample was selected by simple random sampling. Each student had an equal chance of receiving an email inviting them to participate in the study. The modified survey evaluated the participants' knowledge of vaccines, explicitly targeting the influenza vaccine.

During the study, an email was generated inviting students to participate with a hyperlink to the Qualtrics survey. This email was sent to 20% of currently enrolled students at the university during the first round of data collection, from February 15, 2021 through March 5, 2021. During the second round of data collection, an email was sent to 20% of first-year students to remove any chance for duplication of participants and ran from September 25, 2021, through October 12, 2021. Of the roughly 1,682 emails sent, 169 participants agreed to participate in the study. From those 169 surveys, 90 participants completed both the pre-and post-surveys. Therefore, 5.33% of the potential candidates were included in the study. The average age of participants was 22 years old.

The participants who completed the survey provided demographic information. Demographic characteristics included: gender, age, ethnic group, the highest level of education of the participant, the highest level of education of the participants' mother and father, average household income during childhood, if they had received the influenza vaccine the previous season, and if they had received all childhood vaccines. Of the 90 participants, 20 identified as "Male," 67 as "Female," and three (3) "preferred not to answer." As also reflected in the general university population, 84 respondents reported being white, two identified as Native American or Alaska Native, two more as Asian, one student was Hispanic or Latino, and one preferred not to answer. See Figure 3 below for a breakdown of participants' and parents' education levels.

Education Levels of Participants and Their Parents

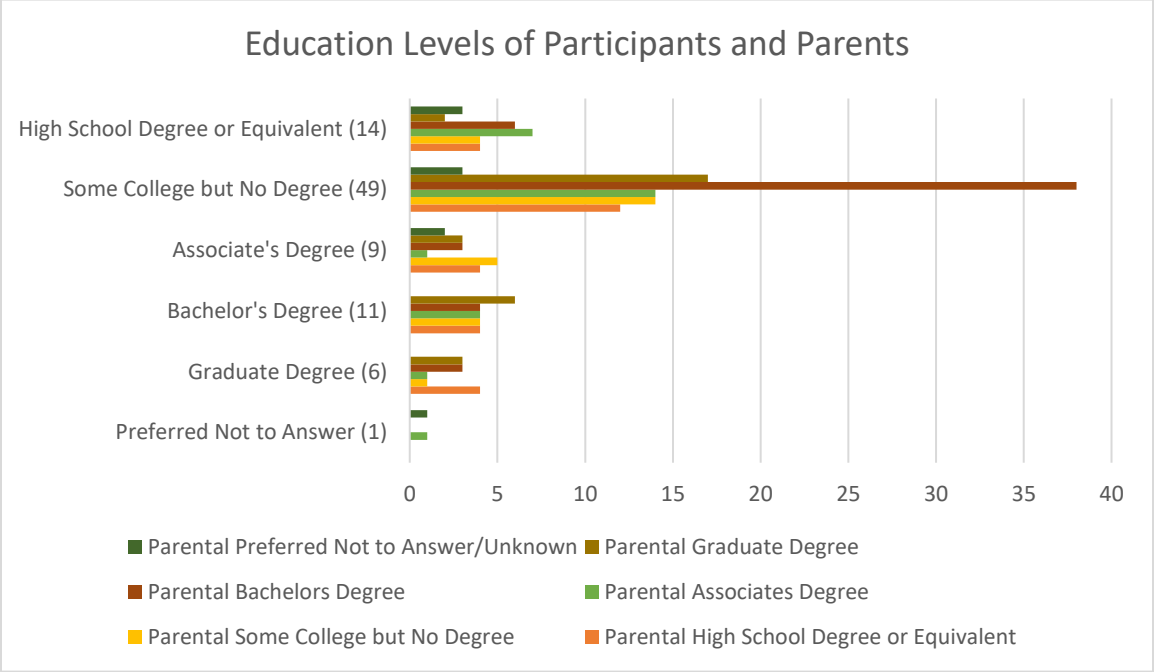


Figure 3. The number of participants for each degree listed is shown in parenthesis. The parental degrees are then further separated and color-coded above.

Descriptive Statistics

A six (6)-point Likert-type scale was used to assess the responses with items ranging from " -strongly disagree" to " -strongly agree". After completing the demographic questions, participants were asked to rate the following statements regarding their knowledge/beliefs about vaccinations:

Table 2

Survey Questions on Influenza Vaccine and Childhood Vaccinations

Survey Item	Question
1	The influenza (flu) vaccine protects me from getting the flu
2	The influenza (flu) vaccine protects me against the different types of flu
3	My faith impacts my decision in receiving the influenza vaccine
4	The cost of the vaccine keeps me from receiving the influenza vaccine
5	I do not receive the influenza vaccine unless it is required
6	The influenza vaccine should only be given to the elderly and children
7	The influenza vaccine gives me the flu
8	I feel knowledgeable about the influenza vaccine
9	I do not feel in danger of contracting the flu
10	The flu is a serious infection
11	Influenza can be deadly in any person
12	Childhood immunizations should be given according to the recommended CDC schedule
13	Childhood immunizations prevent disease
14	Many of the illnesses that childhood immunizations prevent are severe
15	Society and media encourage childhood immunizations
16	Childhood immunizations keep the rest of society safe from diseases
17	Children receive more shots than needed
18	Childhood immunizations have severe side effects
19	Childhood immunizations cause autism
20	All childhood immunizations are safe
21	I am well informed about childhood immunizations
22	If I have children in the future, I will have them immunized

Table 3

Percentage of All Participant's Answers Changed to Agree/Disagree Both Before and After Education

	Before Education		After Education		Desired Response
Question	Disagree	Agree	Disagree	Agree	
Q1	14	86	12	88	Agree
Q2	28	72	18	82	Agree
Q3	90	10	90	10	Disagree
Q4	92	8	95	5	Disagree
Q5	70	30	77	23	Disagree
Q6	85	15	93	7	Disagree
Q7	79	21	88	12	Disagree
Q8	18	82	5	95	Agree
Q9	36	64	38	62	Agree
Q10	19	81	7	93	Agree
Q11	26	74	12	88	Agree
Q12	9	91	10	90	Agree
Q13	4	96	4	96	Agree
Q14	5	95	3	97	Agree
Q15	23	77	37	63	Agree
Q16	8	92	4	96	Agree
Q17	86	14	88	12	Disagree
Q18	86	14	86	14	Disagree
Q19	93	7	94	6	Disagree
Q20	28	72	18	82	Agree
Q21	29	71	13	87	Agree
Q22	3	97	3	97	Agree

When reviewing the data, there is an overall increase in participants' understanding of influenza and childhood vaccines. One point of interest involves questions 9-11. There is a high degree of agreement that the flu is a serious infection (M = 4.97, SD = 1.07) and it can be deadly in any person (M = 4.80, SD = 1.22). However, the level of agreement related to feeling in danger of contracting the flu was noticeably less (M = 3.82, SD = 1.49). This suggests that although a large majority of participants felt that the influenza infection was serious and deadly, fewer felt that they were

personally in danger of catching the flu. This observation correlates with a psychological factor of the HPM or an individual's perceived health status that they are invulnerable to illness (Pender et al., 2006). An individual's perceived health status is one of the many personal factors that can be used to explain or predict a target behavior (Pender et al., 2006).

Table 4

Participant Survey Answers Before Education

Question	M	SD
1. The influenza (flu) vaccine protects me from getting the flu	4.71	1.44
2. The influenza (flu) vaccine protects me against the different types of flu	4.09	1.45
3. My faith impacts my decision in receiving the influenza vaccine	1.68	1.31
4. The cost of the vaccine keeps me from receiving the influenza vaccine	1.69	1.05
5. I do not receive the influenza vaccine unless it is required	2.44	1.71
6. The influenza vaccine should only be given to the elderly and children	2.01	1.36
7. The influenza vaccine gives me the flu	2.18	1.48
8. I feel knowledgeable about the influenza vaccine	4.36	1.33
9. I do not feel in danger of contracting the flu	4.00	1.41
10. The flu is a serious infection	4.46	1.21
11. Influenza can be deadly in any person	4.36	1.43
12. Childhood immunizations should be given according to the recommended CDC schedule	5.12	1.13
13. Childhood immunizations prevent disease	5.24	0.88
14. Many of the illnesses that childhood immunizations prevent are severe	5.31	0.95
15. Society and media encourage childhood immunizations	4.19	1.29
16. Childhood immunizations keep the rest of society safe from disease	5.04	1.19
17. Children receive more shots than needed	2.20	1.23
18. Childhood immunizations have severe side effects	2.13	1.21
19. Childhood immunizations cause autism	1.49	1.07
20. All childhood immunizations are safe	4.24	1.33
21. I am well informed about childhood immunizations	4.21	1.44
22. If I have children in the future, I will have them immunized	5.48	1.01

Note. (N=90). Items were rated on a six-point Likert scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree). Higher means indicate higher levels of agreement.

Table 5

Participant Survey Answers After Education

Question	M	SD
1. The influenza (flu) vaccine protects me from getting the flu	4.98	1.29
2. The influenza (flu) vaccine protects me against the different types of flu	4.56	1.39
3. My faith impacts my decision in receiving the influenza vaccine	1.60	1.20
4. The cost of the vaccine keeps me from receiving the influenza vaccine	1.57	0.89
5. I do not receive the influenza vaccine unless it is required	2.20	1.53
6. The influenza vaccine should only be given to the elderly and children	1.58	0.94
7. The influenza vaccine gives me the flu	1.86	1.35
8. I feel knowledgeable about the influenza vaccine	4.94	0.96
9. I do not feel in danger of contracting the flu	3.82	1.49
10. The flu is a serious infection	4.97	1.07
11. Influenza can be deadly in any person	4.80	1.22
12. Childhood immunizations should be given according to the recommended CDC schedule	5.14	1.29
13. Childhood immunizations prevent disease	5.37	1.01
14. Many of the illnesses that childhood immunizations prevent are severe	5.40	0.92
15. Society and media encourage childhood immunizations	3.89	1.40
16. Childhood immunizations keep the rest of society safe from disease	5.24	1.03
17. Children receive more shots than needed	2.07	1.27
18. Childhood immunizations have severe side effects	2.18	1.30
19. Childhood immunizations cause autism	1.49	1.09
20. All childhood immunizations are safe	4.52	1.33
21. I am well informed about childhood immunizations	4.69	1.17
22. If I have children in the future, I will have them immunized	5.56	0.89

Note. (N=90). Items were rated on a six-point Likert scale ranging from 1 (Strongly Disagree) to 6 (Strongly Agree). Higher means indicate higher levels of agreement.

After education, the mean answer for all questions, with the exception of questions 15 and 19, improved. This improvement does not suggest that answers moved

towards an agree answer as some questions required a disagree response to show understanding. The mean of question 19 (childhood immunizations cause autism) remained the same at 1.49 with the standard deviation increasing from 1.29 to 1.40. This misconception was discussed directly in the education and theoretically should have showed some improvement in the overall answers provided. This lack of improvement correlates with findings by Nyhan & Reifler (2015) suggesting that correcting misperceptions about vaccinations may be ineffective. The mean of question 15 (society and media encourage childhood immunizations) decreased from 4.19 to 3.89 which suggests that after education more participants felt that society and media did not encourage childhood immunizations. The lowest standard deviations, or the least variance among participants was seen in questions 4, 6, 8, 14, and 22. This suggests a majority of participants believe the influenza vaccine should not only be given to the elderly and children, but felt knowledgeable about the vaccine, and cost was not an issue. Evidence further suggests that participants believe childhood immunizations prevent severe illness and would vaccinate their future children.

Question 1: Does the provided education affect the overall understanding of participants in regards to the influenza vaccine and childhood vaccines?

In Figure 4 below, the aggregate survey scores by pre-education, post-education and the pairwise differences for each participant (post-score minus pre-score) are shown. There is a fairly clear decrease in pre- and post-scores, and this is also evident when looking at the score differences box in the plot where the median of the score differences is less than zero. Table 6 below provides numeric summaries of each of these groups.

Differences of Aggregate Survey Scores Pre/Post & Overall

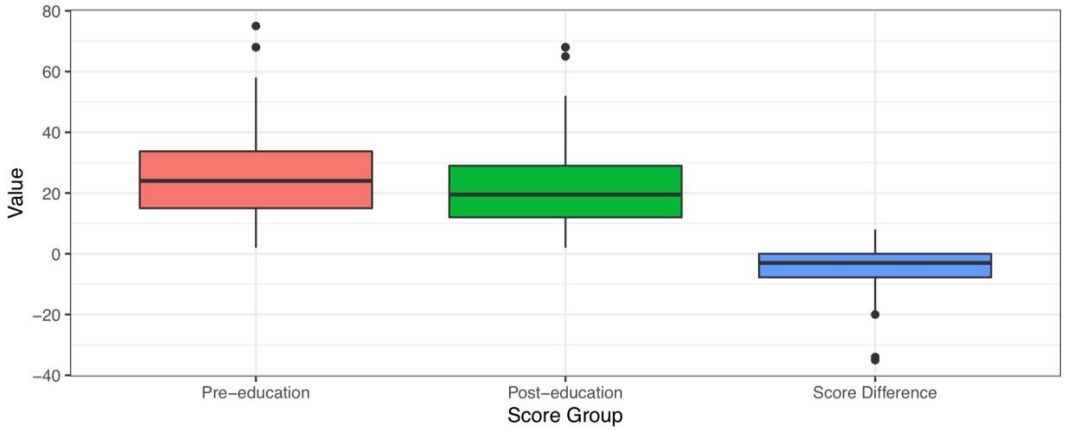


Figure 4. Aggregate scores of all participants prior to education, after education, and the difference between pre-and post-education.

Table 6

Aggregate Survey Score Summaries

Group	Mean	SD	Minimum	First Quartile	Median	Third Quartile	Maximum
Pre-education	26.94	15.09	2	15.00	24.0	33.75	75
Post-education	22.41	14.03	2	12.00	19.5	29.00	68
Score Difference	-4.53	7.21	-35	-7.75	-3.0	0.00	8

For the *t*-test, the assumptions of the test must first be assessed. Those assumptions are independence of observations and normality of observations. For the independence assumption the repeated measures of each participant must be accounted for by using the difference in pre-and post-scores. For normality, we can look at the histogram of the observations below in Figure 5.

Histogram of Aggregate Survey Scores Differences

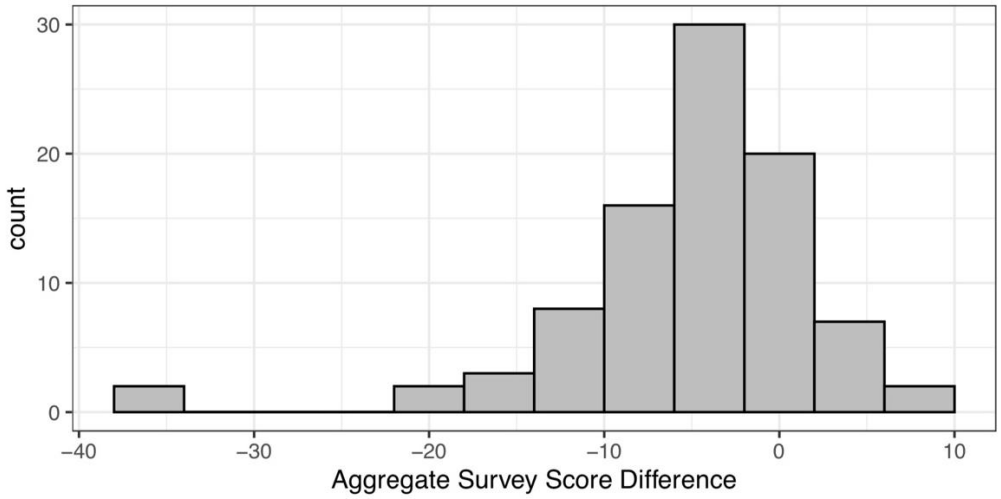


Figure 5. Aside from the few observations between -30 and -40, the bulk of the observations are approximately normally distributed.

In comparing the aggregate survey score differences, the true mean of the differences will be tested to determine if the differences are different from zero (0). This gives the following hypotheses:

- Null hypothesis: The true mean of the differences in aggregate survey scores before and after implementation of the educational video is equal to zero (H_0 : $\mu_{differences} = 0$)
- Alternate hypothesis: The true mean of the differences in aggregate survey scores before and after implementation of the educational video is not equal to zero ($H_A : \mu_{differences} \neq 0$)

Running the *t*-test gives a *t*-statistic of -5.96, with a *p*-value of < 0.0001. Given the small *p*-value, there is evidence to reject the null hypothesis that the true mean of the differences in aggregate survey scores is equal to zero. Alternatively, there is evidence to suggest that the true mean of the differences in aggregate survey scores is not equal to

zero and the implementation of the educational video is associated with a change in the participant's understanding of vaccines.

Question 2: Does an increase in understanding significantly correlate to an increased likelihood of participants subjectively reporting receiving the vaccine?

The use of logistic regression will be used to investigate how understanding and vaccination willingness relate to one another. For this model, the response variable "participants plan on receiving the vaccine this season" will be analyzed using the explanatory variables "aggregate score differences" and "participants vaccination status the previous year". By estimating the effect of these two variables, on the participant's response to receiving the influenza vaccine after participation in the study, the effect of the education and the participants vaccination actions can be observed simultaneously.

Table 7 below represents a breakdown of the participants by having received the previous season's vaccination and their willingness to receive the vaccine after the study. The bottom right corner of Table 7 shows, that of those who received the vaccine the previous season, an overwhelming majority of participants planned to receive the vaccine after the study. This is quite different compared to the proportion of participants who plan to receive the vaccine if they had not been vaccinated the previous season. A total of thirty-four (34) participants provided a response whether they would receive the influenza vaccine or not after participation in this study and were included in this analysis. This differs from the ninety (90) participants who completed both the pre and post-education survey questions from the previous analysis.

Table 7

Breakdown of Previous Season Vaccination Status and Willingness to Vaccinate after Participation in Study

		Will Receive Vaccine After Study	
	All	No	Yes
Total	34	18 (100)	16 (100)
Received Vaccine in Previous Season			
No	25 (73.5)	17 (94.4)	8 (50)
Yes	9 (26.5)	1 (5.6)	8 (50)

When looking at the differences in survey score for participants who reported taking the influenza vaccine after the study, it was observed that the participants who do plan on receiving the vaccine generally have lower aggregate score differences than those who do not plan on receiving the vaccine. However, this difference is not as pronounced as the "participants vaccination status the previous year" explanatory variable.

Differences of Survey Scores by Post-Study Vaccination Plans

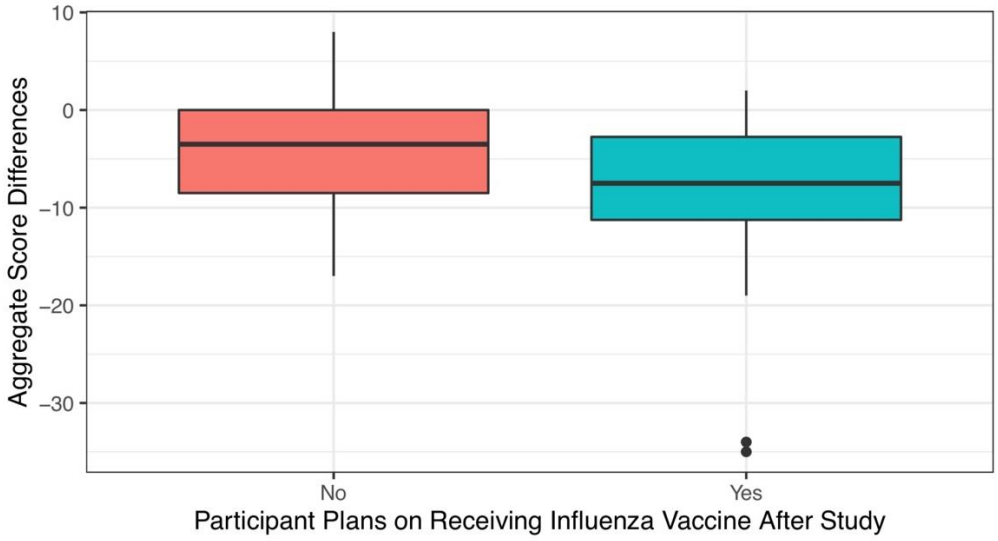


Figure 6. Difference in aggregate score of participants who plan to receive the influenza vaccine after participation in the study versus those who indicate they will not receive the influenza vaccine after participation in the study.

Using logistic regression, *p* values were obtained separately for each of the explanatory variables. For the first variable (previous vaccination status) there is evidence that receiving the vaccine the previous season is associated with an increased likelihood in whether participants will receive the vaccine after the study ($p = 0.009$). There is evidence that the second variable (aggregate score difference) is associated with a difference in participants willingness to receive the vaccine after the study ($p = 0.067$). For lower aggregate score differences there is an increased likelihood of participants receiving the influenza vaccine and for higher aggregate score differences there is a decreased likelihood.

Table 8

Logistic Regression

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-1.585	0.660	-2.402	0.016
'Score Difference'	-0.118	0.064	-1.834	0.067
VaccinePreviousSeasonYes	3.208	1.237	2.594	0.009

Starting with the *VaccinePreviousSeason* variable, the estimated odds of a participant who had received the influenza vaccine in the previous season and plans on receiving the vaccine this season was 2,370% higher than the odds of a participant who did not receive the vaccine in the previous season doing the same. Working from the model coefficients and exponentiating the model coefficient of interest, in this case $e^{3.208} = 24.7$ and then converting that into a percent increase or decrease, (24.7 -1) x 100% = 2,370% (if the subtraction of 1 result is a negative number, then this would be interpreted as a decrease or lower odds). For the *score difference* variable, the estimated odds of a participant planning to receive the vaccine this season are 11% lower ($e^{-0.118} = 0.889$ and (0.889 -1) x 100% = -11%) for each 1-point increase in aggregate score.

Table 9

Breakdown of Participants Vaccinated Previous Season and Intent to Vaccinate for Current Season

Group	Mean Aggregate Score	SD	Minimum	First Quartile	Median	Third Quartile	Maximum
Already Have Vaccine	20.60	10.11	2	14.00	19	25.00	48
Will Not Receive Vaccine	39.39	15.45	16	28.25	38	44.50	68
Will Receive Vaccine	24.25	12.59	9	14.00	23	31.25	58

Question 3: Is there a difference in understanding of those who receive the influenza vaccine and those that don't both prior to and after education?

Since participants were not asked if they were planning on receiving the vaccine this season within the pre-survey, the third question is left looking at responses and unable to test for differences. So, the respondents were split into three groups: those who already have the vaccine (looking at their pre-education scores), those who would not receive the vaccine after the study (using post-education scores), and those who would

receive the vaccine after the study (using pre- and post-education scores). A limitation of this technique is that for the group who will receive the vaccine after the study, there is no way to know if they were planning on getting the vaccine already or if their decision was due to the educational video.

Starting with a summary table of scores (see Figure 7 below), the aggregate score differences for the already planning on receiving the vaccine and will receive the vaccine group are much closer overall than those who will not receive the vaccine after the education. There is an overlap (in aggregate score differences) between the "will receive the vaccine" group and the "will not receive the vaccine" group. Additionally, some respondents in the "already have vaccine" group had aggregate scores within the same range as those in the "will not receive the vaccine" group. The aggregate score differences were used in an attempt to show that a difference in scores correlates in a difference in choice to vaccinate. These overlapping aggregate scores imply that while we do see a difference in average scores between these three groups, similar scores in each group suggest that their views are not fully captured by the survey or there is a missing element to a participant's choice to vaccinate. Simplified, similar aggregate score differences suggest that individuals in these different groups possess the same understanding/knowledge about vaccines but their choice to vaccinate differs.

Aggregate Survey Scores of Respondents by Vaccination Status and Plans

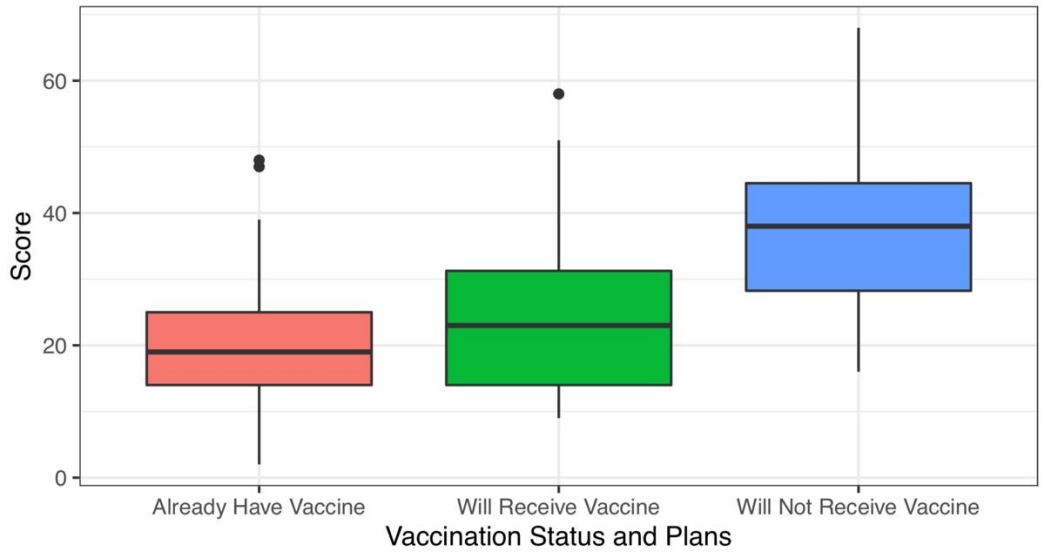


Figure 7. Aggregate scores are broken down by participants' previous vaccination status and intent to vaccinate after participation in the study.

Open-Ended Survey Comments

Along with the quantitative data collected throughout the study, open-ended survey comments were also collected and reviewed. Four comment sections were available for participants to openly express how they felt about the influenza vaccine, childhood vaccines, vaccines in general, and any other comments they wished to provide. Of the comments that were provided, most were positive, with participants believing that immunization against the flu was necessary to prevent the spread of the infection. However, comments regarding the influenza vaccine varied as some felt it was either unnecessary for themselves or held the continued misconception that they contracted the flu due to receiving the influenza vaccine, which correlates with previous studies on vaccination beliefs (Benjamin & Bahr, 2016; Czyz et al, 2019; Rogers, Bahr, & Benjamin, 2018). The majority of comments indicate that participants felt that childhood

immunizations were necessary and protected society against severe diseases. The two most common concerns that participants commented upon regarded childhood immunizations and the number of immunizations given simultaneously or the timing of the CDC schedule. Other comments listed COVID-19 as a source of distrust among the public, a catalyst to the anti-vax movement, and further reason to question the safety and efficacy of all vaccines. Appendix J contains all comments from participants.

Discussion

This DNP scholarly project aimed to evaluate the effect that providing education to college-aged students had on their willingness to receive the influenza vaccine. This study had similar qualitative results as Czyz et al. (2019), with most participants perceiving influenza as a serious and deadly infection; however, most did not feel in danger of contracting the influenza virus themselves. While data collected suggests that most students believe that vaccines are safe and effective, 73% of participants had not received the prior year's influenza vaccine. Improvement or understanding allows individuals to make a more educated decision surrounding vaccines, potentially leading to increased vaccination rates (Benjamin, & Bahr, 2016; Czyz et al., 2019). The following three questions attempted to address this concept of increasing understanding to increase vaccine compliance.

Question 1: Does the provided education affect the overall understanding of participants in regards to the influenza vaccine and childhood vaccines?

With the small observed *p*-value for the *t*-test, there is strong evidence to claim that the true mean of the differences in aggregate survey scores is not equal to zero. This data shows evidence suggests that viewing the educational video is associated with a change

in the participant's understanding of vaccinations. The video may have impacted viewers' beliefs in vaccination and affected the participants' overall knowledge of influenza and childhood vaccines.

Question 2: Does an increase in understanding significantly correlate to an increased likelihood of receiving the vaccine?

Both of the explanatory variables investigated (having previously received the vaccine and viewing an educational video) had at least moderate evidence of an association with the response variable or participant's plan to receive the influenza vaccine after the study. The model estimated that those participants who received the vaccine the previous season had much higher odds of receiving the vaccine for the current season. Additionally, it was estimated that as the participants' aggregate score differences between pre-and post-scores increased (disagreed with more of the survey after the education), the odds of receiving the vaccine for the current season decreased. Overall, there were observable differences in the estimated odds participants would plan on receiving the influenza vaccine for the current season depending on these two explanatory variables.

Question 3: Is there a difference in understanding of those who receive the influenza vaccine and those that don't both prior to and after education?

Unfortunately, design flaws in the survey made it difficult to summarize the results for this question. However, based on the numerical and graphical summary of this data, there does seem to be a difference in understanding of those who choose to receive the vaccine and those who don't.

The results from this project suggest that education has the potential to improve the competence and overall positive perception of individuals surrounding the influenza

vaccine. The HPM is a competence-or approach-oriented model that does not include fear or threat as a source of motivation, as this is ineffective with children, youths, and young adults, who perceive themselves as invulnerable to illness (Pender et al., 2006). Pender's framework states that perceived benefits of action, perceived barriers to action, and perceived self-efficacy are considered to have motivational significance as they are subject to change through nursing action (Pender et al., 2006). Providing education primarily targets both the perceived benefits and the perceived barriers of Pender's HPM to create a more positive attitude towards vaccinations. The results of this DNP scholarly project align with Pender's framework by demonstrating the power of education to positively impact an individual's perception of the influenza vaccine. Health-promoting behavior can improve personal and community health while removing barriers and shedding light on potential benefits. Pender's framework claims that there is an interplay of the different individual characteristics and behavior-specific cognitions with improvement in one or multiple areas increasing the commitment to a health promoting action (Pender et al., 2006). This project reveals a similar result when analyzing the before and after education data as improvement in survey questions denotes increasing efficacy and removal of perceived barriers surrounding vaccination. Although it was not confirmed, 16 of the 34 participants who were not previously immunized expressed their intent to vaccinate against influenza after participation in the study.

Strengths and Limitations

This project's strengths included using simple random sampling and email to generate participants who felt that they could provide truthful feedback as no identifiable data was collected. The educational video was also viewed as a strength. It synthesized

data from research articles into a colorful and interesting 10-minute video designed to engage the viewers' attention. This project adds to the body of nursing knowledge related to education to increase the acceptance of vaccines among college students. Pender's health promotion model was a strength, as its framework is designed to explain behavior and improve an individual's commitment to health through education or the removal of barriers and misconceptions by a trusted healthcare professional.

The limitations of this project include:

- A non-experimental design
- The small sample size is due to the short duration of data collection
- Restrictions were placed by the university on the number of individuals that could be contacted to participate in the study
- The use of a survey that was not tested for either reliability or validity
- The emergence of COVID-19 which disrupted design and collection activities

Future studies should increase the number of students who receive an invitation to join the study by participating in first-year orientation. Increasing the number of participants would allow researchers to touch base with every first-year college student, providing them with information to make an informed healthcare decision during their college experience. Also, research would benefit from further insight into how young adults consider and approach their health care/self-care living without a parent/guardian present. The novel virus COVID-19 global pandemic also impacted the ability to quickly and easily communicate throughout the college campus, challenging as well as limiting the amount of face-to-face contact with students. The COVID-19 pandemic also affected individuals' intent to vaccinate as studies showed a decrease in scheduled vaccinations

either due to fear or quarantine restrictions (SeyedAlinaghi et al., 2021). Due to the nature of the project design, researcher-induced bias was also identified as a potential limitation as participants may have felt inadvertently pressured to provide a "better" answer after education was viewed (Terry, 2018). A final limitation was the inability to track the number of students who participated in the study and then received the influenza vaccine. This would require prior education of campus healthcare workers and an additional form to be filled out by the campus clinic with no guarantee that students would not use an off-campus vaccination clinic.

Implications for Practice

The inferences derived from this scholarly project provided adequate statistically significant evidence to support giving education to college-aged students to increase understanding of a yearly influenza vaccine. The project could not conclusively prove that an increase in vaccination rates was attained after project implementation, as no data was collected on rates of distributed influenza vaccines. To summarize, the small sample size in this project limited the power of the study; however, this did not limit its ability to obtain statistical significance. Considering that the college population has an increased risk of communicable disease exposure, exploring avenues to ensure a healthy population with readily available vaccines through on-campus health fairs and facilities is pertinent. The anecdotal evidence in this study, combined with the low cost, minimal time taken to complete, and absence of risk factors about education, indicates that if campuses implement vaccine education during first-year orientation, this could potentially increase compliance with approved vaccinations.

Recommendations for Future Research

Future researchers are encouraged to conduct this study using larger sample sizes across multiple campuses, multiple periods, during influenza season, and throughout the year. Researchers should also assess the impact education has on participants by providing education to half of the participants to evaluate the understanding of those who receive education and those who do not. College campuses are challenging to collect data and conduct a study due to the nature of college-aged students and their willingness to participate in a study. For this reason, it may be prudent for researchers to offer a chance for financial gains by participating in the study to boost numbers and diversify the "type" of students willing to provide data for a study. Participation in first-year orientation could improve participation numbers and the overall vaccination knowledge of incoming first-year students.

Conclusion

This DNP scholarly project aimed to evaluate whether an educational intervention would increase participants' willingness to receive the influenza vaccination. Without the random assignment of the educational video to some participants, there is not enough evidence to say that the educational video caused any changes in the students' understanding of or perspective on vaccines. However, the educational video was associated with changes in knowledge or views of vaccines. While reviewing the distribution of survey item responses, specific trends were noted both before and after education, with most participants selecting ratings closer to the desired answers about immunization information and beliefs after education was provided. This project discusses the power education holds, with results indicating an increased understanding

and acceptance of the influenza vaccination. Future research examining the effectiveness of education to increase vaccination coverage among college students would be worthwhile. Additional studies may yield even greater positive outcomes regarding national vaccination perceptions, goals, and follow-through.

References

Abbas, K. M., Kang, G. J., Chen, D., Were, S. R., & Marathe, A. (2018). Demographics, perceptions, and socioeconomic factors affecting influenza vaccination among adults in the United States. *PeerJ, 6,* 1-18. https://doi.org/10.7717/peerj.5171

Alberti, T. (2021). Influenza. In T. Buttaro, P. Polgar-Bailey, J. Sandberg-Cook, & J. Trybulski (Eds.), *Primarycare: Interprofessional collaborative practice* (6th ed.)(pp. 1287-1290). St. Louis, MO: Elsevier.

Arriola, C., Garg, S., Anderson, E. J., Ryan, P. A., George, A., Zansky, S. M., … Chaves, S. S. (2017). Influenza vaccination modifies disease severity among community-dwelling adults hospitalized with influenza. *Clinical Infectious Diseases, 65*(8), 1289-1297. https://doi.org/10.1093/cid/cix468

Bekkat-Kerkani, R., & Romano-Mazzotti, L. (2018). Understanding the unique characteristics of seasonal influenza illness to improve vaccine uptake in the US. *Vaccine, 36*(48), 7276-7285. https://doi.org/10.1016/j.vaccine.2018.10.027

Benjamin, S. M. & Bahr, K. O. (2016). Barriers associated with seasonal influenza vaccination among college students. *Influenza Research and Treatment, 2016,* 1-5. http://doi.org/10.1155/2016/4248071

Centers for Disease Control and Prevention. (2022). *Influenza (flu).* Retrieved February 12, 2021, from https://www.cdc.gov/flu/fluvaxview/dashboard /vaccination-dashboard.html

Centers for Disease Control and Prevention. (2021). *Vaccine effectiveness: How well do the flu vaccines work?* Retrieved May 16, 2021, from https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm

Chen, W., & Stoecker, C. (2020). Mass media coverage and influenza vaccine uptake. *Vaccine, 38,* 271-277. https://doi.org/10.1016/j.vaccine.2019.10.019

Cvjetkovic, S. J., Jeremic, V. L., & Tiosavljevic, D. V. (2017). Knowledge and attitudes toward vaccination: A survey of Serbian students. *Journal of Infection and Public Health, 10*(5), 649-656. https://doi.org/10.1016/j.jiph.2017.05.008

Czyz, S. E., Miller, J. Y., Muniz, H. M., Abraham, S. P., & Gillum, D. R. (2019). College students' perceptions of influenza vaccination and childhood immunizations. *International Journal of Studies in Nursing, 4*(2) 66-75. https://doi.org/10.20849/ijsn.v4i2.582

de St. Maurice, A., Martin-Blais, R., & Halasa, N. (2021). Preparing for the 2020-2021 influenza season. *Pediatric Transplantation, 25*(5), 1-8. https://doi.org10.1111/petr.1402

Ferdinands, J. M., Thompson, M. G., Blanton, L., Spencer, S., Grant, L., & Fry, A. M. (2021). Does influenza vaccination attenuate the severity of breakthrough infections? A narrative review and recommendations for further research. *Vaccine, 39*(28), 3678-3695. https://doi.org10.1016/j.vaccine.2021.05.011

Fineout-Overholt, E., Long, L. E., & Gallagher-Ford, L. (2019). Integration of patient preferences and values and clinician expertise into evidence-based decision making. In B. Melnyk & E. Fineout-Overholt (Eds.), *Evidence-based practice in nursing and healthcare: A guide to best practice* (219-232)(4th ed.). Philadelphia, PA: Wolters Kluwer

Fairbanks, T. (2020, August 11). *Influenza presentation* [Video file]. Retrieved from https://www.youtube.com/watch?v=AplKUnXgs-Q

Foradori, D. M., Sampayo, E. M., Fanny, S. A., Namireddy, M. K., Kumar, A. M. & Lo, H. (2020). Improving influenza vaccination in hospitalized children with asthma. *Pediatrics, 145*(3), 1-9. https://doi.org/10.1542/peds.2019-1735

Heavey, E. (2019). Chi-square is there a difference? In E. Heavey (Eds.), *Statistics for nursing: A practical approach* (3rd ed.)(pp. 127-143). Burlington, MA: Jones & Bartlett Learning.

Hussain, A., Ali, S., Ahmed, M., & Hussain, S. (2018). The anti-vaccination movement: A regression in modern medicine. *Cureus, 10*(7), 1-8. https://doi.org/10.7759/cureus.2919

Kini, A., Morgan, R., Kuo, H., Shea, P., Shapiro, J., Leng, S. X.,… Klein, S. L. (2022). Differences and disparities in seasonal influenza vaccine, acceptance, adverse reactions, and coverage by age, sex, gender, and race. *Vaccine, 40*(11), 1643-1654. https://doi.org10.1016/j.vaccine.2021.04.013

Kortum, P., Edwards, C. & Richards-Kortum, R. (2008). The impact of inaccurate internet health information in a secondary school learning environment. *Journal of Medical Internet Research, 10*(2), 1-22. https://doi.org/10.2196/jmir.986

Li, C. & Freedman, M. (2009). Seasonal influenza: An overview. *The Journal of School Nursing, 25*(1), 1-7. https://doi.org/10.1177/1059840508330066

Lutz, C. S., Fink, R. V., Cloud, A. J., Stevenson, J., Kim, D., & Fiebelkorn, A. P. (2020). Factors associated with perceptions of influenza vaccine safety and effectiveness among adults, United States, 2017-2018. *Vaccine, 38*(6), 1393-1401. https://doi.org/10.1016/j.vaccine.2019.12.004

Luz, P. M., Johnson, R. E., & Brown, H. E. (2017). Workplace availability, risk group and perceived barriers predictive of 2016-17 influenza vaccine uptake in the United States: A cross-sectional study. *Vaccine, 35*(43), 5890-5896. https://doi.org/10.1016/j.vaccine.2017.08.078

MacDonald, N. E. (2015). Vaccine hesitancy: Definition, scope and determinants. *Vaccine, 33*(34), 4161-4164. https://doi.org/10.1016/j.vaccine.2015.04.036

Murphy, S. L., Kochanek, K. D., Xu, J., & Arias, E. (2021). Mortality in the United States, 2020. Retrieved July 21, 2022, from the Centers for Disease Control and Prevention website: https://www.cdc.gov/nchs/products/databriefs/db427.htm

National Conference of State Legislatures. (2022). *States with religious and philosophical exemptions from school immunization requirements.* Retrieved June 15, 2021, from https://www.ncsl.org/research/health/school-immunization-exemption-state-laws.aspx

Nyhan, B., & Reifler, J. (2014). Does correcting myths about the flu vaccine work? An experimental evaluation of the effects of corrective information. *Vaccine, 33*(3), 459-464. https://doi.org/10.1016/j.vaccine.2014.11.017

Office of Disease Prevention and Health Promotion. (n.d.). *Healthy people 2020: Immunization and infectious diseases*. Retrieved, October 5, 2021, from https://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases

Papachrisanthou, M. M., & Davis, R. L. (2019). The resurgence of measles, mumps, and pertussis. *The Journal for Nurse Practitioners, 15*(6), 391-395. https://doi.org/10.1016/j.nurpra.2018.12.028

Pender, N. J. (1996). The health promotion model. In N. Pender (Eds.), *Health promotion in nursing practice* (3rd ed.)(pp. 51-75). Stamford, CT: Appleton & Lange

Pender, N. J., Murdaugh, C. L., & Parsons, M. A. (2006). Individual models to promote health behavior. In N. Pender, C. Murdaugh, & M. Parsons (Eds.), *Health promotion in nursing practice* (5th ed.)(pp. 35-73). Upper Saddle River, NJ: Pearson Education

R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/

Ratnapradipa, K. L., Norrenberns, R., Turner, J. A., & Kunerth, A. (2017). Freshman flu vaccination behavior and intention during a nonpandemic season. *Health Promotion Practice, 18*(5), 662-671. https://doi.org/10.1177/1524839917712731

Rogers, C. J., Bahr, K. O., & Benjamin, S. M. (2018). Attitudes and barriers associated with seasonal influenza vaccination uptake among public health students; a cross-sectional study. *BMC Public Health, 18*(1), 1-8. https://doi.org/10.1186/s12889-018-6041-1

Royal, K. (2016). "Face validity" is not a legitimate type of validity evidence! *The American Journal of Surgery, 212*(5), 1026-1027. https://doi.org/10.1016/j.amjsurg.2016.02.018

Sagor, K. H., & AlAteeq, M. A. (2018). Beliefs, attitudes, and barriers associated with the uptake of the seasonal influenza vaccine among patients visiting primary healthcare clinics. *Saudi Medical Journal, 39*(7), 690-696. https://doi.org/10.15537/smj.2018.7.22293

Sakraida, T. J. (2014) Nola J. Pender: Health promotion model. In M. Alligood. (Eds.), *Nursing theorists and their work* (pp. 396-416). St. Louis, MO: Elsevier.

Schmid, P., Rauber, D., Betsch, C., Lidolt, G., & Denker, M.-L. (2017). Barriers of influenza vaccination intention and behavior – A systematic review of influenza vaccine hesitancy, 2005-2016. *PLoS ONE, 12*(1), 1-46. https://doi.org/10.1371/journal.pone.0170550

SeyedAlinaghi, S., Karimi, A., Mojdeganlou, H., Alilou, S., Seyed, P. M., Noori, T., . . . Sabatier, J. (2022). Impact of COVID-19 pandemic on routine vaccination coverage of children and adolescents: A systematic review. *Health Science Reports, 5*(2), 1-8. https://doi.org/10.1002/hsr2.516

Taubenberger, J. K., & Morens, D. M. (2008). The pathology of influenza virus infections. *Annual Review of Pathology, 3*(1), 499-522. https://doi.org/10.1146/annurev.pathmechdis.3.121806.154316

Terry, A. J. (2018). Designing a clinically based qualitative capstone research project. In A. Terry. (Eds.), *Clinical research for the doctor of nursing practice* (3rd ed.)(pp. 87-100). Burlington, MA: Jones & Bartlett Learning

Thompson, M. G., Pierse, N., Huang, Q. S., Prasad, N., Duque, J., Newbern, E. C.,… McArthur, C. (2018). Influenza vaccine effectiveness in preventing influenza-associated intensive care admissions and attenuating severe disease among adults in New Zealand 2012-2015. *Vaccine*, *36*(39), 5916-5925. https://doi.org10.1016/j.vaccine.2018.07.028

Torner, N., Martínez, A., Basile, L., Mosquera, M., Antón, A., Rius, C., … Jané, M. (2018). Descriptive study of severe hospitalized cases of laboratory-confirmed influenza during five epidemic seasons (2010-2015). *BMC Research Notes, 11*(244), 1-6. https://doi.org/10.1186/s13104-018-3349-y

WebMD. (2019). *What are the rules of vaccine exemptions?* Retrieved August 23, 2021, from https://www.webmd.com/children/vaccines/what-are-the-rules-on-vaccine-exemptions

Wickham et al., (2019). Welcome to the tidyverse. Journal of Open Source Software, 4(43), 1686, https://doi.org/10.21105/joss.01686

World Health Organization [WHO]. (n.d.). *Ten threats to global health in 2019*. Retrieved December 16, 2020, from https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019

Zingg, A., & Siegrist, M. (2012). Measuring people's knowledge about vaccination: Developing a one-dimensional scale. *Vaccine, 39*(25), 3771-3777. https://doi.org/10.1016/j.vaccine.2012.03.014

Appendix A

Modified College Student's Perception of Influenza Vaccine and Childhood Immunizations

Demographics

1. Gender: Male Female Prefer not to answer
2. Ethnicity: White Hispanic or Latino Black or African American Asian Pacific Islander Native American Prefer not to answer
3. Age: 18-20 21-23 24-27 28-30 >30 Prefer not to answer
4. What is the highest level of school you have completed or the highest degree you have received? Less than high school degree High school degree or equivalent Some college but no degree Associate degree Bachelor degree Graduate degree Prefer not to answer
5. What is the highest level of school your Father has completed or the highest degree he has received? Less than high school degree High school degree or equivalent Some college but no degree Associate degree Bachelor degree Graduate degree Unknown Prefer not to answer
6. What is the highest level of school your Mother has completed or the highest degree he has received? Less than high school degree High school degree or equivalent Some college but no degree Associate degree Bachelor degree Graduate degree Unknown Prefer not to answer

7. Growing up what was the average household income in your family?

   $0 - $10,000 $10,000 - $25,000 $25,000 - $50,000 $50,000 - $75,000

   >$100,000 Prefer not to answer

8. Did you receive the influenza vaccine during the previous season?: Yes No

   Unsure Prefer not to answer

9. Have you received the recommended childhood vaccinations? Yes No

   Unsure Prefer not to answer

Please indicate the level to which you agree or disagree with each statement. There are no right answers.

Perception of Influenza Vaccine	**Strongly Disagree (1)**	**Disagree (2)**	**Somewhat disagree (3)**	**Somewhat agree (4)**	**Agree (5)**	**Strongly Agree (6)**
1The influenza (flu) vaccine protects me from getting the flu.	SD	D	SWD	SWA	A	SA
2. The influenza (flu) vaccine protects me against the different types of flu.	SD	D	SWD	SWA	A	SA
3. My faith impacts my decision in receiving the influenza vaccine.	SD	D	SWD	SWA	A	SA
4. The cost of the vaccine keeps me from receiving the influenza vaccine.	SD	D	SWD	SWA	A	SA
5. I do not receive the influenza vaccine unless it is required.	SD	D	SWD	SWA	A	SA

6. The influenza vaccine should only be given to the elderly and children.	SD	D	SWD	SWA	A	SA
7. The influenza vaccine gives me the flu.	SD	D	SWD	SWA	A	SA
8. I feel knowledgeable about the influenza vaccine.	SD	D	SWD	SWA	A	SA
9. I do not feel in danger of contracting the flu.	SD	D	SWD	SWA	A	SA
10. The flu is a serious infection.	SD	D	SWD	SWA	A	SA
11. Influenza can be deadly in any person.	SD	D	SWD	SWA	A	SA
Perception of Childhood Immunizations	**Strongly Disagree**	**Disagree**	**Somewhat disagree**	**Somewhat agree**	**Agree**	**Strongly Agree**
12. Childhood immunizations should be given according to the recommended CDC schedule.	SD	D	SWD	SWA	A	SA
13. Childhood immunizations prevent disease.	SD	D	SWD	SWA	A	SA
14. Many of the illnesses that childhood immunizations prevent are severe.	SD	D	SWD	SWA	A	SA
15. Society and media encourage childhood immunizations.	SD	D	SWD	SWA	A	SA

16. Childhood immunizations keep the rest of society safe from diseases.	SD	D	SWD	SWA	A	SA
7. Children receive more shots than needed.	SD	D	SWD	SWA	A	SA
18. Childhood immunizations have severe side effects.	SD	D	SWD	SWA	A	SA
19. Childhood immunizations cause autism.	SD	D	SWD	SWA	A	SA
20. All childhood immunizations are safe.	SD	D	SWD	SWA	A	SA
21. I am well informed about childhood immunizations.	SD	D	SWD	SWA	A	SA
22. If I have children in the future, I will have them immunized.	SD	D	SWD	SWA	A	SA

What do you believe about the influenza vaccination?

What do you believe about childhood immunizations?

Any other beliefs about vaccinations in general?

Have you already received the influenza vaccine for THIS flu season?
Yes No Prefer not to answer

Do you intend to receive the influenza vaccine after participating in this study?
Yes No Prefer not to answer

Appendix B

College Student's Perception of Influenza Vaccine and Childhood Immunizations

Demographics

10. Gender: Male Female

11. Age: 18-20 21-23 24-27

12. Class: Freshman Sophomore Junior Senior

13. Race/Ethnicity: White Hispanic or Latino Black or African American Asian Pacific Islander Native American Other

14. Have you received the influenza vaccine within this past year?: Yes No

15. Have you received all the recommended childhood/adult immunizations? Yes No

If not please note which ones not received: _____

Please circle one item for each statement based on your agreement. Do not leave anything blank.

Perception of Influenza Vaccine	**Strongly Disagree (1)**	**Disagree (2)**	**Somewhat disagree (3)**	**Somewhat agree (4)**	**Agree (5)**	**Strongly Agree (6)**
1The influenza (flu) vaccine protects me from getting the flu.	SD	D	SWD	SWA	A	SA
2. The influenza (flu) vaccine protects me against the different types of flu.	SD	D	SWD	SWA	A	SA
3. My faith impacts my decision in receiving the influenza vaccine.	SD	D	SWD	SWA	A	SA

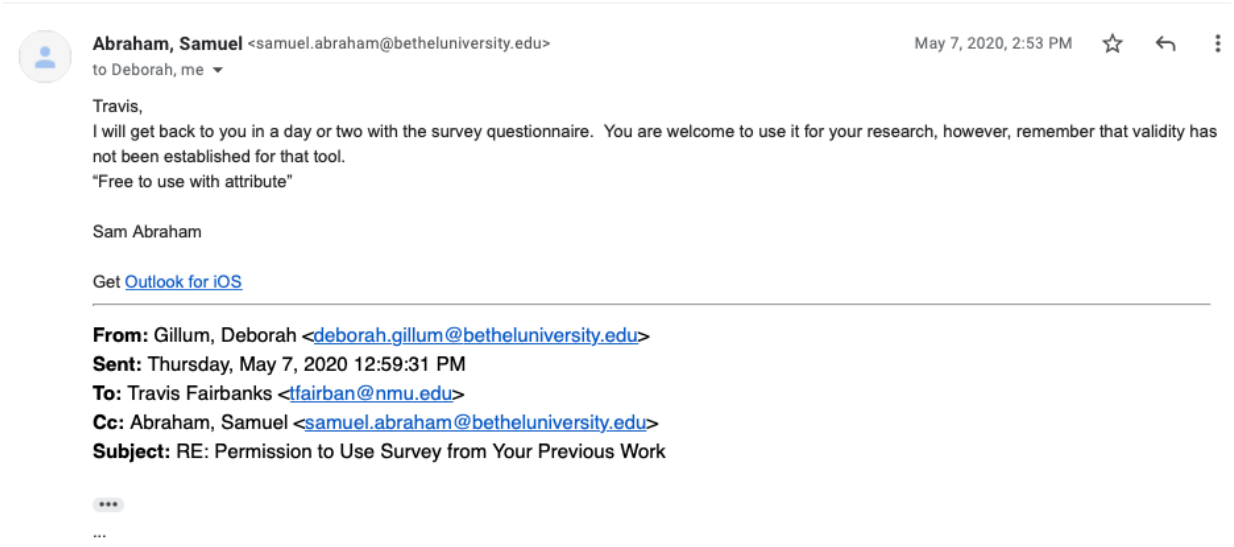
4. The cost of the vaccine keeps me from receiving the influenza vaccine.	SD	D	SWD	SWA	A	SA
5. I do not receive the influenza vaccine unless it is required.	SD	D	SWD	SWA	A	SA
6. The influenza vaccine should only be given to the elderly and children.	SD	D	SWD	SWA	A	SA
7. The influenza vaccine gives me the flu.	SD	D	SWD	SWA	A	SA
8. I feel knowledgeable about the influenza vaccine.	SD	D	SWD	SWA	A	SA
9. I do not feel in danger of contracting the flu.	SD	D	SWD	SWA	A	SA
10. The flu is a serious infection.	SD	D	SWD	SWA	A	SA
11. Influenza can be deadly in any person.	SD	D	SWD	SWA	A	SA
Perception of Childhood Immunizations	**Strongly Disagree**	**Disagree**	**Somewhat disagree**	**Somewhat agree**	**Agree**	**Strongly Agree**
12. Childhood immunizations should be given according to the recommended CDC schedule.	SD	D	SWD	SWA	A	SA
13. Childhood immunizations prevent disease.	SD	D	SWD	SWA	A	SA

14. Many of the illnesses that childhood immunizations prevent are severe.	SD	D	SWD	SWA	A	SA
15. Society and media encourage childhood immunizations.	SD	D	SWD	SWA	A	SA
16. Childhood immunizations keep the rest of society safe from diseases.	SD	D	SWD	SWA	A	SA
7. Children receive more shots than needed.	SD	D	SWD	SWA	A	SA
18. Childhood immunizations have severe side effects.	SD	D	SWD	SWA	A	SA
19. Childhood immunizations cause autism.	SD	D	SWD	SWA	A	SA
20. All childhood immunizations are safe.	SD	D	SWD	SWA	A	SA
21. I am well informed about childhood immunizations.	SD	D	SWD	SWA	A	SA
22. If I have children in the future, I will have them immunized.	SD	D	SWD	SWA	A	SA

What do you believe about the influenza vaccination?

What do you believe about childhood immunizations?

Appendix C



Abraham, Samuel <samuel.abraham@betheluniversity.edu> May 7, 2020, 2:53 PM

to Deborah, me

Travis,
I will get back to you in a day or two with the survey questionnaire. You are welcome to use it for your research, however, remember that validity has not been established for that tool.
"Free to use with attribute"

Sam Abraham

Get Outlook for iOS

From: Gillum, Deborah <deborah.gillum@betheluniversity.edu>
Sent: Thursday, May 7, 2020 12:59:31 PM
To: Travis Fairbanks <tfairban@nmu.edu>
Cc: Abraham, Samuel <samuel.abraham@betheluniversity.edu>
Subject: RE: Permission to Use Survey from Your Previous Work

...

Appendix D

Memorandum

TO:
Travis Fairbanks
School of Nursing

CC:
Kristen Smith
School of Nursing

FROM:
Lisa Schade Eckert
Dean of Graduate Studies and Research

DATE:
July 24th, 2020

SUBJECT:
IRB Proposal HS20-1136

"Effects of Education on Correcting Misconceptions and Acceptance of the Influenza Vaccination Among a College Campus."

IRB Approval Date: 7/23/2020
Proposed Project Dates: 6/01/2020 – 2/01/2021

Your proposal "Effects of Education on Correcting Misconceptions and Acceptance of the Influenza Vaccination Among a College Campus." has been approved by the Northern Michigan University Institutional Review Board. Please include your proposal number (HS20-1136) on all research materials and on any correspondence regarding this project.

If you find that modifications of investigators, methods, or procedures are necessary, you must submit a Project Modification Form for Research Involving Human Subjects before collecting data. Any changes or revisions to your approved research plan must be approved by the IRB prior to implementation.

Appendix E

NORTHERN MICHIGAN UNIVERSITY

Graduate Studies and Research
Marquette, MI 49855-5301
906-227-2300
www.nmu.edu/graduatestudies/

MEMORANDUM

To: Travis Fairbanks
Kristen Smith
Nursing Department

Date: December 1, 2020

From: Lisa Schade Eckert, Ph.D
Dean of Graduate Studies and Research

Your mass email request for HS20-1136, " Effects of Education on Correcting Misconceptions and Acceptance of the Influenza Vaccination Among a College Campus" has been approved by the Dean of Graduate Studies and Research to be sent to 20% of the NMU undergraduate population.

If you have an email list, you may send your mass email to those on the list.

If you need to send to a specified group of potential participants that you do not have email address for, you will need to use the NMU ePostal system. Only faculty and staff members are able to use the ePostal system. The intended recipients and email message can be specified in the EPostal submission.

Information about and instructions for using the EPostal system and the contact information for the survey distributor in the Business Intelligence Office can be viewed here: https://www.nmu.edu/informationtechnology/e-postal-email-services.

NORTHERN MICHIGAN UNIVERSITY

Graduate Studies and Research
Marquette, MI 49855-5301
906-227-2300
www.nmu.edu/graduatestudies/

MEMORANDUM

To: Kristen Smith
Travis Fairbanks
Nursing Department

Date: September 23, 2021

From: Lisa Schade Eckert
Dean of Graduate Studies and Research

Project Title: Effects of Education on Correcting Misconceptions and Acceptance of the Influenza Vaccination Among a College Campus

Proposed Send Date: September 2021

Your mass email request related to IRB protocol HS20-1136, "Effects of Education on Correcting Misconceptions and Acceptance of the Influenza Vaccination Among a College Campus" has been approved by the Dean of Graduate Studies and Research to be sent to 20% of NMU freshmen.

If you have an email list, you may send your mass email to those on the list.

If you need to send to a specified group of potential participants that you do not have email address for, you will need to use the NMU ePostal system. Only faculty and staff members are able to use the ePostal system. The intended recipients and email message can be specified in the EPostal submission.

Please note that all consent forms approved by the IRB must be available with the email send.

Information about and instructions for using the EPostal system and the contact information for the survey distributor in the Business Intelligence Office can be viewed here: https://www.nmu.edu/informationtechnology/e-postal-email-services

Appendix F

My name is Travis Fairbanks and I am working on my degree in the Doctor of Nursing Practice program here at NMU. As part of our program, we contribute to the overall health of our community by doing research and implementing changes to move healthcare in a more positive direction.

My project focuses on the influenza vaccine and dispelling myths that surround this controversial topic. I am asking you to please participate. To complete, you will just click the link below. You will be directed to take a survey, watch a short video, and then complete a few follow-up questions. Your participation is optional but I would be very appreciative if you could help me! Information gathered will not be linked to you in any way and all data will be used to improve the impact of vaccinations on local community health.

Thank you in advance for your time and I truly appreciate any feedback you are willing to provide.

Please follow the link to take the survey.

https://nmu.qualtrics.com/jfe/form/SV_8HNt5P5Oiq5v64Z

If there are any problems or if you have questions, please contact me at tfairban@nmu.edu

Appendix G

We are asking you to take this survey in order to understand the variables an individual may possess which would account for their refusal of certain vaccinations as well as the effectiveness of education on an individual's willingness to receive a vaccine.
If you agree to participate, we would like you to complete a survey, watch a 10-minute educational video on influenza and then complete a shorter portion of the survey.
It will take you approximately 15-20 minutes total to participate in this study.
Your part in this study is anonymous. That means that your answers to all questions are private. No one else can know if you participated in this study and no one else can find out what your answers were. Any reports will be based on group data and will not identify you or any individual as being in this project.
There are no known risks from being in this study, and you will not benefit personally. However, we hope that others may benefit in the future from what we learn as a result of this study.
Completing this survey is completely voluntary. If you decide not to be in this study, or if you stop participating at any time, you won't' be penalized or lose any benefits for which you otherwise qualify.
Any questions you have regarding the nature of this research project will be answered by the principal researcher who can be contacted as follows: Dr. Kristen Smith (906-227-2790) krsmith@nmu.edu, Travis Fairbanks tfairban@nmu.edu or Dr. Lisa Eckart of the Human Subjects Research Review Committee of Northern Michigan University (906-227-2300) leckart@nmu.edu.

- ○ Yes - I consent
- ○ No - I do NOT consent
- ○ I am not 18 years of age

Appendix H

Hello and welcome! I am so glad that you able to join me today and I appreciate you taking time out of your busy schedule to learn a little bit more about influenza. My name is Travis Fairbanks and during this video I want to touch on some basic aspects of the influenza virus, the importance of the flu vaccine, and some myths that have surrounded the vaccines in general.

Influenza, or the flu, has three different types which I have depicted with these viruses here. A type A, a type B, and a type C and on their surfaces they have proteins which help the virus enter and exit the host cells and as you can see here type A and B contain the H and N protein and the type C contains the F protein. Now there are many variations of these proteins so they are further subdivided by a number. You may remember that the H1N1 virus that everyone talked about. All this simply meant was that the virus contains the H protein 1 and the N protein 1 or the H3N2 virus which has the H protein 3 and the N protein 2.

Influenza type A, more specifically the H3N2 virus and the H1N1 virus, are the most common Type A viruses in circulation. Both of which can infect humans as well as some animals.

Influenza type B is less common than type A and it does not mutate as often which is good news for our immune system. Influenza type B does contain the H and N proteins, however there are only a few variations that only have the ability to infect humans.

Lastly, we have influenza type C which is the least common among the influenza viruses and is least likely to mutate. Influenza C has the ability to infect not only humans, which can cause a mild illness in children, but also pigs. Influenza C also contains that F protein on its surface which differs from the H and N proteins but, it still accomplishes the same task of entering and exiting the host cells

Now Type A causes the most severe form of the flu. During replication the flu virus can create genetic copies of itself but it can also create daughter cells whose H or N protein is slightly different from the parent virus. These small changes to the surface proteins of the virus is enough to evade the immunity that our bodies had developed to a previous infection and makes us sick. This process is called genetic drift and is the reason why there is a need for a seasonal influenza vaccine.

Another process the flu uses to evade the host immunity is called antigenic shift. Here we have a pig cell and on one side is a typical pig virus that we will call H2N2 and it mainly infects pig hosts. On the other side we have another influenza virus, lets call H3N4, and this one usually infects human hosts. But as we discussed before some viruses can infect both human and animals. Now both of these flu viruses are going to inject their RNA into the pig cell. This RNA then mixes together in what's known as reassortment and it creates an entirely new virus that contains parts from both the pig virus and the human virus. Unlike genetic drift which only changes the H and N protein slightly antigenic shift creates an entirely new H or N protein.

Antigenic shift is a problem because when the new virus that was created comes into contact with humans we have little to no protection against this new form and with little to no protection we end up getting sick. And depending how easily the disease is transmitted from person to person it may not take long for an entire community to become ill. Antigenic shift is responsible for the major influenza pandemics in the past. One of the worst pandemics was the Spanish influenza of 1918. This disease was the result of antigenic shift, infected over 500 million people worldwide and within that year there were 50 million deaths with many believing that this is a low estimate.

Now influenza can travel a distance of about 6 feet through the air when someone coughs or sneezes. These droplets contain the virus and can land in the eyes nose or mouth of another person as well as be inhaled. The particles that don't land on an unlucky victim can still land and survive for some time in the environment such as on a door knob and then be picked up by another person. If that person then touches their eyes or mouth before washing their hands the virus can get into their system and they get sick

Influenza symptoms typically begin between 1-4 days after catching the flu. However, you are contagious to everyone around you 1 day before you show symptoms as well as 1-2 weeks after your symptoms have improved. So even though you feel fine you can still pass the disease on to anyone around you. Symptoms can range from a headache runny nose, sore throat and a cough to more severe life threatening complications which I won't be covering in this presentation. Symptoms will begin to improve after about a week but

a cough can persist for about 2 weeks and remember that is one of the main mechanisms by which this disease can be spread.

Herd immunity is the idea that if enough people in your community are immune to or vaccinated against a disease it will have nowhere to go. So let's pretend that everyone able to receive the flu vaccine does. This excludes those under 6 months of age, people with life threatening reactions to the vaccine, and those who are immunocompromised due to a chronic condition. The flu virus will not be able to work its way into this community and those not vaccinated will benefit from the protection provided by the rest of the community. Now let's pretend that some of the individuals in this community choose not to vaccinate. Here the virus is able to get into the community but there are still enough people vaccinated that it cannot infect the entire community and those who can't receive the vaccine are protected as well as some of the individuals who chose not to get vaccinated. Finally let's assume that the trend of choosing not vaccinate continues. Here the virus is able to infect all those who did not receive the vaccine and those who were at higher risk of influenza complications succumb to the virus and could potentially die.

Now we know that the best tools to prevent the influenza virus is through vaccinations. The vaccine comes in a couple different forms. There's a trivalent inactivated influenza vaccine which is a destroyed or killed virus that is injected into a muscle. The live attenuated influenza vaccine is a weakened virus that is usually sprayed into the nose. And finally, there is a recombinant influenza vaccine which uses a single gene from the virus to activate our immune system. None of these vaccines have the ability to cause the

influenza disease. The trivalent in the first one simply means that there is a combination of three potential viruses for the upcoming flu season. Scientists use data from around the world to make a best guess for which three viruses will go into the vaccine for that flu season.

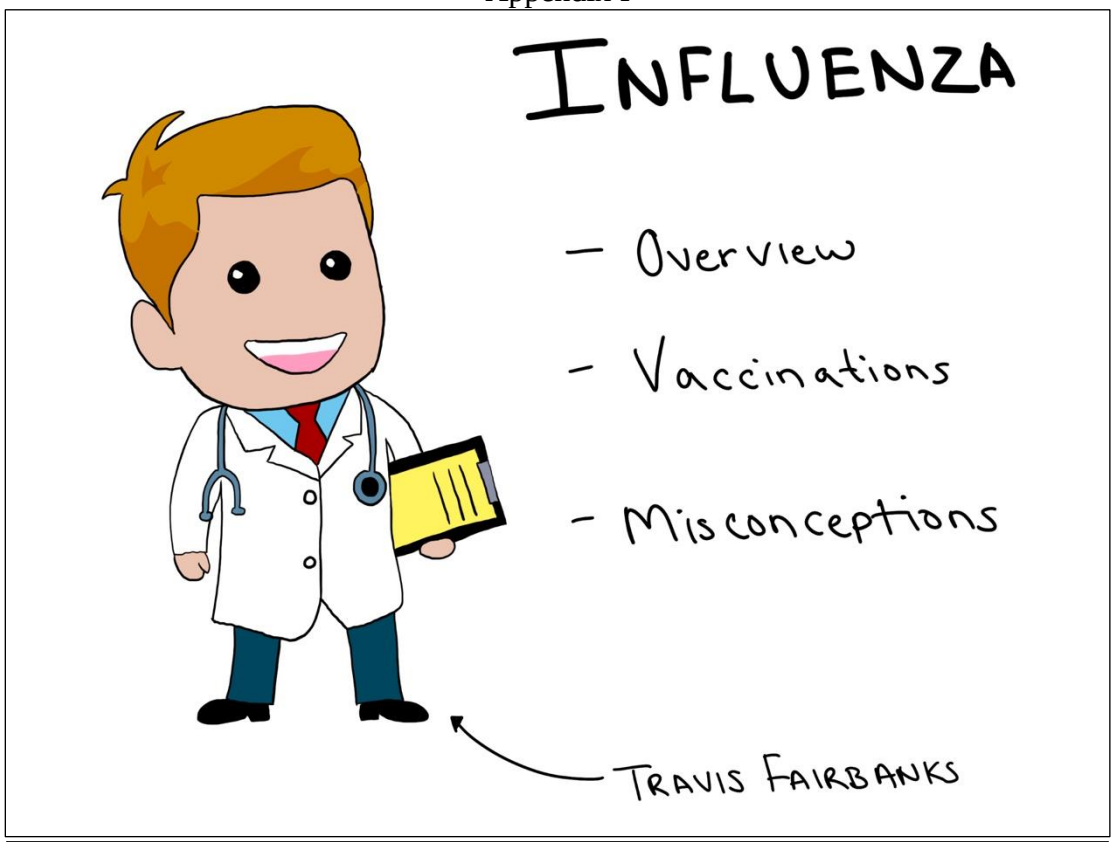
Alright vaccination risks. The virus is grown in an egg protein so those with an allergy to eggs can potentially have a reaction to the vaccine. Side effects to the vaccine are typically very mild with the biggest complaint being soreness, redness, and pain around the injection site. Other symptoms can include low grade fever, headache, and muscle aches which are not a response to the flu virus but side effects to your immune system doing its job. The nasal spray can also cause a runny nose, wheezing, vomiting, sore throat and a cough. All of these symptoms are considered less severe than the symptoms you would experience with the flu.

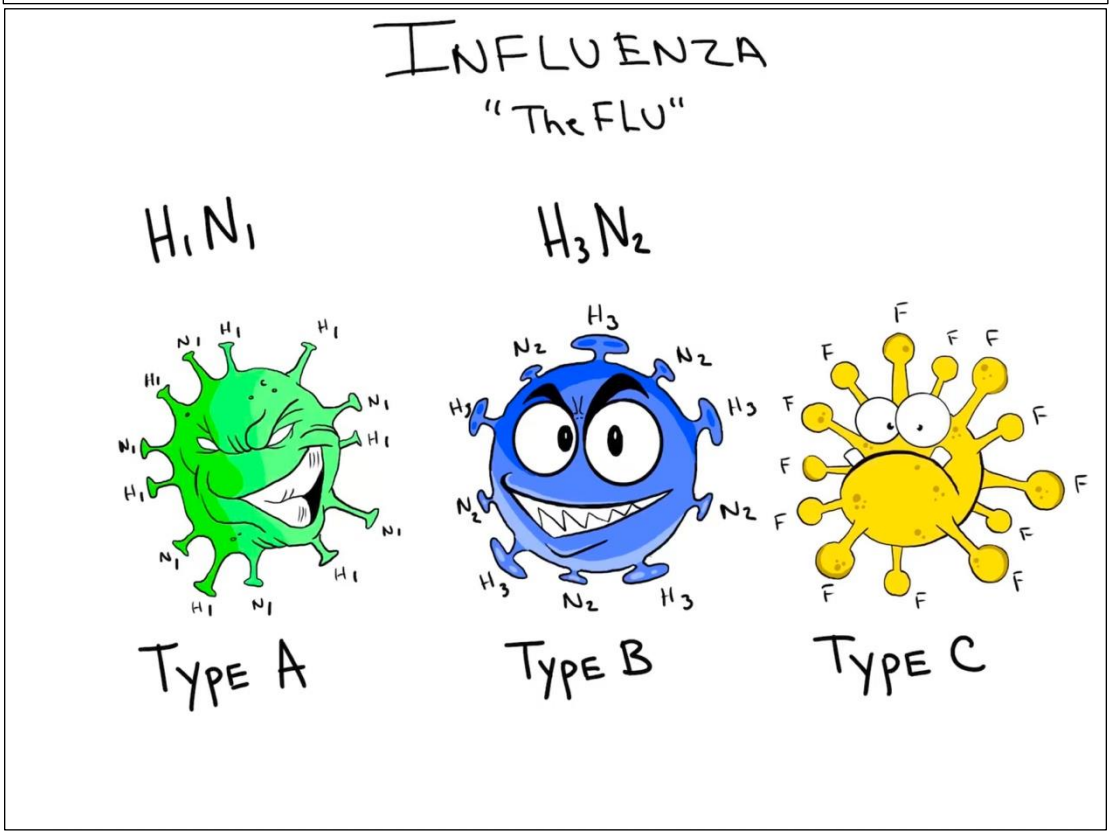
Many misconceptions surround the influenza vaccine or vaccines in general. First one being that flu shots don't really work. This is untrue as they are proven to prevent hospitalizations and severe complications from the flu as well as preventing death from influenza complications. Next one. Healthy people don't need a flu shot. You may not be at high risk for complications but you come into contact with people every day who are. Possibly a parent, a grandparent or even a friend. If I get the flu I can treat it with antibiotics. Antibiotics are good for bacterial infections; the flu is a virus. Vaccinations continue to be the best line of defense against the flu. Finally, vaccines give you autism. Now I've heard this debate repeatedly and I'm here to tell you that this is a media driven

myth. The study that was conducted in 1998 looking into this found, and I quote, “we did not prove an association between MMR vaccine and the syndrome describe” end quote. However, the media ran the story repeatedly to the point that it became a fact to many people. Multiple repeat studies have been conducted with none showing an association. Just pointing out, speak with your health care provider about your health as they will be a great source of knowledge and resources.

Thank you again for your time. I hope you took something positive away from this presentation. Continue to stay safe, stay healthy, and consider vaccinating against the flu, not only to protect your own health but also to reduce the burden placed on the healthcare industry during the COVID 19 pandemic.

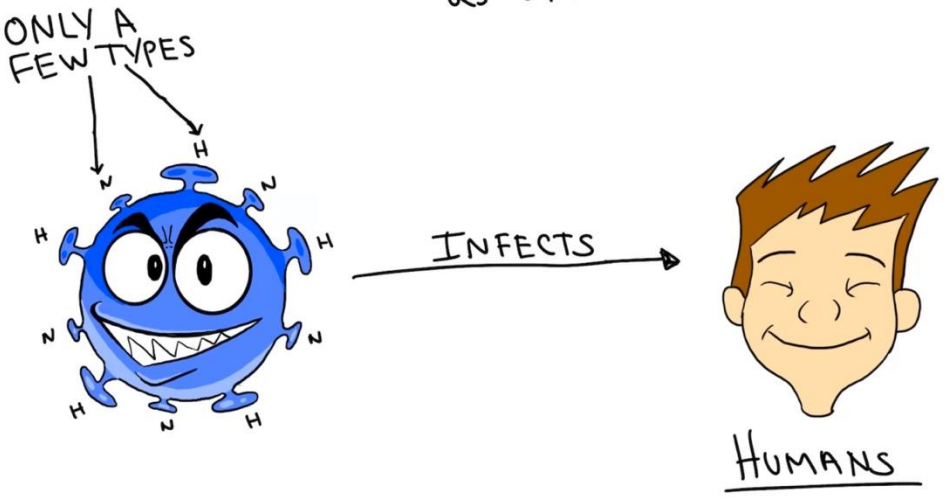
Appendix I


INFLUENZA
- Overview
- Vaccinations
- Misconceptions
TRAVIS FAIRBANKS


INFLUENZA
"The FLU"
H1N1
H3N2
Type A
Type B
Type C

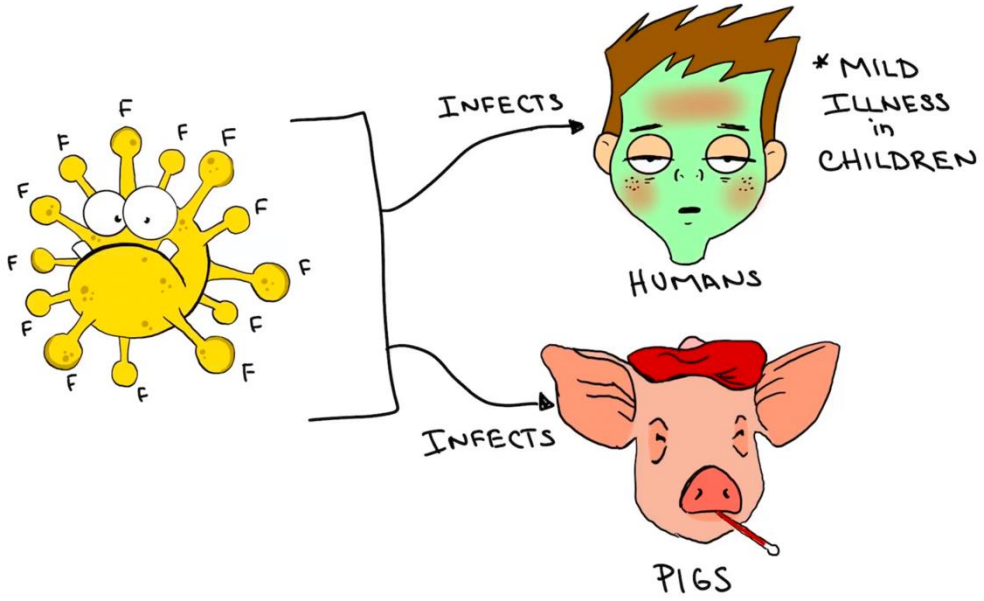
TYPE B (LESS COMMON)

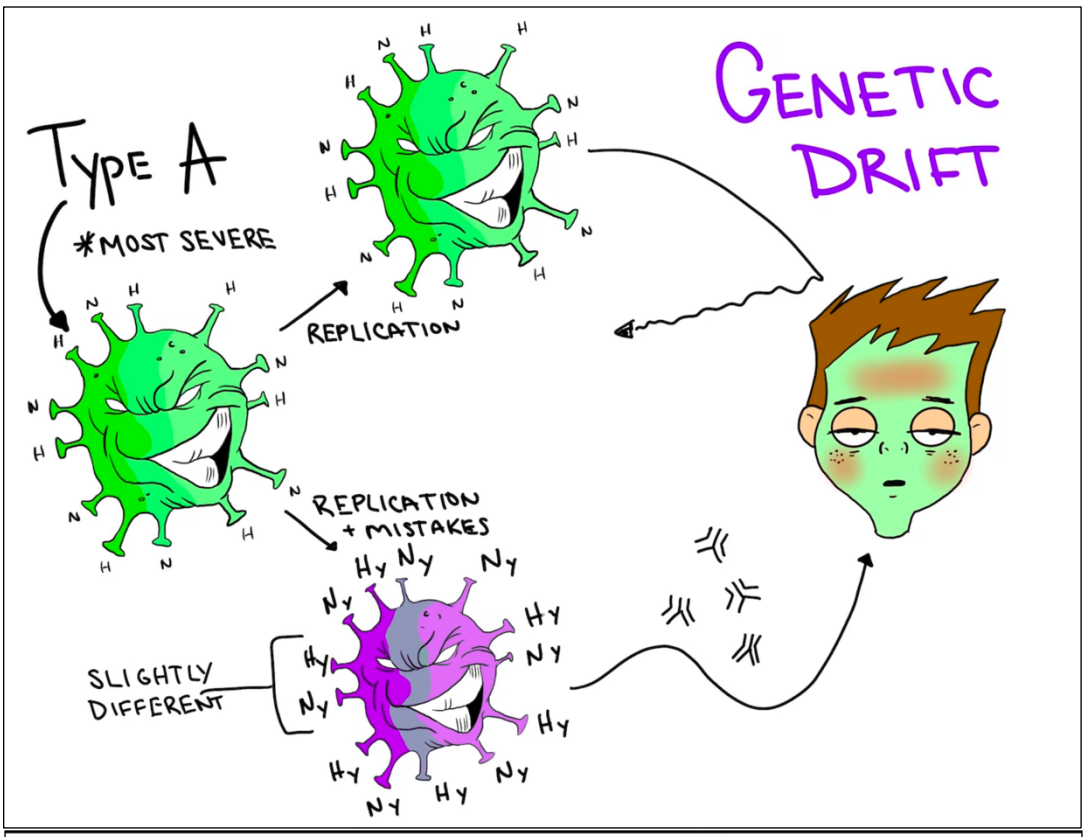
* Doesn't mutate as often

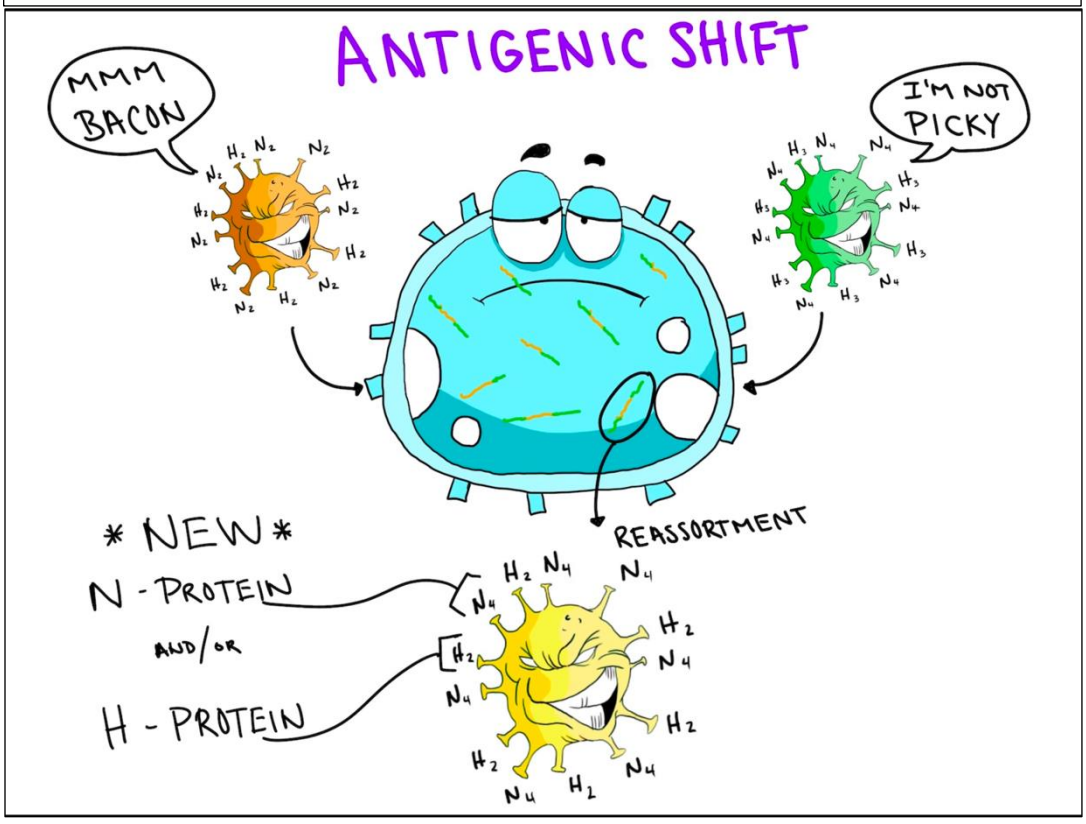


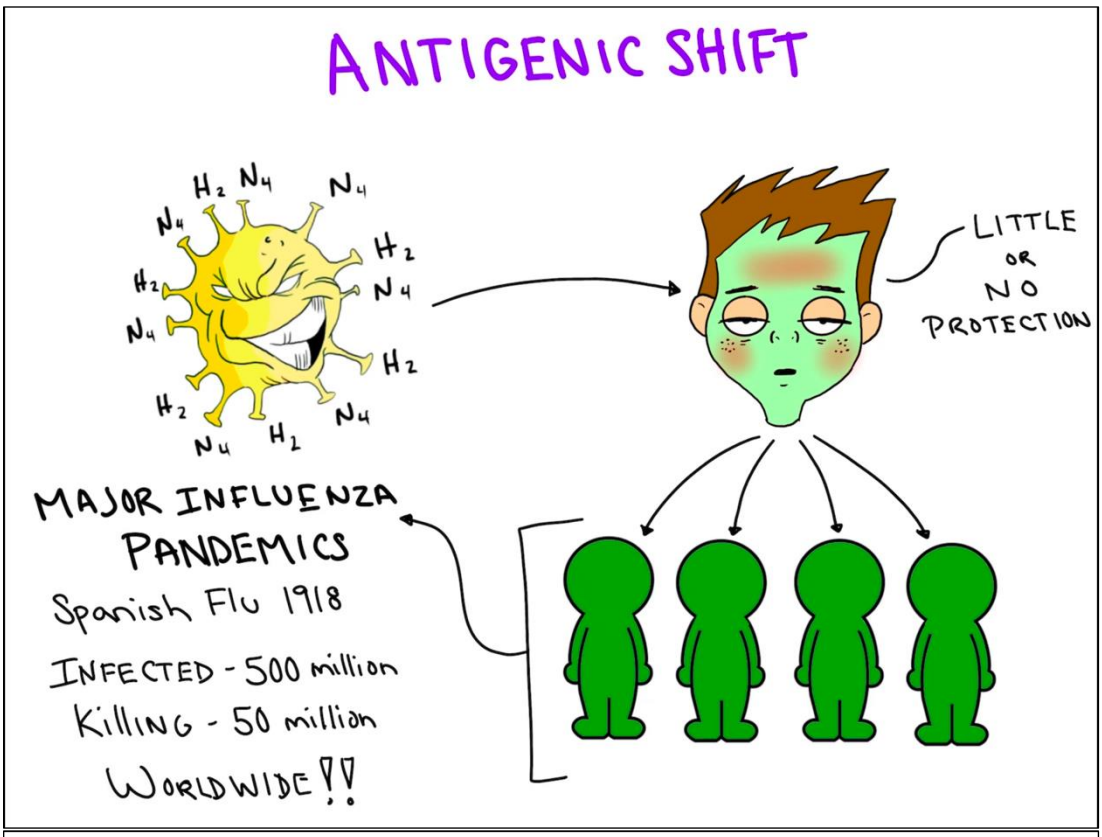
TYPE C

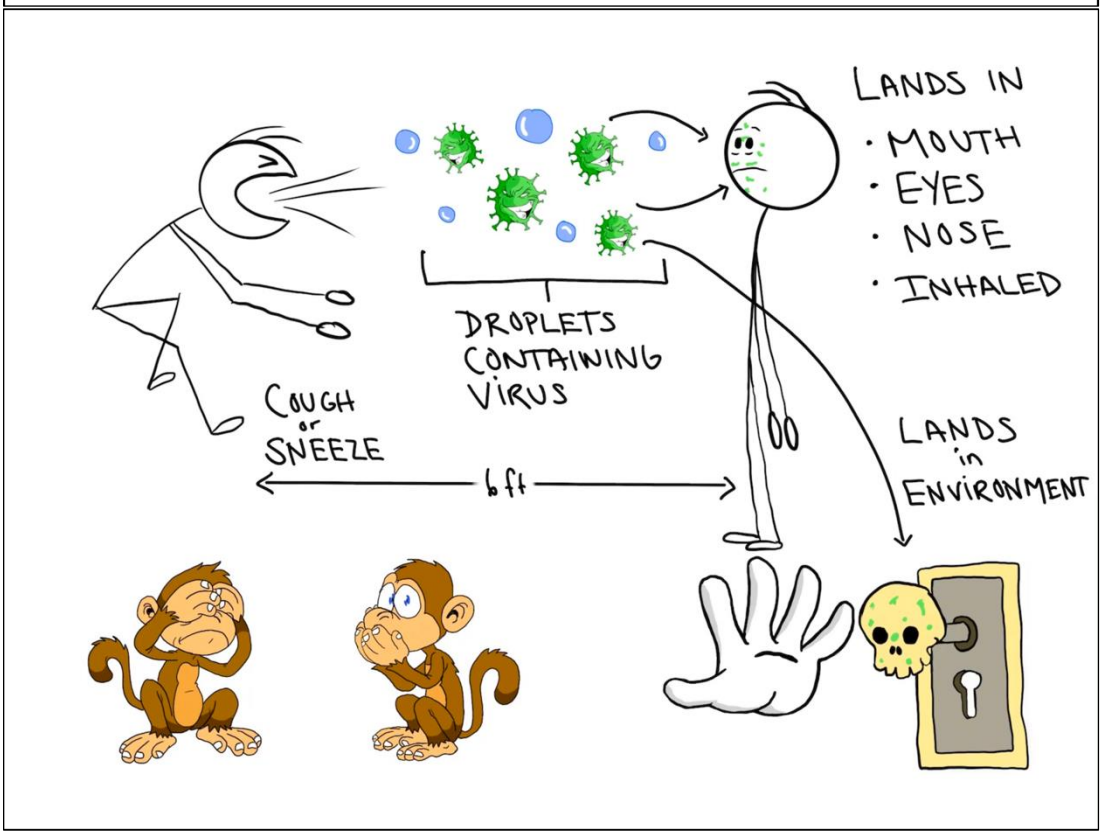
- LEAST COMMON
- LEAST LIKELY TO MUTATE

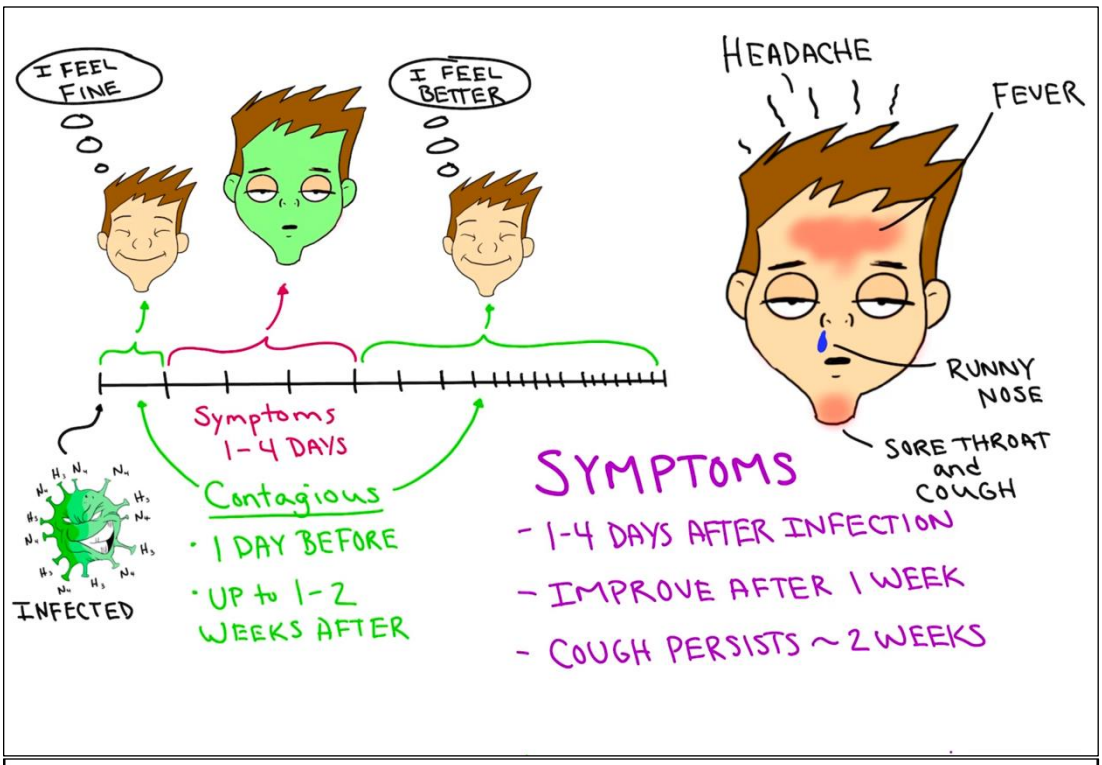


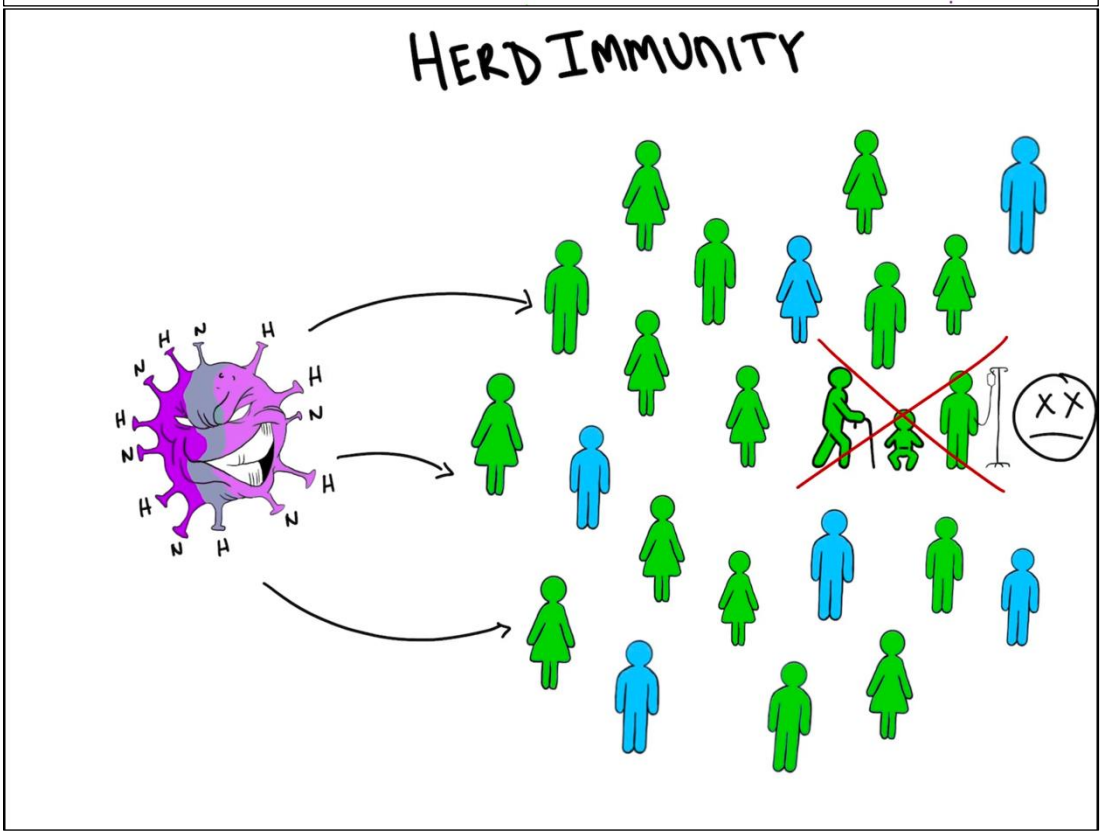

GENETIC DRIFT
TYPE A
*MOST SEVERE
REPLICATION
REPLICATION + MISTAKES
SLIGHTLY DIFFERENT


ANTIGENIC SHIFT
MMM BACON
I'M NOT PICKY
REASSORTMENT
* NEW *
N - PROTEIN
AND/OR
H - PROTEIN


ANTIGENIC SHIFT
H2 N4
N4
N4
H2
H2
N4
H2
N4
H2
N4
N4
H1
LITTLE OR NO PROTECTION
MAJOR INFLUENZA PANDEMICS
Spanish Flu 1918
INFECTED - 500 million
Killing - 50 million
WORLDWIDE!!

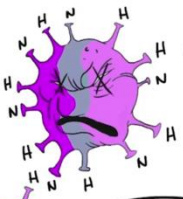

LANDS IN
· MOUTH
· EYES
· NOSE
· INHALED
DROPLETS CONTAINING VIRUS
COUGH or SNEEZE
6 ft
LANDS in ENVIRONMENT


I FEEL FINE
I FEEL BETTER
Symptoms 1-4 DAYS
Contagious
• 1 DAY BEFORE
• UP to 1-2 WEEKS AFTER
INFECTED
HEADACHE
FEVER
RUNNY NOSE
SORE THROAT and COUGH
SYMPTOMS
- 1-4 DAYS AFTER INFECTION
- IMPROVE AFTER 1 WEEK
- COUGH PERSISTS ~ 2 WEEKS


HERD IMMUNITY

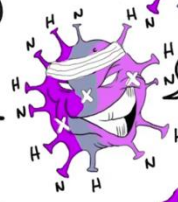
PREVENTION ~ VACCINATION

* TRIVALENT INACTIVATED INFLUENZA VACCINE (TIV) or (IIV)



"KILLED" VIRUS injected into MUSCLE

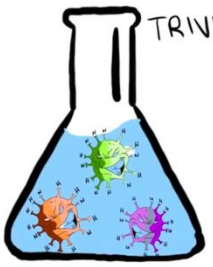
* LIVE ATTENUATED INFLUENZA VACCINE (LAIV)

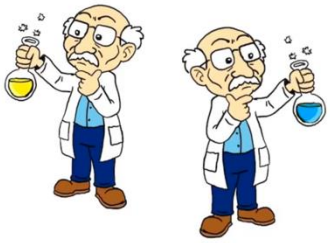


"WEAKENED" VIRUS sprayed into NOSE

* RECOMBINAT INFLUENZA VACCINE (RIV)

USING A SINGLE GENE from the VIRUS





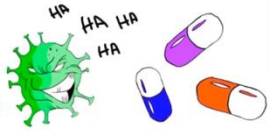
NONE OF WHICH CAUSE the FLU DISEASE

MISCONCEPTIONS

* FLU SHOTS DON'T REALLY WORK
  - PREVENT HOSPITALIZATION and SEVERE COMPLICATIONS from the FLU as well as DEATH

THANK YOU!!

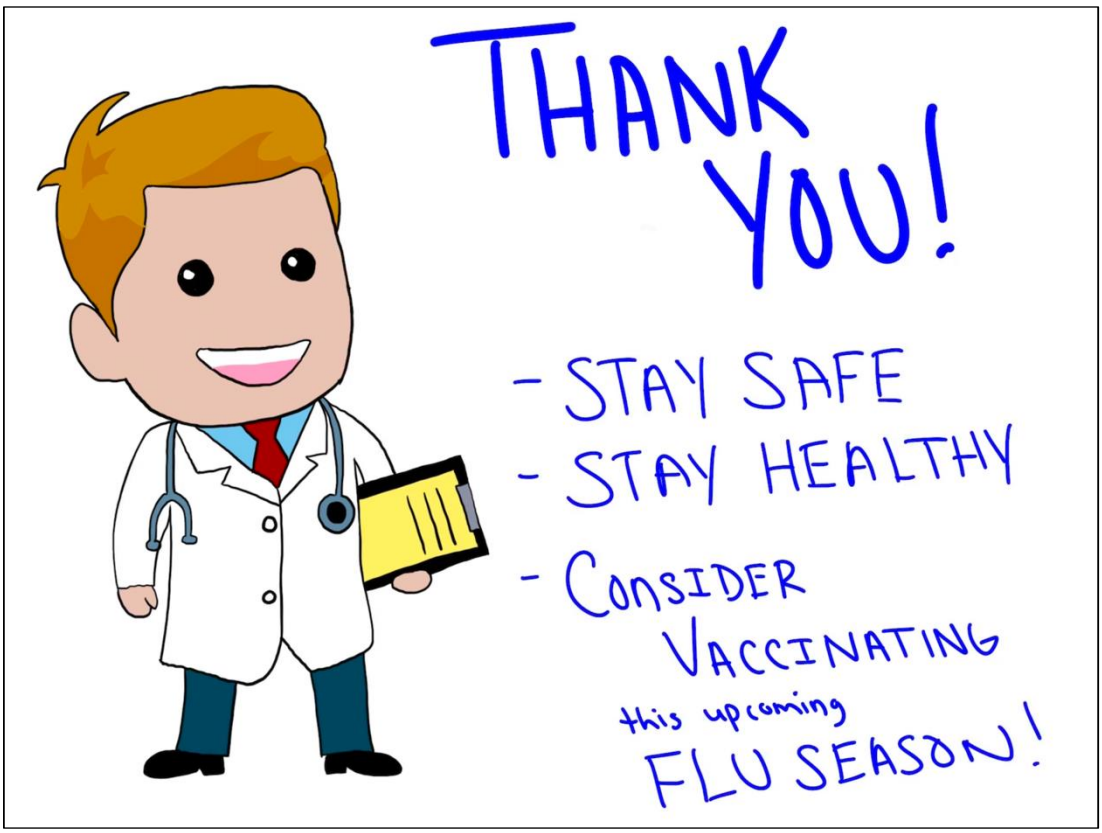
* HEALTHY PEOPLE DON'T NEED A FLU SHOT
  - YOU MAY NOT BE AT RISK FOR COMPLICATIONS BUT YOU COME INTO CONTACT WITH PEOPLE WHO ARE



* IF I GET THE FLU I CAN TREAT IT WITH ANTIBIOTICS
  - ANTIBIOTICS ARE GOOD FOR BACTERIAL INFECTIONS THE FLU is a VIRUS.

* VACCINES GIVE YOU AUTISM
  - MEDIA DRIVEN MYTH
  - "WE DID NOT PROVE AN ASSOCIATION BETWEEN [MMR] VACCINE and the SYNDROME DESCRIBED"

TALK WITH YOUR HEALTH CARE PROVIDER!


THANK YOU!
- STAY SAFE
- STAY HEALTHY
- CONSIDER VACCINATING this upcoming FLU SEASON!

Appendix J

It’s a hoax. They shouldn’t be done.

That they are given to children due to past outbreak severity and severity of permanent side effects everyone would

That it is helpful, but not absolutely necessary. like to avoid happening to the masses.

That it is important for everyone to receive however it may not protect fully against the current "strain" of influenza because the vaccine is developed based on "prediction" of what strain is likely to be popular

I believe childhood immunizations are important because they not only protect your child but the rest of society as well.

If your child can't get the infection (immunized) they can not spread it to those compromised.

Everyone who is able to should get the vaccine so that those that medically cannot will have herd immunity.

That it works

Everyone who is able to should get the vaccine so that those that medically cannot will have herd immunity.

That they should be given

I personally have only gotten one influenza vaccination other than when I was a child and I have only once gotten influenza, i do not believe that it is necessary at all it really doesn't do anything considering for about 15 years i never got one and got influenza once

It is a necessity for me and I strongly approve of people getting it too.

I believe that they should be necessary before placing your child in schools, it helps prevent the spreading of diseases and does more good than harm and i am glad they are necessary to enter most school districts

it has kept me safe throughout childhood and I believe every child should get them.

I have received the influenza vaccine for the last 2 years. I have ended up sick both years.

Strongly agree with them being received. I do not believe they cause autism as the research shows.

It's not that effective.

They can cause severe illness, but the risk is less than the diseases they prevent.

That it protects an individual from getting the three projected types of flu and it helps protect the weaker people in our communities.

I believe that they can be helpful

They are helpful in protecting children and allowing them to grow up without the risk of disease.

I believe that children should receive immunizations

I believe that being vaccinated is beneficial to protecting you and those around you from contracting Influenza however the effectiveness due to different strains complicates my views.

I believe that everyone has the choice to decide whether or not they want to vaccinate their children and it is nobody's business to try and condemn them for their decision.

It's probably really safe and effective, I can't say I am an expert

Most of them are necessary, but if a child is being breastfed and receiving antibodies from the mother, I don't know if how many immunizations done in an extremely short time span is necessarily the safest.

Every time I have got the influenza shit I have gotten the flu. However, when I haven’t gotten the shot I haven’t had influenza in previous years. So I believe that you do get influenza when you get the shot.

That all children should be immunized

It helps to protect us and the people around us from the flu each year. Scientists use their best knowledge and technology to design the flu vaccine.

100% should get them. They are the reason we have eradicated some diseases. They protect children and the people around them from severe illness.

Almost every time I have received the vaccine, I have contracted the opposite strain.

I honestly think that if children were just exposed to the illnesses at a young age , and were able to produce the antibodies for the illnesses there would eventually be no need to vaccinate at birth.

Due to the fact that a virus can mutate at a rapid speed and the vaccines only cover aVery small percentage of an estimated guess of a strain there really is no proven way that this is affective and it's only causing flu strains to become resistant and much more stronger than seasons past, the vaccine really doesn't do much. Many report still falling ill with the flu. It's just a mental security blanket for most when we know viral compounds that can mutate are worthless in vaccine form, unlike polio or MMR which can't mutate.

Every child should be treated as an individual and get the vaccines on their own schedule not one advised by the CDC. As a parent of twins who had a genetic anomaly and a parent of a singleton child three years older than the twins each of them receive faxes on their own schedule per their pediatrician due to their size their growth patterns and consideration to the twins genetic disorders. It is not a one size fits all and we need to stop treating it as such. Science is what backs the use so why is it not displayed come time of injection and one size fits all patterns are shoved in parents faces. It lacks a lot.

That it is an effective way to keep myself and my community safe from contracting the flu and it limits unnecessary illness and death.

I believe that the influenza vaccine saves lives, I just do not get the shot every year.

I believe they are necessary to limit sickness and potentially life-threatening illnesses from children and can also help keep non-immunized children from illness as well.

I believe that childhood immunizations are important.

I don't think it is healthy for ones body to rely on a vaccine to fight off the flu

I think it helps protect children as they grow

Its a shot that needs to be updated but does the job

They are necessary and help prevebr illnesses

It is a beneficial think to have. I am not that knowledgable to be honest, but to my understanding it has incredible potential to prevent a high number of flu-related deaths that occur every year.

Its good

All children should be immunizied for their own safety and the safety of others. To my understanding, many of the dieseases that can be fatal to children are preventable (with maybe a few exceptions).

Good

It should be a choice, no matter what I believe

It should be a choice but I also beleive that there are too many shots given that are not necessary.

That it is a good vaccine however I believe in immunity more

You are injected with a diluter strain of the flu to help prevent against severe illness

They are good

I believe that it is helpful and good for everyone to take since it can prevent illness.

People should get it

I believe that children should get the needed immunizations because they help in the long run and they are safe because they don't cause things like autism.

They are effective

I believe that it can be beneficial to the individual as well as society as a whole--especially if you work in a job where you are consistently exposed to the public.

I can't remember a time when I didn't receive the vaccination therefore I believe it is beneficial.

I believe that childhood immunizations are largely beneficial to the child as well as society, I don't deny that side effects can certainly occur, which could be severe but statistics show those are very rare and unlikely.

The chickenpox is beneficial especially later in life from developing shingles.

Whenever I receive the influenza vaccination I seem to get a stronger flu (stronger symptoms) than on years I do not get the shot.

It prevents me from getting the flu

They are very important!

Brought up in a household that was anti- vaccination, I have never received a vaccination. I feel like it hasn't made a huge difference in my life. If I had kids they would probably receive immunizations though.

Somewhat weary about them because of the way I was raised but I am sure they are actually safe.

It prevents one strain of influenza
I believe the influenza vaccine works

They prevent diseases such as measles, polio, etc

They work

It is an good vaccination to get during that time of year. Making it more accessible is one of the greatest things to help people get their flu shot when they need it.

They are important for your children to be safe and healthy. Yes, some might have certain side effects and you should do your research on what ones your child needs and doesn't, but that shouldn't make you not vaccinate your child. Some of them are more required than others to get.

It is very helpful to protect those that cannot get vaccines from contracting the virus

That it helps lower the spread and risk of the flu virus.

I believe they are beneficial in keeping your child safe and healthy

It is very beneficial for children to get vaccinated.

The vaccine is incredibly important in preventing the spread of the flu in the United States. The effectiveness of the vaccine is sure to vary across different strains, but it will either help your symptoms or keep you far safer than no vaccine would.

Childhood immunizations are vital in preventing the resurgence of old pandemics and life-threatening childhood illnesses. Every child should be given childhood vaccines unless they physically cannot, in which case it is the duty of others to get immunized to protect them.

It is helpful and protects us from the flu.

It prevents the flu

It causes little to no side effects and prevents you from getting influenza

They are also very helpful and necessary to eliminate and/or decrease sicknesses and diseases.

You won’t get chicken pox, HPV, etc...

Necessary

I think it is good for the older generation but i also understand that there is no accurrate way to judge how influenza will mutate through the year which means the vaccine may work great or not very well.

Childhood immunizations are necessay for the health of the child and population that cannot recieve the vaccine and the elderly

I believe everyone who is physically and financially able should get one

IT PROTECTS FROM CONTRACTING INFLUENZA, AND DECREASES SEVERITY AND LENGTH IF YOU DO CONTRACT IT.

It’s necessary to keep people safe

It can be hit or miss depending on the year, but overall why wouldn't I want some level of protection against disease?

Everyone who is able should get them as they build herd immunity and help eliminate diseases over time

THEY PROTECT CHILDREN AND ADULTS FROM LIFE THREATENING AND DISABLING DISEASES

They are definitely needed to help eradicate disease

That they are very important to preventing disease in the overall population.

It has mild side effects like soreness, but it is completely safe, backed by science, and will not give me the flu

If all children would get their vaccinations, we would be able to eradicate many diseases like measles

I believe it's important to get because the flu is serious, especially in children/the immunocompromised/the elderly.

They're important to get, because they prevent disease and contribute to herd immunity. I was vaccinated for Hepatitis B as a kid, so in my drug days when I had an associate with Hep B, I didn't catch it even after sharing needles and cigarettes. My child is fully vaccinated.

I didnt think I needed it but now that I am older I I had all mine. all three kids have thiers get it. and the boosters

I would get it because I want to be healthy now and in the future, but I worry about actually getting the flu from the vaccine, becoming a carrier, or having adverse effects.

It’s important and safe to get every year.

I believe that they are important. They should always be researched because you have a right to know what's being put in the child's body, especially if you are responsible for them.

They should be given.

It does not cause autism and it does protect from what the manufacturers believe will be the current year's strain of the flu.

They help protect the community from potentially deadly diseases

It reduces the severity of getting sick

They help prevent major dangerous and deadly diseases

I believe that the influenza vaccine is effective when given every flu season

I believe that childhood immunizations are very important for the well-being of children and everyone around them.

I think the flu vaccine is important to receive, especially if you work and/or live with people who are considered in a vulnerable population (children, elderly).

I received all of my childhood immunizations. I think it is important to immunize all children, considering some of the diseases that they are being vaccinated for can be very serious.

I usually get my flu vaccine because I believe it protects me from the flu better than not having it.

they are very important and protect individuals and society from deadly diseases.

Everyone should be vaccinated for the flu

People should take a vaccination every year

That it helps prevent the flu

All children should be fully vaccinated

Children should get an immunization every year

That they are needed and increase survival in early childhood

they protect our immune system and decrease the chances the getting the flu.

I do not know enough about it to comment on this.

It prevents you fron getting the flu

this helps children who are growing to be immune to the shots and will protect them.

They are beneficial and helpful to the child and the rest of the population.

They work and children should get them

I got my first flu vaccine in 10 years just a few months ago. It is more important than it seems.

That is helps lessen flu symptoms

People would not immunize their children if it wasn't for requirements by schools. Kids bring vaccinated is very important.

That they are necessary to combat disease

I believe it protects against strains of the infuenza virus, specifically the ones projected by scientists to be the most severe in the coming winter.

I believe the flue vaccine is important

That the people who make it try and predict what influenza strains will look like that year

I believe they are a great way to build up immunity against deadly diseases for children and provide a feeling of security that they will be protected.

Children should be protected against childhood diseases

They have been important in eliminating many different serious diseases

Well it protects the most vulnerable and is a good decision most of the time, it does not offer the same benefits as childhood immunizations due to differing strains and access across society

prevent the spread of flu

Childhood immunizations are a safe and proven method to prevent dangerous diseases in society and should be free and accessible

prevent disease

Take it every year and believe others should also

Fully support

I believe that the influenza vaccination is a good way to keep myself safe, but also to provide safety to those around me.

That it should be given every year to prevent it in people

I don't really have opinions on childhood immunizations. I don't believe that they cause autism or that the side effects are bad enough to counteract the importance of the vaccination.

Needed to prevent sickness later in life

That it is helpful in preventing us from getting it and that it is safe for everyone.

That they are fine and help protect us in the future and when we are young so we don't get sick.

It does more good than bad.

It is safe and effective, but not entirely necessary for all individuals.

It is a tested way to combat influenza and shows good results.

The greatly decrease your chance of getting the flu. It is worth getting.

Derived from various live strains predicted to be present each year.

They are more likely to benefit from them rather than be harmed.

They are safe and effective for almost all individuals.

They are essential to not being at risk for the disease later in life.

The greatly decrease your chance of getting diseases such as the small pox.

They are worth doing.

Generally attenuated from live strains; predicted to provide safety about 70 yrs.

It works

They are effective

It is a necessary tool to ensure public health.

They are vital in preventing disease in children and building immunity.

I believe it to be safe and necessary

Gives you dead virus to build antibodies

They are safe

They are very safe and necessary

It's an inexact forecasting system, but it's our best population wide option next to permanent mask mandates

They prevent serious infections and illnesses that can have lifelong deleterious effects

It is good for herd immunity

It is safe and necessary

Good for Herd Immunity

They are important to prevent deadly diseases

It ends up backfiring by giving the patient the flu.

They make children very ill. There's way too many immunizations for young children as well.

I don’t really believe anything. I had the flu once as a child right after i got my first and only shot so i never got the shot again and i never got the flu again.

i was vaccinated and it’s important everyone should be so those who can’t be due to medical reasons can still keep their herd immunity.

That while it wont prevent against all strains as the virus can sometimes mutate to a strain that the vaccine doesnt cover it is effective against most strains and is the best preventative measure against the influenza virus even if it is not 100% effective.

Immunizations protect not only the children who get them but other people who because of immunocompromises cant receive the immunizations. They also allow for near eradication of extremely dangerous and deadly diseases such as small pox and polio.

The vaccine is still worth getting but the lack of knowledge of the different strains of influenza can make the vaccine per year not as effective as it could have been. Do to the constant changing and mutating of influenza strains.

I believe they are necessary to protect others with lower immune systems and others that can’t afford to be vaccinated.

Constant discussion and attacking of them is annoying. The anti-vax movement annoys me too. My belief is make your own personal "best" choice for you and your family, and let others decide for themselves in peace too.

There is so much misinformation out there about vaccinations. Currently it seems the media (the left) is the main culprit especially with the China Virus vaccine

Anti-vaxers are on the same level as flat earthers (and they should go back to school)

if they actually work they should be heavily implemented

They are very important

I do not believe vaccinations cause autism.

The distrust is growing significantly with COVID. I think if vaccines really were that safe that they couldn't prove the vaccine caused severe problems, then vaccine companies should be able to be sued.

I think they are a great discovery that have helped society as a whole.

I think vaccines and how they work are complicated and controversial however if there was more education and less of a stigma I think that it could improve.

I am not an expert, but I do know that even people who are experts don't know everything. Medicine is continually evolving and they serve their purpose well, but more research definitely needs to be done (especially on flu/COVID vaccines if the public is going to need to take them more than once)

Not all vaccinations work the way we are told they will.

They are safe and effective. I wish more people trusted the science.

I’m not totally against them, I do think that some of them work, but some, like the influenza vaccine, I am skeptical about.

Every time I have gotten the flu vaccine I have contracted pneumonia. And the final time I received the vaccine two years ago as a healthy 27-year-old I contracted pleurisy that went undetected and collapsed my lungs causing severe lifelong complications all that was a known side effect by the CDC it was never reported to me that this could’ve happened upon receiving the flu vaccine and it was a direct effect from the vaccine itself. They do not inform their patients of this and there’s somebody in the medical professional field with a graduate degree I was highly disturbed to find this out

They are a benefit to society.

I believe that vaccines save lives.

I just believe in trying to let your body adjust to the world and not put so much crap in it unless needed

They are important and work

Vaccinations are important not only to protect yourself, but others as well.

Not really, but also good

As Bill Gates has said, immunizations are for population control

I don't like how people are Anti- vaccinations and if any one in the medical field is they shouldn't be able to work in the profession.

People are crazy to not vaccinate

As a public school teacher, I find the extremists against vaccinating children to be troublesome if they intend to send them to public school with the masses.

I believe it is better for children and babies to get chicken pox naturally as opposed to taking the vaccine

Vaccinations are important. As long as you do your research and you know what is being put in your body, vaccinations are good for you. Being knowledgeable is a important part of it.

They are a good thing.

Vaccinations are incredibly important for our survival as a society, and are the reason that life expectancy is much higher than it was years ago. Misinformation about vaccines can be deadly and should be met with much more pushback than it is currently receiving.

For the most part they are well studied and safe.

Needed for humanity to survive

They dont cause autism, sometimes they dont work very well but are needed in some instances

They are very important for the wellbeing of public health

THERE ARE RISKS BUT RARE, AND THE BENEFITS OUTWEIGH THE POTENTIAL RISKS.

They are an informed persons only choice

I trust vaccines because of the rigorous testing and trials they much undergo before they are even approved

Serious side effects and allergic reactions are possible, but rare. The consequence of being unvaccinated outweigh the risk of adverse reactions. Personally, I'm on an immunosuppressant med for an autoimmune disease and catch every opportunistic infection, so I stay vaccinated as much as I can and fully vaccinate my child.

Thank GOD we have them- too bad their are uninformed ingnorant people that don't believe in science.

It is relatively rare for a child to have a reaction - in those cases children should not have vaccines and if everyone else used the good sense that GOD gave them by getting vaccinated we would protect our most vulnerable who cant.

The topic of vaccinations is confusing to me because they have mixed results. On the one hand, they can save you a lot of trouble, stress, and potential suffering. But on the other hand, I know some are recalled. I was recommended one specifically by a doctor to prevent a type of female cancer, but I didn't have the vaccine. It turns out they recalled it a short time later.

We need to solve the anti vaccine movement

We don’t fully know what’s in all of them

Vaccines are important !!

I think vaccinations are a crucial part of maintaining the overall health of our society.

There’s too much misinformation surrounding vaccines that lead to dangerous situations for individuals and for public health

Everyone should get it

They do NOT cause autism.

They all work as far as i know and i belive in them

Everyone should get vaccinated if possible

Going into a science background, I find vaccines to not be very scary when I know the "science" behind it, so when information is present on what is in the vaccine and how it functions in your body.

They are good

I won't go out of my way to receive a vaccination unless it is out of the experimental phase

Vaccines are safe and should be given to as many people as possible except those medically unable or those with true religious exemption (i.e. Amish, Christian scientists)

prevention is good

I believe they should be mandated in several parts of society as they are critical to wiping diseases off the planet.

I think people should seek them rather than have them forced upon them.

They are impressive feats of modern medicine.

They are good.

Particularly effective but do nothing to solve problems of over- population.

They are necessary

Vaccine disinformation is an abhorent transgression of politics and financial incentives against the public health.

They are 100% needed and should be taken as recommended by the CDC.

Safe and reliable

People should be required to get them and they should be free.

They are safe and important to get

Hopefully the COVID vaccine is much more effective than any other vaccine!

Vaccines in general are perfectly safe and any small side effects are typically well worth the safety of yourself and other people. Vaccines have been scientifically proven multiple times not to cause diseases such as autism and even if they did I would much rather have a child alive with autism then dead from small pox.

There is a large issue with vaccines being politicize which has led to misinformation about vaccines and health in genral. There is also a lack of information being taught to family’s and adults about how they work.

Appendix K

Thank you,

And I don't see an issue with your use of the image for a very time-limited project like this. Given the nature of the content - it will clearly be out of date almost any day but from what you describe - it should be fine. Please provide the URL link to the content.

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Yours in health,

Beth

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