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### AN EVIDENCE-BASED QUESTIONNAIRE TO ASSESS INFLUENZA VACCINE ADHERENCE IN YOUNG ADULTS AGES 19 TO 25 YEARS

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AN EVIDENCE-BASED QUESTIONNAIRE TO ASSESS INFLUENZA VACCINE  
ADHERENCE IN YOUNG ADULTS AGES 19 TO 25 YEARS

A DOCTOR OF NURSING PRACTICE SCHOLARLY PROJECT

PRESENTED TO THE FACULTY OF THE  
SCHOOL OF NURSING AND HEALTH SCIENCES  
LA SALLE UNIVERSITY

IN FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE  
DOCTOR OF NURSING PRACTICE

BY

TRICIA A. GILL

DOCTOR OF NURSING PRACTICE PROGRAM

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## Abstract

Young adults ages 19 to 25 years in the United States are at increased risk for influenza because their annual flu shot adherence is the lowest out of all age groups. Their non-adherence and increased potential for illness have a very great impact on contacts, including family, friends, coworkers, their children, and people in the community. The purpose of this Doctor of Nursing Practice Project is to create an evidence- and theoretically-based questionnaire aimed at assessing flu vaccine adherence in young adults ages 19 to 25 years in a primary care practice with the future objective of reducing the overall flu illness burden in the United States. The questionnaire's item content is based on analysis of literature in a systematized review and evidence- and theoretically-based practice citations of the Center for Disease Control and Prevention as well as three other independent studies. The questionnaire items are structured by Rogers' Change Theory using three patterns of change: early adopter, late majority, and laggard. The questionnaire was revised based on expert healthcare providers' judgments of item validity.

*Keywords:* Quality improvement, questionnaire, influenza vaccine, adherence. Young adults

## **An Evidence-Based Questionnaire to Assess Influenza Vaccine Adherence in Young Adults Ages 19 to 25 Years**

The Center for Disease Control and Prevention (CDC, 2020) recommended an annual influenza vaccine, or *the flu shot*, for adults ages 19 to 25 years. This recommendation is based on the close quarters in which they live and their common practices, such as residing in dorms and sharing bathrooms and food, which place them at higher risk for the spread of communicable diseases. Although their risk of chronic illness is low, their age-associated invincibility limits the performance of preventive health maintenance behaviors and is related to their false impression of low personal health risks (U.S. Department of Health and Human Services [USDHHS], CDC, 2020).

Studies show that people tend to become more concerned about their health as they grow older (USDHHS, CDC, 2020). The percentage of people vaccinated during the 2018 to 2019 flu season increased as the age ranges increased. However, approximately 34.9% of people ages 18 to 49 years were vaccinated in the 2018 to 2019 flu season. This rate is attributed to young adults' inflated sense of their own health and well-being because of their youth and the decreased likelihood of having significant comorbidities at this age (USDHHS, CDC, 2020).

## **Misconceptions**

The CDC (2020) identified some common misconceptions about the flu. It is important for healthcare providers to educate and to remind young adults about the risks of contracting influenza, including pneumonia and death. Misconceptions include the ideas that the flu vaccine can give a person the flu; having the flu illness naturally is safer than receiving the vaccine; the flu vaccine does not work every year; and the flu vaccine can increase the risk of becoming ill with other respiratory viruses. The facts countering such misconceptions consist of the following: the inactivated version of the flu vaccine cannot cause a person to get the flu; It is safer to be vaccinated than it is to have the flu because of the unpredictable risks related to natural disease exposure (CDC, 2020i).

The annual flu vaccine is important to receive every year because the strains that are put in the annual vaccine are updated to stay ahead of mutation of the circulating flu viruses; and some people may still get the flu despite having received the flu vaccine because the viral strains can change, which allows for breakthrough flu (CDC, 2020i). The benefit still lies in receiving the flu vaccine because if people get sick with the flu, they can experience less severe and a less lengthy period of illness which reduces the risk of complications from having the flu (CDC, 2020). Also, receiving the flu vaccine cannot increase susceptibility of other respiratory viruses, including COVID-19 (CDC, 2020). Benefits of the flu vaccine include decreasing risk of becoming infected with the flu, decreasing risk of hospitalization related to complications of having the flu, and protecting vulnerable people in the community by creating herd immunity (CDC, 2020).

## **Problem Statement**

A report from the Institute of Medicine (IOM, 2014) described disparities and challenges in young adults' health status. Examples include injury, violence, decreased health care access, chronic illness, unplanned pregnancy, lower educational attainment, and increased unemployment. Because young adults often leave the care and guidance of their parents to transition into living on their own in either a private setting or college settings, they are at greater risk to miss opportunities for preventive self-care (Walker-Harding et al., 2017).

During the 2018 to 2019 flu season, the CDC (2020) reported a 45.43% flu vaccination rate in people ages 18 years and older, which was an increase of 8.2% as compared to the previous 2017 to 2018 flu season. Data to estimate flu vaccination rates were captured via a telephone survey using the Behavioral Risk Factor Surveillance System (BRFSS) and the National Immunization Survey (NIS-Flu). With low vaccination rates in this age group, the risk of infection is elevated and could increase the risk for flu to spread in their communities. The CDC estimated that another 4,000 to 11,000 hospitalizations could have been prevented by increasing flu shot adherence by only another 5% across all age groups. Flu vaccination rate data showed increased coverage with increased aging populations (CDC, 2020).

The CDC (2021) reported that the 2019 to 2020 flu season was moderate with an estimated 38 million illnesses. There were 18 million visits to healthcare providers, 400,000 hospitalizations, and 22,000 deaths because of a flu diagnosis. The illness burden was particularly severe in children ages 0 to 4 years and in adults ages 18 to 49 years of age. The flu illness rate for adults ages 19 to 49 years was the highest flu burden ever reported by the CDC for this group. The hospitalization burden of adults ages 18 to 49

years was 20% and the percentage of age 18 to 49 years who died from the flu was 11%. During the 2020 to 2021 flu season there were 0.8 per 100,000 hospitalizations for all ages and 18.3% of those hospitalizations were ages 18 to 49 years. Data on death from flu during the 2020 to 2021 season is still pending, but pediatric deaths dropped to one death for the entire season. A record number of 193.8 million flu shots were given during the season (CDC, 2021).

The flu shot should be offered during primary care visits for physical exams, follow-up sick visits, and hospitalizations. Providers should reinforce the need for an annual flu shot every fall prior to flu season (USDHHS, CDC, 2020). Primary health care providers need to explain the facts and discuss the benefits of having the annual flu vaccine. The problem to be addressed in this Doctor of Nursing Practice Project is the creation of an evidence-based questionnaire to help increase flu shot adherence in young adults ages 19 to 25 years.

### **Purpose**

Approximately 89% of primary care advanced practice nurses (APNs) are committed to the mission of screening, preventing, and treating acute and chronic diseases in their patients. It is the responsibility of the primary care APNs and physicians to decrease risks and care gaps for patients at the primary care level by educating about vaccines and disease processes, reminding patients to have their vaccines in a timely manner, and ensuring safe and timely administration of vaccines before each flu season (AANP.org, 2020). Therefore, the purpose of this Doctor of Nursing Practice Project is to develop a questionnaire, that is evidence-based, theoretically-based, and age-appropriate for primary care providers to administer so that primary care providers can evaluate

which classification they represent: early adopter, late adopter, and laggard to determine likelihood of adhering to flu vaccine immunization in young adults ages 19 to 25 years. Also, an evidence- and theoretically-based script will be developed that matches questions that assists primary care providers to share information during patient visits. The rationale for the project is to standardize the communication episodes of primary care health care providers during office visits and to increase future flu immunization adherence in this population.

### **Project Question**

The question for this Doctor of Nursing Practice Project is: What are the evidence-based, theoretically-based, and expert-validated items of a revised questionnaire that standardizes the communication episodes of primary care practitioners during office visits with young adults 19 to 25 years and fosters their decisions to accept influenza vaccination? What are components of an evidence- and theoretically-based script that matches the questions on the instrument?

### **Conceptual Definitions**

The following definitions will be used in this doctoral project:

**Young adults** are defined by as people between 18 to 25 years of age (Walker-Harding et al. (2017). They are a group in a unique and critical period of development in which there are gaps in healthcare. The biological and psychosocial development of the young adult is not yet complete, leaving them open for risks to their health and well-being. However, opportunities arise for healthcare providers to intervene and to leave a lasting impact on their lives (Walker-Harding et al., 2017).

**Flu vaccination** is defined as a direct injection of Haemophilus influenza polysaccharide through the subcutaneous skin and into the muscle of a patient to prevent the flu (CDC, 2020).

**Flu vaccination adherence** is defined as the stated agreement of a person to receiving the influenza vaccine and accepting the flu vaccination injection.

**Age-appropriate, evidence-based questionnaire** is a set of sequenced, developmentally appropriate questions that structure communication episodes of primary care providers when encouraging young adults, classified as early adopters, late adopters, and laggard, to accept flu vaccination. The questionnaire may assist providers to assess primary care patients' likelihood to adhere to influenza vaccination and document patients' responses. The questionnaire acts as a cognitive aid for enhancing primary care providers' performance (Scriven, 2008). The questionnaire is evidence- and theoretically- based and standardizes primary care practitioners' communication with young adults during office visits to assess whether they might accept influenza immunization. The questionnaire will also include an evidence- and theoretically-based script that matches the questions.

**Implementation process** is defined as the recommended sequence of statements that primary care practitioners use when following the questionnaire.

### **Review of the Literature**

This section of the project includes the PICO question for the project, the systematized review process and appraisal of the literature, and the framework for the project.

## PICO Question

The PICO question follows:

- P/P: Young adults health promotion activities reveal a low flu vaccination rate.
- I: Evidence-based, age-appropriate questionnaire that standardizes primary health care providers' communication episodes with young adults during office visits to assess intent to complete flu vaccination and that includes a script matching each question.
- C: Usual communication by primary health care providers to promote flu vaccination adherence of young adults during office visits.
- O: The flu vaccination adherence will increase for young adults in a primary care practice (future outcome after the project is implemented).

The purpose of this systematized review was to examine research on flu vaccine adherence in young adults. The database searches excluded articles older than 5 years old, articles in any other language other than English, and if they were not full text articles; duplicate studies were excluded when located in different search engines.

## **Search Strategy**

Table 1 shows the results of the databases searched and the ultimate number of articles chosen for appraisal. Table 2 provides the results of appraising citations selected for the systematized review.

## **Observational Data Research**

Ferdinands et al. (2018) conducted a prospective test-negative case control study examining the prevention of influenza hospitalization among adults in the United States

during the 2015 to 2016 flu season. Results were pulled from the hospitalized adult influenza vaccine effectiveness network (HAIVEN). Participants included 1,467 adults who were over the age of 18 and had been hospitalized in 8 different hospitals within Texas. Their diagnosis was lab confirmed with respiratory specimens and analyzed via Pearson's Chi Square test. Fisher's exact test was used for categorical variable analysis, and the Wilcoxon rank-sum test, or the t-test was used to test for continuous variables (Ferdinands et al., 2018).

Of the 1,467 patients admitted there were 67% who had self-reported their history of having their flu vaccine within more than 14 days prior to illness onset during the 2015 to 2016 flu season (Ferdinands et al., 2018). Two different vaccines had been given including trivalent (20%) and quadrivalent (80%). Patients ages 65 years and older received either the quadrivalent (10%) or the inactivated high dose flu vaccine (45%). Twenty-two patients were admitted to the ICU. The overall length of stay in the hospital was shorter in those who were vaccinated as compared to those who were not vaccinated (8.5 versus 12 days). Twenty-four percent of the unvaccinated individuals were infected with flu as compared to 12% of vaccinated individuals. The final estimate for vaccine effectiveness was 51%. Limitations to the study were that the patients self-reported their own vaccine status, so the final data may not be entirely accurate. Having people admitted with increased risk with other comorbidities could cause unintended bias when being admitted out of caution. Implications for this information in practice are that there needs to be a very strong and frequent effort to encourage patients who are at higher risk of hospitalization to receive their flu shot as soon as possible because these data shows that if flu was not at least prevented all together, that their days in the hospital were

reduced. Patients who are positive for the flu despite vaccination need to be reminded that the flu vaccine did not fail and that they should continue to receive their annual flu vaccines despite previous history of infection (Ferdinands et al., 2018).

### **College Age Cohort Research**

Ryan et al. (2019) conducted an anonymous cross-sectional research survey across 14 different colleges in the University of Florida to understand influenza vaccine perspectives and hesitancy in university students to promote increased vaccine uptake. There were 1,039 participants who had a mean age of 22, majority were female, non-Hispanic white, U.S. citizens. Research Electronic Data Capture (REDCap) was used to capture electronic data through University of Florida. Chi square was used to measure knowledge differences and SAS 9.4 analysis was used to measure demographic characteristic and key outcomes: class standing, vaccine history, previous flu illness, if previous vaccination influenced their decision to have their vaccine during the 2017 to 2018 season, preference for vaccination type, knowledge of flu vaccines, reasons for refusal or acceptance of vaccines, barriers to vaccination, and their preference on how they received vaccine information and education (Ryan et al., 2019).

A total of 1,122 survey responses indicated that 62.8% were vaccinated (Ryan et al., 2019). Out of the student responses in the group, 67.2% expressed intent on getting their flu shot in the upcoming fall. Health-related fields of study were 3 times more likely to be vaccinated (76%) because they have a required vaccination policy if encountering patient contact during their program studies. Graduate students had a higher vaccine uptake at 72.1% as compared to undergraduate students at 54.7%. Undergraduate students reported that 56.5% of them relied on family member for medical decision

making and 35.8% relied on their medical provider. Unvaccinated undergraduates reported that 58.9% would rely on close family or friends for medical decisions. Graduate students were less likely to rely on others to help them make medical decisions (22.8%) and said that they would have a higher likelihood to rely on their medical provider (66.5%). A reported 67.4% of undergraduate students made their own medical appointments as compared to 87.5% of graduate students. Students who reported having a history of having the flu included 59.3% of responses. A large number had reported having the flu vaccine in the past (82.4%), but 49.0% reported having routine vaccines during their childhood. Parental vaccine uptake was reported at 41% and 48.9% said that their history of vaccine uptake influenced their decision to have their vaccines as adults. Responses included that most had been vaccinated before (86.5%), that they believed that the vaccine was the best way to protect themselves against the flu (91.3%); most had expressed that they had been educated about the flu shot, how it works, had discussed its importance (87.9%), was recommended by a healthcare professional (67.7%), and that it was required by the university and their program (57.7%). Most had received the vaccine early in the flu season (77.0%), but 8.6% received it later after they had heard of the severity of the flu season. Timing was just out of convenience for 14.4%. Reasons reported for not getting the vaccine were that it was not a priority for them (77.0%), inconvenience of having to go out to get the vaccine (61.2%), vaccine was ineffective and that the flu was not severe enough to get the vaccine (31.5%), did not want the vaccine (55%), and believed that their immune system would protect them from the flu (42.6%). Limitations of the study were that the response rate was very small and not representative of the student population. The barriers to vaccination revealed some potential for the

student health department as well as the health science programs students to hold educational sessions and flu shot drives at the dining halls and entryways to buildings to improve knowledge of and access to the vaccines. Implications for practice are for the primary care providers to take every opportunity for reminders to have their flu vaccine at physical exams prior to returning to college, during follow up visits if in for a visit during the flu season, and to remind them to go to flu drives and pharmacies if they are not able to travel back to their own primary care provider (Ryan et al., 2019).

Franks and Narveen (2017) published online survey study results collected across 8 universities in North Carolina to determine flu vaccination rates of the college students, to capture changes in vaccine rates or perceptions of the flu vaccine related to the 2014 to 2015 flu season, and to understand reasons for or against vaccine adherence in the students. Participants were ages 18 years and older, from freshman to senior years. The survey was conducted via SurveyMonkey and included 15 questions about demographics, attitudes, perceptions, knowledge, vaccine status, and behavioral changes that occurred during the 2014 to 2015 flu season. The responses were recorded in a Likert scale and open-ended responses. The data were then entered into an Excel spreadsheet and analyzed via SPSS. Chi-square tests computed probability values and the statistical significance was set at  $p < 0.05$  (Franks & Narveen, 2017).

Results collected from 265 surveys were from 69% female and 31% male students (Franks & Narveen, 2017). There were 32% freshman, 32% sophomores, 22% juniors, and 15% seniors. Majors included 31% in Arts and Sciences, 28% in Business and Economics, 13% in Education, and 28% in Nursing and Health Science. During the 2013 to 2014 season, 32% self-reported being vaccinated, but only 22% self-reported being

vaccinated during the 2014 to 2015 flu season. This decrease was statistically significant ( $p < 0.05$ ,  $X^2 = 6.2119$ , and  $p = 0.0127$ ). Vaccination rates for each class were reported as 28% for freshman, 29% for sophomore, 38% for juniors, and 41% for seniors during the 2013 to 2014 season and decreased in the 2014 to 2015 season to 22% of freshman (6% decrease), 13% of sophomores (17% decrease), 33% of juniors (6% decrease), and 27% of seniors (14% decrease). The largest decrease was with the sophomore class. The program results included a vaccination rate for the 2013 to 2014 flu season which included of 26% in the College of Arts and Science, 27% in the College of Business and Economics, 26% in the College of Education, and 46% for the College of Nursing and Health Sciences. The vaccination rates decreased in the 2014 to 2015 season to 19% (7% decrease) for the College of Arts and Sciences, 18% (10% decrease) for the College of Business and Economics, 11% (15% decrease) for the College of Education, and 35% (12% decrease) for the College of Nursing and Health Sciences. Despite the loss of vaccinations from the first year to the next, the College of Nursing and Health Sciences maintained the highest vaccination adherence. Barriers were discovered when collecting the responses of the unvaccinated participants. their responses included 66% that were not worried about getting the flu, 15% forgot or were too busy, 12% said they didn't want the vaccine, 7% felt that the vaccine was ineffective, 7% felt that the vaccine could make them sick, 6% reported parental influence against the vaccine, 10% reported other reasons and 14% reported no reason for not receiving the flu vaccine during the 2014 to 2015 flu season. Hand washing was an increased behavioral change that 53% of the students reported. Protective behavioral changes included reduced food sharing (29%) drink sharing (34%), hand shaking (27%), high fiving (19%), kissing (18%), and hugging

(17%). Limitations to this study were that there was no reported educational activities or flu drives on campus between the two seasons. The students need to have the education to dispel the misinformation identified in their survey results. The concept of herd immunity is one that needs to be driven home to college cohorts so that overall illness and outbreaks do not interfere with their academic time. Implications for practice include the need to draw college students into primary care for their annual physical exams to give face to face reminders and education about their need for updated vaccines before returning to college (Franks & Narveen, 2017).

Benjamin and Bahr (2016) conducted a cross-sectional design study to examine the barriers associated with seasonal influenza vaccination among college students. Questionnaires were given to 383 students at California State University, Northridge during a one-week period in January 2014. A multivariate logistic regression analysis, t-test, and chi-square were used to analyze the data collected on living location, ethnicity, gender, age, year of college, visit within the last 6 months to a medical provider, whether they had health insurance, reported being encouraged to receive the seasonal influenza vaccine, previous vaccine history, and whether they planned on having their flu vaccine during the current season. Those who were not vaccinated were asked about attitudes about seasonal flu vaccines including cost, access, importance, and risks of vaccination. Responses for attitudes were assessed using a Likert Scale (Benjamin & Bahr, 2016).

The respondent group included a mean age of 21, 55.8% were female, 45.4% were Hispanic, 82.6% resided off campus, 37.2% were in their first year of school, 50.8% reported seeing a medical provider within the last 6 months, 59.6% reported being encouraged to receive the seasonal flu vaccine, and 72.2% reported having health

insurance (Benjamin & Bahr, 2016). Only 20% of the respondents reported having their flu vaccine in the last 6 months. There was a significant finding associated with a higher likelihood of having the flu shot (44.3%) as a freshman as compared to other years. Males had a 50.6% vaccination rate as compared to female at 49.4%. Barriers to vaccination discovered in the responses from the unvaccinated individuals included 47.8% of the students who believed that they could get the flu from the flu vaccine, 41.6% believed that there was a risk of dangerous side effects, 22.4% believed that vaccines were too expensive, 26.6% said that they were not informed that the flu shot may be important, 39.6% felt that they were not in danger of contracting the flu, 19.4% of the students said they did not know where to go to get the flu shot, and 35% said they had no time to get the vaccine. Limitations to this study included lack of exposure to an evidence based educational intervention during the flu seasonal to capture those students who may have been open to vaccination and to clear up a lot of the false impressions they had on cost, access, and dangers of vaccination. Most of the respondents lived off campus so there needs to be more of a drive to mandate the flu shot if living in a campus cohort to prevent outbreaks. There may have been more vaccinations than indicated if the survey was reapplied to those living on campus. There is a need for the on campus medical center to promote vaccination by providing vaccines during a flu drive with an annual program (Benjamin & Bahr, 2016).

### **Summary of Empirical Research**

The empirical research studies presented showed that young adults need more encouragement and education about the flu vaccine and its importance in a cohort environment before each flu season begins because they fall short in vaccine adherence.

Many of their reasons for poor vaccine uptake include misinformation that can easily be corrected through education from their primary care provider's guidance, flu education, drives through college health services, and by providing instant, free, and convenient access to the vaccine at every opportunity. Primary care providers need to continually and consistently reinforce the importance of flu vaccination and educate young adults so they develop lasting positive preventative attitudes towards their own health.

## **Related Literature**

### ***Young Adults and Vaccination***

A report from the Institute of Medicine (IOM, 2014) described disparities and challenges in young adults. Examples include injury, violence, decreased health care access, chronic illness, unplanned pregnancy, lower educational attainment, and increased unemployment. Because the young adult often leaves the care and guidance of their parents to transition into living on their own in either a private setting or college settings, they are at greater risk to miss opportunities for preventive self-care (Walker-Harding et al., 2017).

During the 2018 to 2019 flu season, the CDC (2020) reported a 45.43% flu vaccination rate in people ages 18 years and older, which was an increase of 8.2% as compared to the previous 2017 to 2018 flu season. The data to estimate flu vaccination rates were captured via a telephone survey using the Behavioral Risk Factor Surveillance System (BRFSS) and the National Immunization Survey (NIS-Flu). With low vaccination rates in this age group the risk of infection is elevated and could increase the risk for flu spread in their communities. The CDC estimated that another 4,000 to 11,000 hospitalizations could have been prevented by increasing flu shot adherence by only

another 5% across all age groups. Flu vaccination rate data showed increased coverage with increased aging populations (CDC, 2020).

### ***APN Mission at the Primary Care Level***

Approximately 89% of primary care APNs are committed to the mission of screening, preventing, and treating acute and chronic diseases in their patients. It is the responsibility of the primary care APNs to decrease risks and care gaps for patients at the primary care level by educating about vaccines and disease processes, reminding patients to have their vaccines in a timely manner, and ensuring safe and timely administration of vaccines before each flu season (AANP.org, 2020).

### ***Checklists in Health Care***

Hales and Pronovost, (2006) discussed how the use of a checklist can reduce error in settings where levels of stress and fatigue are high. High pressure environments can increase the likelihood of errors, decrease the level of compliance in standard operating procedures, and decrease competency. Checklists are often used in aviation for safety protocols during preflight procedures. Product manufacturing also use a standard checklist to ensure safety, quality, and consistency in their product. Healthcare has recognized the benefit of checklists in reducing error and improving communication. It has difficult to mandate checklists in healthcare because of the lack of perfect standardization of human response from patient to patient. The procedures in healthcare can be developed into tailored check lists for each scenario. Unforeseen events can cause a failure of checklist use, especially in early adoption of the checklist. With consistent use a checklist becomes part of habit. Some healthcare providers may see checklists as

limiting their clinical judgement and decision making, however checklists have been directly connected with reduction in errors that can be correlated with improvement in patient safety, outcomes, and better use of resources and time (Hales & Pronovost, 2006).

### **Critical Summary**

Young adults are at high risk for influenza illness and spread related to their consistent annual levels of low flu shot adherence. Research evidence shows that misconceptions in flu shot information and gaps in education lead the reasons for non-adherence. The CDC annually and consistently reports the high impact of flu illness burden on the US brought on by young adults' non-adherence to the flu vaccine. An evidence- and theoretically-based questionnaire with accompanying script is needed so that primary care providers can consistently intervene and educate young adults to increase their flu vaccine adherence. As the primary care providers indicate *Yes* or *No* on the questionnaire, the instrument' response items will function as a checklist.

### **Theoretical Framework**

Everitt Rogers (1983) created a Model of the 5 Stages in the Innovation-Decision Process. Innovation is an idea, practice, or project that is perceived as new. Uncertainty is identified as a potential barrier to innovation. Communication channels are identified as where participants create and share information to create a mutual understanding. Diffusion is identified as the process by which the information is shared, which is a social process that involves relationship interpersonal communication. These relationships are seen as a more powerful way to create or change strong attitudes that are held by individuals (Rogers, 1983).

The Innovation-Decision making process starts with the Knowledge Stage (Rogers, 1983). The questions of “who, what, and why,” determines what the innovation is and how and why it works. Three types of knowledge include awareness knowledge which shows the knowledge of the innovation’s existence, how-to-knowledge helps to show how to use the innovation correctly, and principles knowledge helps to understand how and why the innovation works (Rogers, 1983).

The Persuasion Stage is identified when the individual has either a positive or negative attitude about the innovation (Rogers, 1983). This does not always lead directly to adoption or rejection of the innovation. The attitude towards the innovation is developed after the knowledge of the innovation is discovered. Degree of uncertainty and opinions from colleagues and peers can affect the decisions towards adopting or rejecting innovation. This continues through to the Decision Stage where the final decision to adopt or reject the innovation. A trial phase of being introduced to the innovation can help increase the likelihood of adoption in the early phase of decision making. Rogers identified types of rejection including two active rejection and passive rejection. Active rejection can occur when the individual trials the innovation, but later decides to reject it. Passive rejection is where the innovation is not adopted at all. Compatibility of innovation helps increase adoption because the innovation aligns with the individuals’ values, needs, or past experiences. Complexity can affect the adoption of innovation because the perceived level of difficulty can interfere with the ability to understand and use the innovation. Trialability is helpful because if the individual can experiment with the innovation on a short-term basis. Observability is the level of how visible an

innovation is to others. When peers can role-model the innovation it increases the likelihood of adoption (Rogers, 1983).

Three types of adopters were identified by Rogers (1983). Innovators are 2.5% of those individuals who are more likely to express new ideas. They are usually the ones who bring the innovation into the table from outside of the system by using their complex, technical knowledge. Early Adopters are 13.5% of individuals who are limited in their social boundaries and are more likely to hold leadership roles in the social system. Because of their influence, their opinion and ability to adopt an innovation has a large impact on whether others adopt the innovation. Early Majority are identified 34% of those who adopt the innovation before their peers, though they are not typically considered leaders in the adoption role. Their decision-making process typically takes longer than the innovators and the early adopters. Late Majority are 34% of those who usually wait until their peers adopt the innovation. They feel uncertain, but their peer's adoption of the innovation often leads them to feel more comfortable in their decision-making process. Laggards are skeptical and often do not hold leadership roles. They are often not as socially connected and less aware of the innovation and how it works. They look to other individuals to decide whether the innovation works and whether the other individuals adopted it or not (Rogers, 1983).

Primary care providers who meet resistance from young adults during their conversation about the flu shot need to use persuasion to guide those who fall into the late majority and laggard phase of Rogers' Theory. This approach can help the late majority and laggards to reach the Decision Phase where they either accept or reject the flu vaccine. An evidence- and theoretically-based questionnaire with accompanying script

matching the questions will allow a streamlined, standardized, and assessment approach so that primary care providers could identify young adults' likelihood of adhering to flu shot immunization.

## **Method**

### **Design**

This quality improvement project's future aim is to increase future influenza vaccine adherence rates of patients ages 19 to 25 years in a primary care practice. The project constitutes Phase 1 of a quality improvement initiative. The design targets quality improvement strategies through the creation and validation of an evidence- and theoretically-based questionnaire that ultimately may be integrated into Penn Medicine's EPIC software. The questionnaire items are sequentially structured by early adopter, late adopter, and laggard change patterns (Rogers, 1983) to guide the communication of primary care providers as they care for young adults during office visits and offer an opportunity to receive influenza immunization. The questionnaire also includes an evidence- and theoretically-based script that matches the items on the instrument and a checklist-style response option of "Yes" or "No" for each question.

Appendix A, the Project Operational Matrix, structures phases of this quality improvement project. Program or project goals target flu vaccination rates specifically for young adults ages 19 to 25 years and overall reduction of the illness burden of flu in the United States. See the short-term, intermediate-term, and long-term objectives in Appendix A that will affect the project in the primary care practice and ideally, national flu vaccination rates.

The project's Phase 2 will be rolled out following the doctoral student's graduation and Penn Medicine Institutional Review Board's (IRB's) approval of implementing the questionnaire and script through a pilot study at one of the Penn Medicine primary care sites. An interdisciplinary team of primary care providers will be involved in the review of the questionnaire and implementation process prior to project submission to the IRB. There are two groups of health care providers including Internal and Family Medicine at Penn Medicine Primary Care in Bucks County. The primary care providers function independently from one another and include a combination of doctor of medicine (MD) and doctor of osteopathic medicine (DO), and NPs, for a total of 10 providers.

### **Step 1: Draft Questionnaire**

The questionnaire items and matching script developed based on qualitative analysis (Graneheim & Lundman, 2004) of empirical and theoretical literature in the systematized literature review and obtained from other data sources, including CDC publications, and a handout from the CDC (2021) in Appendix C. The questionnaire is an attempt to standardize primary care providers communication episodes with young adults during primary care visits. The questionnaire's items are scaled using a checklist-style response option: 1 = *Yes* and 0 = *No*.

The project addresses assessment of flu vaccine adherence initially through a draft questionnaire divided into three types of theoretical change patterns (Rogers, 1983) by young adults when asked by primary care providers to accept a flu shot and who are persuaded to do so. The three types of change patterns or change adopters (Rogers, 1983) were identified to match young adults' predicted responses: early adopters of the flu

vaccine who get immunized at the primary care office; late majority who require more persuasion from the primary care providers and who most likely will get immunized in the future; and laggards who will not provide evidence of immunization at the next primary care visit.

The project director created Table 3 that illustrates her qualitative analysis of the literature that she performed. She generated draft items of the questionnaire and the matching script located in Appendix B.

### **Step 2: Expert Validation**

Step 2 of the questionnaire will be conducted when draft items are submitted to 8 health care professionals who are experts on influenza vaccination and primary care practice with young adults. The judges' expertise includes the following characteristics: Family or Internal Medicine M.D. or D.O., Adult Gerontology Nurse Practitioner (AGNP), Family Nurse Practitioner (FNP).

### **Sample and Setting**

The sample for the project consists of empirical and theoretical citations identified in the systematized review, theoretical citations, and other sources such as CDC publications. The future setting for Phase 2 is Penn Medicine Primary Care in Bucks County.

### **Ethical Considerations**

This quality improvement project matches exempt status and does not require review by La Salle and Penn Medicine's Institutional Review Boards. A letter was obtained from both La Salle and Penn Medicine for exemption. The project director

understands that the questionnaire does not involve human subjects. The data sampled and analyzed are textual.

## **Instrumentation**

### **Step 1: Draft Questionnaire**

The instrument development process of the influenza vaccine questionnaire followed steps. Step 1 was completed as the project director created Table 3, a matrix constructed in Microsoft Word to record the qualitative analysis of the literature. Table 3 was organized into three columns for the qualitative analysis of empirical and theoretical literature. The column headings are Meaning Units (text selected from references and supported by citations including author and date), Codes, and Questionnaire items created by the project director based on the code. The qualitative analysis was organized deductively based on the three change patterns, early adopters, late majority, and laggard (Rogers, 1983), and followed Graneheim and Lundman's (2004) method of analysis.

### **Step 2**

The project director will ask eight content experts to participate in a review of draft questionnaire items to assess content validity of the expert type. Each statement of the questionnaire will be critiqued using a 4-point scale: 1 = *not relevant*, 2 = *unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant*, 3 = *relevant but needs minor alteration*, 4 = *very relevant and succinct* (Lynn, 1986). Comments will also be elicited on the Expert Validity form (Appendix C). Polit and Beck's (2006, 2021) process will be used to identify item content validity (I-CVI) and overall survey content validity (S-CVI). Expert feedback will be

used to revise the questionnaire after content validity indexes are determined through numeric calculations of scale ranks and comments are analyzed.

The I-CVI is calculated by adding the 3 or 4 ranks on each item and dividing by the total number of experts. The S-CVI is calculated by adding the total percentages for each item and dividing by the number of items.

Rigor was established for the qualitative analysis of the literature that build the draft items by a faculty member and the Chair of the DNP Project Team who reviewed the audit trail for the qualitative analysis. The faculty member and Chair reviewed Table 3 emphasizing the connections of the meaning units and codes with draft questionnaire items. The script answers matching the questions were developed by using the qualitative statement resources pulled from the qualitative analysis.

### **Procedures for Data Collection**

The project director printed the literature sources in preparation for data analysis. She kept a file of materials and documents the literature used on the analysis. After the draft questionnaire is sent to six experts, the project director will request that they return them via email. The project director will scan the completed forms and share them with the Chair of the DNP Project Team.

### **Plan for Data Analysis**

#### **Step 1: Qualitative**

Microsoft Word was used to create a matrix, Table 3, to analyze textual sources from the literature and other sources using the qualitative method of content analysis (Graneheim & Lundman, 2004). The project director selected textual material or meaning

units supported by author and year, identified codes, and created draft questionnaire items and linked script.

## **Step 2: Quantitative**

The project director will enter data from the Content Validity form sent to 8 expert reviewers into an Excel spreadsheet to analyze I-CVI and S-CVI statistics on experts' responses on the draft questionnaire. She will analyze the comments of the experts and identify themes that might assist with questionnaire revision. Polit and Beck's (2006) method of calculating I-CVI and S-CVI will be used. Eighty percent is used as a cutoff for statement inclusion. To calculate the I-CVI percentage, the number of 3 and 4 ranks per statement is divided by the number of experts. To calculate the S-CVI, all questionnaire statement percentages are summed and divided by the total number of questionnaire items.

## **Questionnaire Validity Data Analysis**

Eight expert reviewers were consulted for content validity of the questionnaire. I-CVI scores were calculated for the thirteen questions to reveal an S-CVI score of 99% validity. There were some additions to the questions because the experts felt it was important to define certain points including question 2 "greater risk of severe disease and complications from the flu" and question 8 "best timing for flu shot is October to December". Some corrections included question 7 "last line may not be unnecessary" which resulted in the deletion of "Symptoms can be very mild to very severe" and question 9 "redundant, consider eliminating first sentence" which resulted in removing the statement "Good safety record". The question 10 comment resulted in the addition of

“Many studies have shown that vaccines do not cause autism. There is a remote risk of Guillain-Barre”.

### **Conclusion and Plan**

Young adults ages 19 to 25 years in the United States are at increased risk for influenza because their annual flu shot adherence is the lowest out of all age groups. Their non-adherence and increased potential for illness have a very large impact on contacts, including family, friends, coworkers, their children, and people in the community. This questionnaire was structured by Rogers’ Change Theory using three patterns of change and revised based on clinical expert judgments with an item validity score of 99%. The hypothesis for this future project is that use of this evidence-based questionnaire and educational script will increase flu shot adherence in young adults ages 19 to 25 years. Data will be collected from the 2021 to 2022 flu season without the use of the questionnaire and will be compared to 2022 to 2023 flu season after the application of the questionnaire during visits in primary care within the Penn Medicine Bucks practice. Results will be published. The questionnaire will then be used throughout all Penn Medicine primary care practices and eventually throughout primary care practices within the United States.

### **Future Applications**

This questionnaire can be used in the future to help increase education and adherence with many other vaccines and age groups. The COVID and measles, mumps, and rubella (MMR) vaccines are of high interest because of the wide variety of misinformation available to the public. The shingles vaccine has changed recently so reeducating the public with updates in age recommendations, the new Shingrix vaccine

differences, and expected side effects is important. The questionnaire can also apply to general vaccine education in all age groups including correction of misconceptions, timing, and preservatives.

## Timeline

### *Proposed Timeline for DNP Project*

Tasks to be completed	Aug 2021	Sept -Oct 2021	Nov 2021	Dec 2021	Jan- Feb 2022	March 2022	April 2022	May -July 2022	August 2022	Sept 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	March -May 2023
Secure Capstone Committee and submit proposal																
Prepare and submit proposal to La Salle																
Defend Proposal																
Obtain clinical expert feedback on additional survey questions																
Meet with Penn Leadership and Medical Staff: overview of project, invitation to take survey																
Administer survey																
Prepare data for analysis																
Analyze data																
Complete Capstone Project paper																
Defend Capstone Project																
Disseminate results																

Identify journal for submission and send email to editor															
Prepare manuscript for submission to journal															

**Committee**

The committee members are from Penn Medicine and La Salle University. Dr. Frances Kinder is the chair and Dr. Mary Palovcak is the faculty reader from La Salle University. Dr. Alan Kravatz is the Penn Medicine clinical faculty preceptor.

## References

- American Association of Nurse Practitioners. (2020). *Nurse practitioners in primary care*. <https://www.aanp.org/advocacy/advocacy-resource/position-statements/nurse-practitioners-in-primary-care>
- American Academy of Family Physicians. (2021). *ACIP updates flu vaccine recommendations for 2020-2021*. <https://www.aafp.org/news/health-of-the-public/20200909acipflu.html>
- American Academy of Family Physicians. (2020). *ACIP updates flu vaccine recommendations for 2020-2021*. AAFP News. <https://www.aafp.org/news/health-of-the-public/20200909acipflu.html>
- Benjamin, Stephanie, Bahr, Kaitlin O. (2016). Barriers associated with seasonal influenza vaccination among college students. *Influenza Research and Treatment*, 2016, 1-4. <https://doi.org/http://dx.doi.org/10.1155/2016/4248071>
- Brunsveld, A. H., Arbous, M. S., Kuiper, S. G., de Jonge, E. (2015). A comprehensive method to develop a checklist to increase safety of intra-hospital transport of critically ill patients. *Critical Care*, 19(214), 1-9. <https://doi.org/10.1186/s13054-015-0938-1>
- Centers for Disease Control and Prevention. (2019a). *Estimated influenza illnesses, medical visits, hospitalizations, and deaths in the United States — 2017–2018 influenza season*. <https://www.cdc.gov/flu/about/burden/2017-2018.htm>
- Centers for Disease Control and Prevention. (2020b). *Early-Season influenza vaccination uptake and intent among adults – United States, September 2020*. *FluVaxView*.

*Seasonal influenza (Flu)*. <https://www.cdc.gov/flu/fluview/nifs-estimates-sept2020.htm>

Centers for Disease Control and Prevention. (2020c). *Estimated influenza illnesses, medical visits, hospitalizations, and deaths in the United States — 2018–2019 influenza season*. <https://www.cdc.gov/flu/about/burden/2018-2019.html>

Centers for Disease Control and Prevention. (2020d). *Estimated influenza illnesses, medical visits, hospitalizations, and deaths in the United States — 2019–2020 Influenza Season*. <https://www.cdc.gov/flu/about/burden/2019-2020.html>

Centers for Disease Control and Prevention. (2020e). *Flu vaccination coverage, United States, 2018–19 influenza season*. <https://www.cdc.gov/flu/fluview/coverage-1819estimates.htm>. <https://www.cdc.gov/flu/fluview/coverage-1819estimates.htm>

Centers for Disease Control and Prevention. (2020f). *Flu vaccination coverage, United States, 2019–20 influenza season*. *FluVaxView*. *Seasonal influenza (Flu)*. <https://www.cdc.gov/flu/fluview/coverage-1920estimates.htm>

Centers for Disease Control and Prevention. (2020g). *Flu vaccine and people with egg allergies*. <https://www.cdc.gov/flu/prevent/egg-allergies.htm>

Centers for Disease Control and Prevention. (2020h). *General population*. <https://www.cdc.gov/flu/resource-center/freeresources/print/print-general.htm>

Centers for Disease Control and Prevention. (2020i). *How to prevent flu*. <https://www.cdc.gov/flu/prevent/prevention.htm>

Centers for Disease Control and Prevention. (2020j). *Misconceptions about flu vaccines*. <https://www.cdc.gov/flu/prevent/misconceptions.htm>

Centers for Disease Control and Prevention. (2021k). *How does flu make you sick?*.

<https://www.cdc.gov/flu/resource-center/freeresources/video/media-video.htm>

Centers for Disease Control and Prevention. (2021l). *Influenza vaccinations administered to adults in pharmacies and physician medical offices, United States. FluVaxView. Seasonal influenza (Flu)*.

<https://www.cdc.gov/flu/fluvoxview/dashboard/vaccination-administered.html>

Centers for Disease Control and Prevention. (2021m). *Who needs a flu vaccine and when*.

<https://www.cdc.gov/flu/prevent/vaccinations.htm>

Centers for Disease Control and Prevention. (2021n). *Estimated influenza illnesses, medical visits, hospitalizations, and deaths in the United States — 2019–2020 Influenza season*. <https://www.cdc.gov/flu/about/burden/2019-2020.html>

Centers for Disease Control and Prevention. (2021o). *Flu season*.

<https://www.cdc.gov/flu/about/season/flu-season.htm>

Centers for Disease Control and Prevention. (2021p). *Key facts about influenza (Flu)*.

<https://www.cdc.gov/flu/about/keyfacts.htm>

Ferdinands, J. M., Gaglani, M., Martin, E. T., Middleton, D., Monto, A. S., Murthy, K., Silverira, F.P., Talbot, H. K., Zimmerman, R., Alyanak, E., Strickland, C., Spencer, S., & Fry, A. M. (2019). Prevention of influenza hospitalization among adults in the United States, 2015–2016: Results from the US hospitalized adult influenza vaccine effectiveness network (HAIVEN). *Journal of Infectious Diseases*, 220(8), 1265-1274. <https://doi.org/10.1093/infdis/jiy723>

- Franks, A., Jandu, N. (2017). Vaccine rates and protective health-behaviors amongst college students during influenza season. *iMedPub Journals*, 6(3), 1-8.  
<https://doi.org/10.4172/2254-609X.100066>
- Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, 24(2), 105-112. <https://doi.org/10.1016/j.nedt.2003.10.001>
- Grohskopf, L. A., Sokolow, L. Z., Broder, K. R., Walter, E. B., Fry, A. M., & Jernigan, D. B. (2018). *Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices—United States, 2018–19 Influenza Season*. Centers for Disease Control MMWR Office.  
<https://doi.org/10.15585/mmwr.rr6703a1>
- Hales, B. M., Pronovost, P. J. (2006). The checklist- a tool for error management and performance improvement. *Journal of Critical Care*, (21), 231-234.  
<https://doi.org/10.1016/j.jcrc.2006.06.02>
- Lynn, M.R. (1986). Determination and quantification of content validity. *Nursing Research*, 35, 382-385.
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendation. *Research in Nursing and Health*, 29, 489-492.
- Polit, D. F., & Beck, C. T. (2021). *Nursing research: Generating and assessing evidence for nursing practice* (11<sup>th</sup> ed.). Wolters Kluwer.

Rogers, E. M. (1983). *Diffusion of innovations* (3<sup>rd</sup> ed.). The Free Press.

Ryan, K. A., Filipp, S. L., Gurka, M. J., Zirulnik, A. (2019). Understanding influenza vaccine perspectives and hesitancy in university students to promote increased vaccine uptake. *Heliyon*, 5(10), 1-7.

<https://doi.org/https://doi.org/10.1016/j.heliyon.2019.e02604>

Steyn, L. (2019). Understanding flu vaccination. *Professional Nursing Today*, 32(1), 21-26.

U.S Department of Health and Human Services, Centers for Disease Control and Prevention. (2020). *Recommended adult immunization schedule for ages 19 years and older*

Walker-Harding, L. R., Christie, D., & Joffe, A. (2017). Young adult health and well-being: A position statement for adolescent health and medicine. *Journal of Adolescent Health*, 60, 758-759. [https://www.jahonline.org/article/S1054-139X\(17\)30164-7/fulltext](https://www.jahonline.org/article/S1054-139X(17)30164-7/fulltext)

Yeung, M. P. S., Lam, F. L. Y., & Coker, R. (2016). Factors associated with the uptake of seasonal influenza vaccination in adults: a systematic review. *Journal of Public Health (Oxford, England)*, 38(4), 746-753. <https://doi.org/10.1093/pubmed/fdv194>

**Table 1***Search Process Review of Literature*

Database	Total Articles	Articles Remaining After Title Review	Articles Remaining After Abstract Review	Articles Retrieved and Examined	Articles that fit Inclusion Criteria
Cochrane Library	0	0	0	0	0
Joanna Briggs Institute EBP Database	0	0	0	0	
CINAHL	15	10	10	10	0
Medline	1	1	1	1	1
PubMed	4	4	4	4	4
HAPI	0	0	0	0	0
TRIP	0	0	0	0	0
ProQuest Dissertations & Theses Global	3	3	3	3	3
Science Direct	1	1	1	1	1
AAP News Journal and Gateway	1		1		
Jama Network	1	1	1	1	1

**Table 2***Table of Evidence of Appraised Literature*

Database # Article First Author, Year (full citation in References)	Purpose of Study Major Variables (IV, DV) or Phenomenon	Theory/ Conceptual Framework	Design	Measurement Major Variables (Instrument)	Data Analysis (Name of Statistics, descriptive, Inferential and Results)	Findings	Evidence Level of Research & Quality Johns Hopkins Nursing Evidence-Based Practice
AAP News and Journals Gateway  Glanz et al. (2017)	Web-based Social Media Intervention to Increase Vaccine Acceptance: A Randomized Controlled Trial IV: web-based content presented in two arms  DV: increased uptake of childhood vaccines	None listed	3-arm randomized control trial	Logistic regression	739 total participants in VSM (visit social media) and VI (website with vaccine information) arms.	33/75 vaccine hesitant participants visited web sites compared to 226/664 non-hesitant participants. Infants in VSM arm more likely to be up to date at age 200 days than infants in UC arm (OR = 1.92; 95% CI, 1.07–3.47. Up-to-date status did not differ significantly between VI and UC arms or VSM and VI arms. Interaction between study arm and baseline vaccine hesitancy status was not statistically significant ( $p = .52$ ). Among all infants enrolled from birth to age 200 days in KPCO ( $n = 8877$ ) during study, rate of up-to-date status was 86.3%, suggesting UC infant population representative of overall KPCO infant population.	1A
Cutrona, et al. (2018)	Improving Rates of Outpatient Influenza Vaccination Through EHR Portal Messages and Interactive	Factorial design	Randomized control trial	Bivariate analysis and multivariate analysis	20,000 patients assigned to each of 4 study arms including a portal message, a phone call, both phone call and message, or	Among portal users, 14.0% (702) of both portal messages and calls, 13.4% (669) of message recipients, 12.8% (642) of call recipients, and 11.6% (582) of those with usual care received flu vaccines. Multivariable analysis of portal users, those receiving portal messages alone (OR 1.20, 95% CI 1.06–1.35) or calls alone (OR 1.15 95% CI 1.02–1.30) were more likely than usual care recipients to	1A

	<p>Automated Calls: A Randomized Controlled Trial</p> <p>IV: receipt of portal message or IVR phone call, both message and call, or no intervention</p> <p>DV: improvement in influenza vaccination rates</p>				<p>no intervention (usual care).</p>	<p>be vaccinated. Those receiving messages and calls were also more likely than usual care group to be vaccinated (ad hoc analysis, using a Bonferroni correction: OR 1.29, 97.5% CI 1.13, 1.48). Among non-portal users, 8.5% of call recipients and 8.6% of usual care recipients received influenza vaccines (p=NS).</p>	
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<p>JAMA Network</p> <p>Szilagyi et al. (2020)</p>	<p>Effect of Patient Portal Reminders Sent by a Health Care System on Influenza Vaccination Rates.</p> <p>4-arm Randomized Clinical Trial</p> <p>IV: portal reminders DV: influenza vaccine rates</p>	<p>Models included a fixed effect for study arm (0 vs 1 vs 2 vs 3 reminders), random practice effects, and adjustment for patient characteristics (age, sex, race/ethnicity, and vaccination history).</p>	<p>4-arm randomized clinical trial</p>	<p>Chi-square test</p>	<p>A total of 164,205 patients (mean [SD] age, 46.2 [19.6] years; 95,779 [58.3%] female) were randomly allocated to 1 of the 4 study arms via letter in the electronic health record portal (EHR). (38% in the 1-reminder group, 38.2% in the 2-reminder group, 38.3% in the 3-reminder group, no reminder group).</p>	<p>A total of 52.9% of patients in the 1-reminder group, 55.9% in the 2-reminder group, and 58.8% in the 3-reminder group read the reminder letters at least once; for the 2-reminder group, 33.2% read both letters, and for the 3-reminder group, 12.8% read 2 letters and 24.5% read 3 letters. Of all influenza vaccinations recorded in the EHR, data for 0.8% of controls came exclusively from self-reporting vaccinations to the portal vs 3.6% of the 1-reminder group, 5.7% of the 2-reminder group, and 7.5% of the 3-reminder group, suggesting that the portal reminders prompted many patients to report vaccinations received elsewhere. Only 416 patients (0.3%) visited embedded website providing information about influenza vaccination; even fewer viewed video testimonials. Across all intervention groups, patients who opened 1 letter or more, more likely to be vaccinated than were those who did not open any letters (39.1% vs 25.4%; adjusted RR, 1.41; 95% CI, 1.38-1.44). We also used instrumental variables approach to adjust intention-to-treat effect of assignment to intervention for the proportion of intervention patients who opened any letters.</p>	<p>1A</p>
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						Although intention-to-treat effect of 1, 2, and 3 reminders was estimated to be a 0.66–percentage point increase in rates, local mean treatment effect of opening a letter, using assignment to intervention as an instrument, estimated to be 1.18 percentage points and was statistically significant (risk difference, 1.18; 95% CI, 0.29-2.07).	
Medline Halloran & Hudgens (2018)	Estimating population effects of vaccination using large, routinely collected data.  Observational Study  IV: flu vaccination  DV: direct effectiveness of flu vaccination in preventing disease	Test-negative observational design	Observational study	Regression Model	Study was conducted in Ontario healthcare system using respiratory specimens at a lab during the 2010-2011 flu season and information of flu vaccination receipt obtained from billing claims from the Ontario Health Insurance Plan (OHIP).	75% elderly adults in Ontario received vaccine through physicians that submitted claims through OHIP. 569 individuals tested positive for flu and 238 of them were vaccinated versus 1661 individuals who tested negative of whom 934 were vaccinated. Vaccine effectiveness was 44% (95% CI 29, 53%)	1A
PubMed Ferdinands al. (2018)	Prevention of influenza hospitalization among adults in the United States, 2015–2016: Results	Prospective test-negative case control design	HAIVEN study included 1467 people hospitalized in 8	Pearson Chi-square or Fisher exact test for categorical variables and	67% total patients were vaccinated with flu shot. 20% received trivalent and 80% received	22 patients who were admitted to ICU, median length of stay in hospital was shorter among vaccinated cases versus unvaccinated cases. (8.5 vs 12 days, $p = .73$ ). 24% of unvaccinated patients and 12% of	1A

	<p>from the US hospitalized adult influenza vaccine effectiveness network (HAIVEN).</p> <p>Multiyear test-negative case control study  IV: flu vaccinated given versus no flu vaccine given  DV: flu vaccine effectiveness</p>		<p>different Texas Hospitals with possible influenza associated illnesses confirmed by laboratory specimen, pt. 18 years of age or older during the 2015-2016 flu season</p>	<p>Wilcoxon rank-sum test or <i>t</i> test for continuous variables</p>	<p>quadrivalent vaccine. Of those ages &gt;65 years 45% received inactivated high-dose, 45% received standard quadrivalent-dose vaccine, and 10% received trivalent standard dose vaccine.</p>	<p>vaccinated patients were infected with influenza. Vaccination was 51% (95% CI, 29%–65%) and 53% (95% CI, 11%–76%) effective in preventing hospitalization due to influenza. VE was significantly protective for all age groups (18–49 years, 50–64 years, and ≥65 years; and did not vary significantly by age among all enrollees or when restricting cases to patients with influenza A(H1N1) pdm09. Patients vaccinated in current season only or in both current and prior influenza seasons had significantly protective VE of 52% (95% CI, 12%–74%) and 55% (95% CI, 35%–69%).</p>	
<p>PubMed  Hughes et al. (2020)</p>	<p>Projected population benefit of increased effectiveness and coverage of influenza vaccination on influenza burden in the United States.</p> <p>Observational retrospective</p>	<p>Compartmental model</p>	<p>Mathematical Model to estimate number of influenza associated illnesses</p>	<p>5,000 Monte Carlo simulations to construct 95% credible intervals (Cr I; 2.5% and 97.5% values) around the point estimates of the additional</p>	<p>Comparison of 3 season estimated number of prevented flu - associated illnesses, medically attended illnesses, and hospitalization across 5 age groups.</p>	<p>Low severity season (2011–12), 5% increases in VE across all ages would prevent an additional 228,000 (95% Cr I: 209,000–299,000) illnesses, 112,000 (95% Cr I: 102,000–147,000) medically-attended illnesses, and 4,900 (95% Cr I: 4,000–7,700) hospitalizations High severity season an additional 1,050,000 (981,000–1,170,000) illnesses, 526,000 (95% Cr I: 486,000–589,000) medically-attended illnesses, and 25,000 (95% Cr I: 22,000–30,000) hospitalizations</p>	<p>1A</p>

	<p>study, meta-analysis IV: IV: increased effectiveness and coverage of influenza vaccination DV: flu burden in the U.S.</p>			prevented burden		<p>would be prevented. High severity season, increasing VE by 5% among adults 50–64 years would result in the greatest numbers of additional illnesses prevented. For adults aged <math>\geq 65</math> years, an increase of 5% in VE would translate to 19,000 more influenza-associated hospitalizations prevented in the high severity season. Coverage was consistently lower in the 18 to 49-year age group compared with other age groups. Moderate severity season, among people aged 18–49 years, our analysis showed that increasing coverage by only 5% would prevent hundreds of thousands more illnesses and increasing coverage to 70% would prevent 3,780,000 total illnesses. Focusing vaccination efforts on working-aged adults also has economic benefits, as one study estimated that this age group experiences an average of 8 million productive days lost and high indirect costs due to influenza.</p>	
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Science Direct Ryan et al. (2019)	Understanding influenza vaccine perspectives and hesitancy in university students to promote increased vaccine uptake. IV: vaccine perspectives and hesitancy in university students  DV: increased flu vaccine uptake	Anonymou s cross- sectional survey	None listed	Chi-square testing to measure knowledge differences, SAS 9.4 analysis to measure demographi cs and key outcomes.	Survey was collected via REDCap via University of Florida from March to May 2018. A total of 1,122 students responded to questions about demographic information, vaccination history, preference for vaccine type, knowledge of flu vaccines, reasons for accepting or refusing flu vaccines, perceived barriers to vaccines, preferences to receiving flu vaccine education and information.	1,122 students included in survey, Majority were female (80.0%), non-Hispanic white (69.7%) and US citizens (94.2%). Total vaccinated (62.8%). 67.2% of students expressed intent on getting their seasonal flu shot in upcoming fall.	1B
iMedPub journals Franks & Jandu (2017)	Vaccine Rates and Protective Health Behaviors amongst College Students during	none	Survey design	Chi-square, SPSS, and Microsoft Excel	270 students participated in survey via SurveyMonkey which asked about attitudes, perceptions,	265 respondents total, 69% female, 31% male, 32% freshman, 32% sophomore, 22% juniors, 15% seniors, 31% in Art and Science Programs, 28% in Business and Economics, 13% in College of Education, 28% in	1A

	<p>Influenza Season</p> <p>IV: Protective Health Behaviors</p> <p>DV: Vaccine Rates</p>				<p>knowledge, vaccine status, and other behavioral changes in response to 2014-2015 seasonal influenza outbreak.</p>	<p>Nursing and Health Sciences. 32% total reported having flu vaccine during 2013-2014 flu season, vaccination rates for each graduate year had no statistical significance between groups but noted was decline in vaccine rates from one season to next (6% decreased in freshman, 13% for sophomores, 38% for juniors, 41% for seniors from 2013-2014 compared to 2014-2015 seasons which was considered statistically significant (<math>p &lt; 0.05</math>) chi-square value of 6.211 and a p-value of 0.0127. Despite a 12% decrease in vaccination from 2013-2014 to 2014-2015 flu season students in Nursing and Health Sciences Programs showed greatest vaccination rates overall. Non-vaccinated respondents for 2014-2015 season said they were not worried about getting flu (43%), they forgot or were too busy (15%), did not want vaccine (12%), felt the vaccine was ineffective (7%), believed the vaccine makes people sick (7%), parental influence against vaccine (11.6%), other reasons (10%), no reason (14%).</p>	
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<p>PubMed</p> <p>Benjamin &amp; Bahr (2016)</p>	<p>Barriers Associated with Seasonal Influenza Vaccination among College Students</p> <p>IV: college student's attitudes towards flu vaccines</p> <p>DV: flu vaccine adherence</p>	<p>None listed</p>	<p>Cross-sectional design</p>	<p>Multivariate logistic regression analysis, t-test and chi square test</p>	<p>383 questionnaires were given to a convenience sample of students at California State University, Northridge (CSUN) during a one-week period in January 2014. Participants were at least 18 years of age, able to read and write English, completed a questionnaire with demographic information including age, sex, race/ethnicity, campus living status, year of study, health care information including insurance status, last visit with a medical</p>	<p>Mean age was 21 years, 55.8% were female, 45.4% were Hispanic, 82.6% reported residing off campus, 37.2% were in their first year, 50.8% reported seeing a medical provider within last six months, 59.6% reported being encouraged to receive seasonal influenza vaccine, and 72.2% reported having health insurance. 20% of respondents reported having their flu shot in last 6 months. Year of undergraduate study showed a significant association with receiving flu shot (<math>p &lt; 0.02</math>) freshman <math>N=35</math> (44.3%). Mean age was 21.1 years. Males had a 50.6% vaccination rate as compared to females at 49.4%, though only 20.6% of total participants were vaccinated. 47.8% of students believed that they could get flu from flu shot. 41.6% believed that there was risk of dangerous side effects. 22.4% believed that vaccines were too expensive. 26.6% said that they were not informed that flu shot may be important. 39.6% believed that they were not in danger of contracting flu. 19.4% of the students said that they didn't know where to go to get flu shot.</p>	<p>1A</p>
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					<p>provider, whether they had previously received encouragement about getting the seasonal flu shot, previous vaccine history and whether they planned to receive the flu shot this season. Those who were not vaccinated were asked about attitudes about seasonal flu vaccines including cost, access, importance, and risks of vaccination. Attitudes are assessed using a Likert scale from 1= agree and 4= strongly disagree</p>		
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**Table 3**

*Qualitative Analysis of Literature: Meaning Units, Codes, and Draft Questionnaire Items Structured by Change Patterns*

Meaning unit (citation, date)	Codes	Draft Questionnaire Items
<b>Early Adopter</b>		
<p>Flu is a contagious virus that infects the nose, throat, and lungs. Symptoms include fever, sore throat, cough, runny nose, headache, body aches, and fatigue. Some people get vomiting and diarrhea which is more common in children. Symptoms can be mild to severe (CDC, 2021).</p>	Experience	Have you had the flu in the past? (Ryan et al., 2019)
<p>Anyone can get the flu, but people who are under the age of 5 years, pregnant, older than 65 years, or have chronic health issues like heart disease, asthma, and diabetes are at greatest risk of severe disease, complications, and death (CDC, 2021).</p>	Risk	Are you worried about getting the flu? (Franks et al., 2017)
<p>Previous experience with flu vaccination and side effects can influence the decision to have the annual flu vaccine (Ryan et al., 2019). Vaccines can cause side effects that are generally mild and go away on their own within a few days. Common side effects include soreness, redness, and/or swelling from the shot, headache, fever, nausea, muscle aches (CDC, 2021).</p>	Vaccination history	Have you had the flu vaccine in the past? (Ryan et al., 2019)
<b>Late Majority</b>		
<p>Some people who get vaccinated still get sick with flu. When that happens, vaccination has been shown in several studies to reduce severity of illness in those people who get vaccinated but still get sick (CDC, 2021).</p>	Efficacy	Do you think the flu shot works? (Ryan et al., 2019)

<p>The composition of influenza vaccines is changed in most seasons, with one or more vaccine strains replaced annually to provide protection against viruses that are anticipated to circulate (Grohskopf et al., 2018)</p>	<p>Risk</p>	<p>Does the severity of the flu season affect your decision to have your flu vaccine? (Ryan et al. 2019)</p>
<p>Getting the flu shot annually is the most important step in preventing the flu. Washing hands, covering cough and sneezing, and staying away from sick people is another way to prevent the spread of flu. Getting the flu shot also protects others in the community from flu because it reduces the risk of spread of illness from person to person (CDC, 2021).</p>	<p>Protection</p>	<p>Do you believe that the flu shot is the best way to protect yourself against the flu? (Ryan et al., 2019)</p>
<p>Flu can spread from one person to another before symptoms occur but is most contagious in the first 3 to 4 days after illness begins. Healthy people can infect others one day before they develop symptoms and up to 5 to 7 days after becoming sick. Symptoms can be very mild to very severe (CDC, 2021).</p>	<p>Immunity</p>	<p>Do you think your immune system alone will protect you against the flu? (Ryan et al., 2019)</p>
<p><b>Laggard</b></p>		
<p>Flu season in the U.S. is in the fall and winter. The season peaks between December and February and can last until as late as May. The best time to have your flu vaccine is between October and December (CDC, 2021).</p>	<p>Timing</p>	<p>Did you forget to have your flu shot? (Franks et al., 2017)</p>
<p>Good safety record. Hundreds of millions of Americans have safely received flu vaccines over the past 50 years, extensive research supporting the safety of flu vaccines (CDC, 2021).</p>	<p>Safety</p>	<p>Do you think that the flu shot safe? (CDC, 2021)</p>

Vaccines can cause side effects that are generally mild and go away on their own within a few days. Common side effects include soreness, redness, and/or swelling from the shot, headache, fever, nausea, muscle aches (CDC, 2021).	Side effects	Are you worried about side effects? (Franks et al., 2017)
The flu vaccine cannot give you the flu because it is made with killed or inactivated flu virus strains (CDC, 2021).	Misconceptions	Can you get the flu from the flu shot? (CDC, 2021)
History of childhood vaccination can influence attitudes towards necessity of adult vaccination (Ryan et al., 2019).	Previous vaccination	Did you have your childhood vaccines? (Ryan3 et al., 2019)
Family attitude towards vaccines can have an impact on the decision to vaccinate (Ryan et al., 2019).	Family influence	Does your family tell you not to have the flu shot? (Franks et al., 2017)

**Figure 1**

U.S. Influenza Data for Adults Ages 18-49										
Year	% Vaccination ages 18-49	Symptomatic Influenza cases in ages 18-49	Symptomatic cases in all ages	% Disease Burden in ages 18-49 years	Flu Related Hospitalizations in ages 18-49	Total Hospitalizations in all ages	% Hospitalizations in ages 18-49	Flu Related Deaths in age 18-49	Flu Related Deaths in all ages	% Deaths in ages 18-49
2017-2018	26.90%	14,428,065	44,802,629	32%	80,985	808,129	10%	2,803	61,099	5%
2018-2019	34.90%	9,794,700	28,908,721	34%	54,798	375,126	15%	1,590	27,619	6%
2019-2020	38.40%	13,311,444	34,949,979	38%	74,717	380,209	20%	2,184	20,342	11%
2020-2021 results not finalized by CDC			818,939						932	

Appendix A  
Project Operational Matrix

Program Goal 1: Increase consistent flu vaccine education for young adults ages 19 to 25 years					
Program Goal 2: Increase flu vaccine adherence for young adults ages 19 to 25 years					
Program Goal 3: Reduce overall flu illness burden for people in the United States					
Objectives	Methods and Techniques	Timeline	Evaluation Methods	Responsible Personnel	Outcomes
<b>Short Term Objectives:</b> Increase consistency in provider communication when discussing the flu shot with young adult patients.					
1. To create an evidence- and theoretically based checklist for young adults to promote influenza vaccine adherence.	Qualitative analysis to identify themes from research and theoretical sources for checklist	Oct to Nov 2021	Expert review using Lynn (1986) scale	Project Director and DNP Project Team	Revised checklist
<b>Intermediate-term Objectives:</b> Increase flu vaccine adherence in young adults in the practice.					
1. To invite the primary care team to review the validated checklist.	Providers present and discuss checklist information with each participating young adult patient.	January to March 2022	Results/recommendations on checklist items and process of implementation	Participating Penn Medicine Bucks CCA Providers	Revised checklist and implementation process
2. To consult with information technology staff to determine process of including checklist in EPIC.	IRB approval by Penn Medicine and La Salle University received, preparation of checklist for EPIC.	August-Sept 2022	Checklist added to EPIC	Participating Penn Medicine Bucks CCA Providers  Information Technology staff  Project Director	Checklist added to EPIC
<b>Long-term Objectives:</b> Reduce flu illness burden in the United States by using this standardized questionnaire.					
1. To disseminate the checklist for review by all primary care		September 2023		Project Director	Primary care practices adopt

practices within Penn Medicine.				Information Technology staff	checklist for adult patients
2. To disseminate the checklist for review by all primary care offices across the U.S. to use this checklist.		September 2024	Increased flu vaccine acceptance in young adults and reduced flu illness burden in young adult patients within the U.S.	Project Director	Primary care practices adopt checklist for adult patients

**Appendix B**  
**Questionnaire with Script**

Questionnaire Items	Yes	No	Script Response
<b>Early Adopter</b>			
Have you had the flu in the past?			Flu is a contagious virus that infects the nose, throat, and lungs. Symptoms include fever, sore throat, cough, runny nose, headache, body aches, and fatigue. Some people have vomiting and diarrhea which is more common in children. Symptoms can be mild to severe (CDC, 2021).
Are you worried about getting the flu?			Anyone can get the flu, but people who are under the age of 5 years, pregnant, older than 65 years, or have chronic health issues like heart disease, asthma, and diabetes are at greatest risk (CDC, 2021).
Have you had the flu vaccine in the past?			Previous experience with flu vaccination and side effects can influence the decision to have the annual flu vaccine (Ryan et al., 2019).
Will you have your flu shot today?			
<b>Late Majority</b>			
Do you think the flu shot works?			Some people who get vaccinated may still get sick with flu. When that happens, vaccination has been shown in several studies to reduce severity of illness in those people who get vaccinated but still get sick (CDC, 2021).
Does the severity of the flu season effect your decision to have your flu vaccine?			The composition of influenza vaccines is changed in most seasons, with one or more vaccine strains replaced annually to provide protection against viruses that are anticipated to circulate (Grohskopf et al., 2018, pp 8).
Do you believe that the flu shot is the best way to protect yourself against the flu?			Getting the flu shot annually is the most important step in preventing the flu. Washing hands, covering cough, and sneezing, and staying away from sick people is another way to prevent the spread of flu. Getting the flu shot also protects others in the community from flu because it reduces the risk of spread of illness from person to person (CDC, 2021).

Do you think your immune system alone will protect you against the flu?			Flu can spread from one person to another before symptoms occur but is most contagious in the first 3 to 4 days after illness begins. Healthy people can infect others one day before they develop symptoms and up to 5 to 7 days after becoming sick. Symptoms can be very mild to very severe (CDC, 2021).
Will you have your flu shot today?			
<b>Laggard</b>			
Did you forget to have your flu shot?			Flu season in the U.S. is in the fall and winter. The season peaks between December and February and can last until as late as May (CDC, 2021).
Do you think that the flu shot is safe?			Good safety record. Hundreds of millions of Americans have safely received flu vaccines over the past 50 years, extensive research supporting the safety of flu vaccines (CDC, 2021).
Are you worried about side effects?			Vaccines can cause side effects that are generally mild and go away on their own within a few days. Common side effects include soreness, redness, and/or swelling from the shot, headache, fever, nausea, and muscle aches. The flu vaccine cannot give you the flu because it is made with killed or inactivated flu virus strains (CDC, 2021).
Can you get the flu from the flu shot?			
Did you have your childhood vaccines?			History of childhood vaccination can influence attitudes towards necessity of adult vaccination (Ryan et al., 2019).
Does your family tell you not to have the flu shot?			Family attitudes toward vaccines can have an impact on the decision to vaccinate (Ryan et al., 2019).
Will you have your flu shot today?			

## Appendix C

### *Expert Validity of Young Adult Influenza Adherence Questionnaire*

<p>Directions:</p> <p>Content Experts: Please critique parts of the draft on the influenza adherence questionnaire for young adults.</p> <ul style="list-style-type: none"> <li>• Please read each item and rank each using the scale provided. Use yellow highlighting to select the number on the 4-point scale provided, save the document, and email it to gillt1@lasalle.edu.</li> <li>• Kindly comment on additions, deletions, and revisions as you evaluate each section. Thank you very much.</li> </ul>						
<b>Early Adopter</b>						
Have you had the flu in the past?	Flu is a contagious virus that infects the nose, throat, and lungs. Symptoms include fever, sore throat, cough, runny nose, headache, body aches, and fatigue. Some people have vomiting and diarrhea which is more common in children. Symptoms can be mild to severe (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Are you worried about getting the flu?	Anyone can get the flu, but people who are under the age of 5 years, pregnant, older than 65 years, or have chronic health issues like heart disease, asthma, and diabetes are at greatest risk (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Have you had the flu vaccine in the past?	Previous experience with flu vaccination and side effects can influence the decision to have the annual flu vaccine (Ryan et al., 2019). Vaccines can cause side effects that are generally mild and go away on their own within a few days. Common side effects include soreness, redness, and/or swelling from the shot,	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment

	headache, fever, nausea, and muscle aches (CDC, 2021).					
Will you have your flu shot today?						Comment
<b>Late Majority</b>						
Do you think the flu shot works?	Some people who get vaccinated may still get sick with flu. When that happens, vaccination has been shown in several studies to reduce severity of illness in those people who get vaccinated, but still get sick (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Does the severity of the flu season effect your decision to have your flu vaccine?	The composition of influenza vaccines is changed in most seasons, with one or more vaccine strains replaced annually to provide protection against viruses that are anticipated to circulate (Grohskopf et al., 2018, pp 8).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Do you believe that the flu shot is the best way to protect yourself against the flu?	Getting the flu shot annually is the most important step in preventing the flu. Washing hands, covering cough, and sneezing, and staying away from sick people is another way to prevent the spread of flu. Getting the flu shot also protects others in the community from flu because it reduces the risk of spread of illness from person to person (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment

Do you think your immune system alone will protect you against the flu?	Flu can spread from one person to another before symptoms occur but is most contagious in the first 3 to 4 days after illness begins. Healthy people can infect others one day before they develop symptoms and for up to 5 to 7 days after becoming sick. Symptoms can be very mild to very severe (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Will you have your flu shot today?						Comment
<b>Laggard</b>						
Did you forget to have your flu shot?	Flu season in the U.S. is in the fall and winter. The season peaks between December and February and can last until as late as May (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Do you think that the flu shot is safe?	Good safety record. Hundreds of millions of Americans have safely received flu vaccines over the past 50 years, extensive research supporting the safety of flu vaccines (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment

Are you worried about side effects?	Vaccines can cause side effects that are generally mild and go away on their own within a few days. Common side effects include soreness, redness, and/or swelling from the shot, headache, fever, nausea, and muscle aches (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Can you get the flu from the flu shot?	The flu vaccine cannot give you the flu because it is made with killed or inactivated flu virus strains (CDC, 2021).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Did you have your childhood vaccines?	History of childhood vaccination can influence attitudes towards necessity of adult vaccination (Ryan et al., 2019).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Does your family tell you not to have the flu shot?	Family attitudes toward vaccines can have an impact on the decision to vaccinate (Ryan et al., 2019).	1 = not relevant	2 = unable to assess relevance without item revision or item in need of such revision that it would no longer be relevant	3 = relevant but needs minor alteration	4 = very relevant and succinct	Comment
Will you have your flu shot today?						

## Appendix D

### *Draft Questionnaire Prior to Expert Review Feedback*

<b>Early Adopter</b>	Revised Items	Revised Script
Have you had the flu in the past?	No revision	
Are you worried about getting the flu?	No revision	Anyone can get the flu, but people who are under the age of 5 years, pregnant, older than 65 years, or have chronic health issues like heart disease, asthma, and diabetes are at greatest risk of severe disease, complications, and death (CDC, 2021).
Have you had the flu vaccine in the past?	Revision	Previous experience with flu vaccination and side effects can influence the decision to have the annual flu vaccine (Ryan et al., 2019). If you have had the flu shot before your immune system will tolerate the flu shot again.
Will you have your flu shot today?	No revision	No revision
<b>Late Majority</b>		
Do you think the flu shot works?	No revision	No revision
Does the severity of the flu season effect your decision to have your flu vaccine?	No revision	No revision
Do you believe that the flu shot is the best way to protect yourself against the flu?	No revision	No revision
Do you think your immune system alone will protect you against the flu?	Revision	Flu can spread from one person to another before symptoms occur, but is most contagious in the first 3 to 4 days

		after illness begins. Healthy people can infect others one day before they develop symptoms and for up to 5 to 7 days after becoming sick. Being unvaccinated can increase your risk of complications, hospitalization, and death (CDC, 2021).
Will you have your flu shot today?	No revision	No revision
<b>Laggard</b>		
Did you forget to have your flu shot?	No revision	Flu season in the U.S. is in the fall and winter. The season peaks between December and February and can last until as late as May. The best time to have your flu vaccine is between October and December (CDC, 2021).
Do you think that the flu shot is safe?	No revision	No revision
Are you worried about side effects?	No revision	Vaccines can cause side effects that are generally mild and go away on their own within a few days. Common side effects include soreness, redness, and/or swelling from the shot, headache, fever, nausea, muscle aches. Many studies have shown that vaccines do not cause autism. There is a remote risk of Guillain-Barre' (CDC, 2021).
Can you get the flu from the flu shot?	No revision	The flu vaccine cannot give you the flu because it is made with killed or inactivated flu virus strains (CDC, 2021).
Did you have your childhood vaccines?	Revision	History of childhood vaccination can influence attitudes towards necessity of adult vaccination (Ryan et al., 2019). If you had your childhood vaccines your immune system has already been

		exposed to vaccines and you can continue to tolerate vaccines.
Does your family tell you not to have the flu shot?	Revision	Family attitudes toward vaccines can have an impact on the decision to vaccinate (Ryan et al., 2019). Despite your family's views, you are an adult and are permitted to make your own private decisions for your personal health
Will you have your flu shot today?	No revision	No revision

## Appendix E

Expert Content Validity Scoring										
Question Number	Expert #1	Expert #2	Expert #3	Expert #4	Expert #5	Expert #6	Expert #7	Expert #8	I-CVI Score	Comments
1	4	4	4	4	4	4	4	3	100%	If the patient is an early adopter, aren't they worried about getting the flu? For young adults, I think the description should be shortened. Hopefully none of this info is new to any adult.
2	4	2	4	4	4	4	3	4	87.50%	add greater risk of severe disease/complications from the flu
3	4	4	4	3	4	4	3	4	100%	How many vaccines are you going to consider? 1,2, every year, etc...
4	4	4	4	4	4	4	4	4	100%	
5	4	3	4	4	4	4	3	4	100%	Should the question read "Does the predicted severity of the flu season...", maybe add even if not a perfect match, the shot will help minimize symptoms
6	4	4	4	4	4	3	4	4	100%	could be more succinct
7	4	4	4	4	4	3	3	4	100%	last line may be unnecessary
8	4	4	4	4	4	4	3	4	100%	add best timing October to December
9	4	4	4	4	4	3	4	4	100%	redundant, consider eliminating first sentence
10	4	4	4	4	4	4	4	4	100%	Should address common misconceptions about autism and provide realistic figures about remote risks like Guillain-Barre'
11	4	4	4	4	4	4	4	4	100%	
12	4	4	4	4	4	4	4	4	100%	
13	4	4	4	4	4	4	3	4	100%	
									S-CVI Score =99%	

Appendix F  
Revised Questionnaire with Script

Questionnaire Items	Yes	No	Script Response
<b>Early Adopter</b>			
Have you had the flu in the past?			Flu is a contagious virus that infects the nose, throat, and lungs. Symptoms include fever, sore throat, cough, runny nose, headache, body aches, and fatigue. Some people have vomiting and diarrhea which is more common in children. Symptoms can be mild to severe (CDC, 2021).
Are you worried about getting the flu?			Anyone can get the flu, but people who are under the age of 5 years, pregnant, older than 65 years, or have chronic health issues like heart disease, asthma, and diabetes are at greatest risk of severe disease, complications, and death (CDC, 2021).
Have you had the flu vaccine in the past?			Previous experience with flu vaccination and side effects can influence the decision to have the annual flu vaccine (Ryan et al., 2019). If you have had the flu shot before your immune system will tolerate the flu shot again.
Will you have your flu shot today?			
<b>Late Majority</b>			
Do you think the flu shot works?			Some people who get vaccinated may still get sick with flu. When that happens, vaccination has been shown in several studies to reduce severity of illness in those people who get vaccinated, but still get sick (CDC, 2021).
Does the severity of the flu season affect your decision to have your flu vaccine?			The composition of influenza vaccines is changed in most seasons, with one or more vaccine strains replaced annually to provide protection against viruses that are anticipated to circulate (Grohskopf et al., 2018, pp 8).
Do you believe that the flu shot is the best way to protect yourself against the flu?			Getting the flu shot annually is the most important step in preventing the flu. Washing hands, covering cough, and sneezing, and staying away from sick people is another way to prevent the spread of flu. Getting the flu shot also protects others in the community from flu because it reduces the risk of spread of illness from person to person (CDC, 2021).

Do you think your immune system alone will protect you against the flu?		Flu can spread from one person to another before symptoms occur, but is most contagious in the first 3 to 4 days after illness begins. Healthy people can infect others one day before they develop symptoms and for up to 5 to 7 days after becoming sick. Being unvaccinated can increase your risk of complications, hospitalization, and death (CDC, 2021).
Will you have your flu shot today?		
<b>Laggard</b>		
Did you forget to have your flu shot?		Flu season in the U.S. is in the fall and winter. The season peaks between December and February and can last until as late as May. The best time to have your flu vaccine is between October and December (CDC, 2021).
Do you think that the flu shot is safe?		Hundreds of millions of Americans have safely received flu vaccines over the past 50 years. There is extensive research supporting the safety of flu vaccines (CDC, 2021).
Are you worried about side effects?		Vaccines can cause side effects that are generally mild and go away on their own within a few days. Common side effects include soreness, redness, and/or swelling from the shot, headache, fever, nausea, and muscle aches. Many studies have shown that vaccines do not cause autism. There is a remote risk of Guillain-Barre´(CDC, 2021).
Can you get the flu from the flu shot?		The flu vaccine cannot give you the flu because it is made with killed or inactivated flu virus strains (CDC, 2021).

<p>Did you have your childhood vaccines?</p>		<p>History of childhood vaccination can influence attitudes towards necessity of adult vaccination (Ryan et al., 2019). If you had your childhood vaccines your immune system has already been exposed to vaccines and you can continue to tolerate vaccines.</p>
<p>Does your family tell you not to have the flu shot?</p>		<p>Family attitudes toward vaccines can have an impact on the decision to vaccinate (Ryan et al., 2019). Despite your family's views, you are an adult and are permitted to make your own private decisions for your personal health.</p>
<p>Will you have your flu shot today?</p>		



**Title of DNP Project:**

**An Evidence-Based Questionnaire to Assess Influenza Vaccine Adherence  
in Young Adults Ages 19-to-25 years**

**Author:**

**Tricia A. Gill**

**Date: 04/21/2022**

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Submitted in partial fulfillment of the requirements for the Degree of Doctor of Nursing Practice

