Vaccine Hesitancy in People Who Inject Drugs

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Throughout history, the medical community has battled many diseases plaguing humanity. It was not until vaccines were created that many of these diseases could be controlled, such as smallpox and the influenza virus. Historical documentation exists regarding immunizations and treatments for diseases dating back to the 1500s when Emperor K'ang Hsi had his children inhale smallpox scabs to help fight off the infection (The College of Physicians of Philadelphia, n.d.). In contrast to these rudimentary efforts to control disease, today's vaccines have been researched and developed using safer methods resulting in better control of many diseases (United States Department of Health and Human Services [HHS], 2020a). Many members of the public may lack understanding or worry about the potential adverse effects of vaccinations, leading many to refuse vaccines (Lunan, 2020).

People who inject drugs (PWID) were assessed to determine if they were vaccine hesitant, given the opportunity to vocalize their opinion about the influenza vaccine, and then were educated about the vaccine to see if education would alter any present vaccine hesitancy. For this study, vaccine hesitancy was defined as a "... delay in acceptance or refusal of vaccination despite the availability of vaccination services" (MacDonald, 2015, p. 4161). Education can be used to decrease refusal of vaccines by helping individuals understand how vaccines work and what they do to protect individuals and groups in each population. Education to those who do not understand why they are at risk of vaccine preventable diseases can also help them to overcome any hesitancy they may have towards vaccines, including the influenza vaccine.

One of the best ways to protect against the influenza virus is through yearly vaccination against the virus (United States Department of Health and Human Services, 2018). Immunized

individuals protect not only themselves but also others, resulting in herd immunity. Herd immunity is the concept of creating a barrier of immunized individuals who protect others who are either unable or unwilling to be vaccinated from preventable diseases. Herd immunity, however, is only useful in protecting the unvaccinated if vaccination among other community members is adequate (Gavi: The Vaccine Alliance, 2020). Refusal of vaccines has become a common issue and is a threat to vaccines' effectiveness and herd immunity around the world (WHO, n.d.b).

The Practice Problem

The practice problem is to determine the effect of education on overcoming vaccine hesitancy in PWID. In the United States during the 1970s, a decrease in profits and increased litigation around vaccines caused vaccine manufacturers to decrease production. The National Vaccine Injury Compensatory Program, developed in 1986, was implemented in the United States to protect individuals receiving vaccines. The program compensated the public for any harm a vaccination caused, leading to increased use of vaccines by the public (The Immunisation Advisory Centre, 2020). However, even with this protection, hesitancy towards vaccines is still present (McSpadden, 2021).

Population

The PWID population is considered a high-risk population for many diseases, including influenza (World Health Organization [WHO], n.d.a). Within this population, it was well-documented that an individual with an underlying health condition increases their risk for complications of the influenza virus (Day et al., 2010; Sira, Brown, Ambegaokar, Modin, & Kelly, 2019). For example, the influenza virus is one of many diseases that have been recognized to cause poor outcomes for those who contract the disease (Mayo Clinic, 2019). Many PWID

have comorbidities that increase the risk of complications related to the influenza virus including HIV, hepatitis infections, and tuberculosis. Access to vaccinations, utilization of hand hygiene, and trust in health care professionals has been shown to be necessary to help control PWID disease rates including respiratory infections caused by the influenza virus. However, PWID may lack access to vaccinations, running water for hand hygiene, and lack trust in health care professionals (Vasylyeva, Smyrnov, Strathdee, & Friedman, 2020).

Epidemiology

In 2019, the WHO created a list of ten threats to world health. The WHO focused on topics that need to be addressed as a global community, not just individual nations, due to their threat to the entire world population. Three of the threats identified by the WHO included the influenza virus, vaccine hesitancy, and the lack of primary health care in many countries (WHO, 2019).

The threat of the influenza virus includes physical complications of the disease including fever, muscle aches, pneumonia, chest pain, difficulty breathing, acute respiratory distress syndrome, and death. The disease is easily spread when infected individuals sneeze, cough, or talk near someone and does not require the infected individual to be showing signs to be considered contagious. Another key part of the threat includes the fact that the virus is constantly changing, and scientists need to change the influenza vaccine yearly to try and reduce the infection rate (Mayo Clinic, 2021). Despite the availability of vaccinations for influenza, a large portion of the United States' population is affected by influenza each year (O'Brien, 2017).

The threat of vaccine hesitancy plays a role in the success of the vaccination program as individuals who refuse vaccines may lower the herd immunity of a population. A significant portion of a population needs to be immunized for herd immunity to be effective (Gavi: The

Vaccine Alliance, 2020). Lack of herd immunity may lead to an increase in medical bills and mortality rates as vaccine-preventable diseases, including influenza, continue to spread (American Journal of Managed Care Perspectives, 2020).

The threat of a lack of accessibility to primary health care includes the lack of affordability and access to the influenza vaccine (WHO, n.d.b). In the 2018-2019 influenza season, the CDC estimated influenza's prevalence to be 16 million people who sought medical treatment and 35 million people who did not seek medical attention. Over 490,000 people were hospitalized, and approximately 34,000 people died of influenza during that same season (CDC, 2020a).

Problem Significance

The significant problem about vaccine hesitancy is the complications that may occur when it is present in a population. People who were vaccine-hesitant increased their risk of contracting preventable diseases, including influenza. Vaccine hesitancy also decreases the effectiveness of herd immunity, which generally protects people who cannot receive vaccines, including those who are immunocompromised, elderly, or vaccine hesitant. By not receiving vaccines, PWID increase the risk of influenza complications to themselves and other members of the population (CDC, 2019).

Since 1994, the use of immunizations has been proven to have saved the United States healthcare system over $1.8 trillion (Kadets, 2019). This trend in savings is in jeopardy if vaccine hesitancy continues to rise. There has been an increase in uninsured care costs related to influenza in hospitals. There was a yearly cost of over $10 billion in outpatient and hospital care related to individuals who have influenza (O'Brien, 2017). Even though the influenza vaccine could lower these costs, many PWID are hesitant to receive the influenza vaccine.

Many individuals are hesitant to accept the influenza vaccine, leading to an increase in influenza diagnoses. The PWID population has expressed interest in learning about vaccines, but also verbalized either disinterest or distrust in an influenza vaccine (G. Clark, Personal Communication, June 12, 2019). Guidelines are reviewed and updated at least yearly to ensure the safety and efficacy of influenza vaccine for the public and special populations, including the elderly and immunocompromised (CDC, 2020b). Significant education is needed to help people understand the purpose of a vaccine and how it helps protect individuals and their community.

Project Purpose

The purpose of this study was to determine if education decreased vaccine hesitancy in PWID. With the varied views on vaccines and preventive medicine, scientific knowledge and facts must be distributed to those at the highest risk for contracting the influenza virus. It is more important than ever that people understand why healthcare professionals are using vaccines to promote and maintain public health. The influenza vaccine has become an important part of disease prevention because it can help decrease the risk of complications related to the influenza virus, including hospitalizations and death (CDC, 2021a).

Even though the influenza virus mutates rapidly, the vaccine is thoroughly researched and created yearly to provide recipients with the most significant protection against the influenza virus possible (Mayo Clinic, 2019). The PWID population is underserved regarding healthcare needs, including a lack of access, background knowledge, and education regarding the need for vaccine protection (Lewis, Baughner, Finlayson, Wejnert, & Sionean, 2019). Therefore, educating PWID about receiving the vaccine is in the best interest of the PWID and may decrease the likelihood of being affected by or having severe complications from the influenza virus (Easton, 2019).

Outcomes and Impact

The study's expected outcomes were for the PWID to recognize their increased risk of influenza, for them to understand how vaccines can help with that risk and determine if education decreased their vaccine hesitancy. The PWID are unique as the population participates in risky behaviors that lead to a higher risk for comorbidities, such as HIV, increasing the risk of influenza complications (Alpren et al., 2020). This study aimed to help PWID understand their risk factors related to their current lifestyle and the influenza virus. The researcher anticipated a decrease in vaccine hesitancy by having education focused on the PWID current beliefs on vaccines.

Education about vaccines can assist PWID to recognize their increased risk for influenza. Vaccine education will also help participants make informed decisions about their health care needs. Participants should be able to verbalize how the influenza vaccine can decrease their risk of being affected by the influenza virus. Education can help to ensure that PWID have an understanding about the influenza vaccine and how their choice affects them if they choose to not receive it. PWID can be surveyed to understand if they have decreased their vaccine hesitancy through education.

Advanced Practice

Advanced practice nurses have a unique position in the fight to decrease vaccine hesitancy as nurses are trained in providing holistic patient care. These medical providers can help identify those at high risk with screening tools to ensure proper care and treatment (Visconti, Sell, & Greenblatt, 2019). Advanced practice nurses can counsel patients and provide beneficial education for the entire person rather than just addressing their medical diagnoses. As research on vaccine hesitancy becomes more prevalent, doctorate prepared nurses have a unique

ability to advocate for options that help PWID overcome this hesitancy, rather than just focusing on the treatment of the influenza virus. By increasing herd immunity understanding and vaccine knowledge in PWID, the populations' vaccine hesitancy may decrease.

Objectives

The objective of this study was to show whether education can alter vaccine hesitancy in PWID. The researcher anticipated that PWID could decrease vaccine hesitancy through personalized education regarding the influenza vaccine. Pre- and post- intervention survey data were compared to determine if the education intervention had an impact on decreasing vaccine hesitancy. Themes related to the participants' views about vaccines were also identified from survey results.

Research Question

The PICO for this study was: Do PWID (Population) who are educated about influenza vaccine (Intervention) compared to current beliefs (Comparison) show a change in vaccine hesitancy (Outcome)? By answering the question above, the researcher anticipated education would alter the view of PWID about vaccine hesitancy.

Theoretical Framework

This study's framework encompassed the umbrella term of the Cognitive Learning Theory (CLT), which has several sub-theories that focus on how a person learns. According to the CLT, experiences, self-view, understanding of learning, current and previous environmental factors, and willingness to learn all affect how a person learns (Braungart & Braungart, 2018). An illustration of this theory can be found in Appendix A.

Sub-Theories

Gestalt theory, created by Wertheimer and Koffka in the early 1910s, is a sub theory of the CLT focused on an individual's perception of information and how an individual tries to make learning as straightforward as possible. Individuals do this by screening out information not perceived as necessary (Akdeniz et al., 2016; The Editors of Encyclopedia Britannica, 2019; Wertheimer, 1923). A key concept of Gestalt theory is that people will perceive information based on previous experiences, internal drive, history with the topic, and environmental factors.

Social Learning Theory (SLT) is another theory used as a part of this studies framework under the CLT umbrella. SLT explains that people learn based on how other individuals are treated after acting in a specific manner. If someone acts in a specific manner and is punished, the peers may be less likely to repeat the punishable action (Bandura, 1971; Braungart & Braungart, 2018). Participants are surrounded by peers who may or may not have vaccine hesitancy. Participants may have seen people receive influenza vaccine and then developed an adverse reaction, which led to hospitalization despite the immunization. Participants could have been worried about common side effects, including headache, fever, nausea, soreness at the injection site, muscle aches, and the less common side effect of an anaphylactic or allergic reaction. Allergic reactions may lead to symptoms such as shortness of breath, swelling of the tongue or lips, and a full-body rash (Centers for Disease Control and Prevention [CDC], 2019). For example, a member of the PWID may still be infected by the influenza virus and show signs even if they were vaccinated. Individuals who witness the symptoms in someone recently vaccinated may feel that the vaccine does not protect against the influenza virus. This feeling may then develop if those who did not get the vaccination avoided infection following influenza season as well. Using SLT, individuals may then discuss how the influenza vaccine

did not protect someone who had the influenza vaccine, leading to an increase in vaccine hesitancy.

The population may feel no drive to receive the vaccine if the population is not being affected by the virus. Some feel that viral illness can be overcome with our immune system instead of needing vaccines (Centers for Disease Control and Prevention, 2021b). Conversely, SLT can also work to help decrease vaccine hesitancy within a population. Peers may be more likely to reduce vaccine hesitancy in the population as vaccines are better understood through word of mouth, social media platforms, and other methods of peer-to-peer communication (Arede et al., 2019).

A final set of two theories helped to create the last parts of the study framework. Social constructionism is used to describe a shared understanding of the world by social structure (Berger and Luckmann, 1966; Braungart & Braungart, 2018; Oxford University Press, n.d.). Social Constructivism, created by Vygotsky in 1978, reinforces the idea that knowledge can only be gained by an individual when the community adopts the knowledge (Berkeley Graduate Division, n.d.; Vygotsky, 1978). These two theories help illustrate how learning can only occur when peers and the community around an individual adopt the new information.

Why Cognitive Learning Theory?

The CLT framework was chosen to ensure the participants feel as if the researcher was listening and their personal views were considered during the interactions (Wills & McEwen, 2019). The researcher focused on participants' viewpoints, backgrounds, and the current environment when creating the education about vaccine hesitancy for PWID. Rather than just directing the learner, CLT encouraged two-way communication between educator and learner. This allows the participant to have meaningful input into the conversation (Braungart &

Braungart, 2018). While a participant can learn from the educator, an educator can learn just as much about the participants' viewpoint by conversing with them. Adjustments are made to the material being presented through verbal communication and printed material to ensure that both the educator and learner are giving and receiving mutually beneficial information. Gestalt theory was also used to lead the researcher through the creation of an educational intervention based on the participants views of the world (Wills & McEwen, 2019).

Organizational Assessment

The setting for this study was a syringe exchange program in Tennessee. This organization's mission was "…provide compassionate care to empower, promote, and inspire wellness" (Choice Health Network, 2020). The vision was “a future in which everyone is treated equally, have hope, and lives a healthy lifestyle” (G. Clark, Personal Communication, June 12, 2019). The organizations’ mission and vision demonstrated a need to ensure participants are provided the best resources and education about medical treatment available to help them to live healthier lives.

Project Alignment, Organization Mission, Values, and Readiness to Change

The organization uses education to help participants understand all their healthcare options. The organization has always shown interest in new information that may lead to a better chance of success concerning their clients' lifestyle choices. The non-profit organization offers multiple services that included medical screenings and treatments for infectious diseases, case management, and syringe exchanges to ensure a successful life (Choice Health Network, 2020). Although vaccines were offered by the organization and used by the clients, the influenza vaccine was not easily obtained in the quantity needed. The organization director verbalized interest in the findings to apply for grants for the influenza vaccine (G. Clark, Personal

Communication, June 12, 2019). This study sought to decrease vaccine hesitancy through education, just as this organization aimed to make sure participants understood the means they have available to make proper decisions about healthcare needs, such as availability of the health department and staff who can help screen them for medical needs. The education in this project promoted success in the participants' daily lives, including self-care and healthcare knowledge.

Anticipated Barriers, Facilitators, and Challenges

No barriers within the organization were anticipated. The director facilitated the data gathering and interaction with the participants by allowing the researcher access to participants during the syringe exchange program. The challenges to this study came from the participants. Appointments times are spaced out to ensure social distancing was adhered to during the pandemic of COVID-19, although the appointments were eventually canceled, allowing anyone to participate in the exchange on any day. The appointments were spread minutes or hours apart based on scheduling needs and the participants continued to follow social distancing guidelines during the survey. The participants' barrier of time was minimal as the survey was designed to be employed in a limited time frame of 2-3 minutes (G. Clark, Personal Communication, June 12, 2019).

Sustainability Plan

The sustainability plan included giving the educational material used in the intervention to the organization as a digital document that can be distributed to participants (Appendix B and Appendix C). The director of the organization may use the results to help apply for grants to pay for influenza vaccines to help increase the vaccine's availability (G. Clark, Personal Communication, June 12, 2019). The organizations health staff could use the pamphlet as part of their education to ensure PWID understand vaccines' risks and benefits during the syringe

exchange and health screenings they offer. One activity the organization is planning is a vaccine clinic that will offer vaccinations and education about how vaccinations protect PWID.

Analysis of the Evidence-Based Literature

CINAHL and Cochrane data bases were reviewed from 2010 through 2020. The search terms used included "vaccine hesitancy," "adults," and "NOT children" when utilizing each database search engine. The range of articles was expanded to begin in 2010 as the four years of 2016-2020 produced only eight articles in CINAHL. The expanded period increased the articles to 11 to allow for greater results. In Cochrane, the original date range showed eight articles, while the expanded period showed nine articles for review. While pediatrics was not included in the literature review, parents of pediatric patients were included. Within these two databases, a combination of 19 articles resulted, two of which were duplicates leading to 17 articles in total. Criteria for inclusion in this study were opinions on vaccines by the public and providers on vaccines, compulsory vaccine views, vaccine uptake in people with comorbidities, and education related to vaccine uptake. Criteria for exclusion in this study were pharmacy interventions related to vaccine administration and pediatric fears, including needles and pain. Of those 15 articles, 10 met the criteria of the literature review. The literature review table can be seen in Appendix D and used multiple databases to search for topics about vaccine hesitancy and vulnerable populations.

Synthesis of Relevant Literature

Vaccines have a history of being both highly effective and controversial. The scientific and medical community have long emphasized vaccines' usefulness in preventing diseases (United States Department of Health and Human Services [HHS], 2020b). With herd immunity, vaccinated people protect those around them who cannot have, or refuse vaccines by creating a

barrier for individuals who are resistant to disease. This barrier of resistant individuals makes it more difficult for a pathogen to affect people at risk (Gavi: The Vaccine Alliance, 2020). History has even shown a substantial decrease in infectious rates in many diseases since introducing the vaccine. One disease of note is polio, as it can cause life-long paralysis but has been controlled and almost eradicated with a vaccine (CDC, 2018). There is a need to continue vaccines to ensure the health of the world population.

The world has unprecedented access to information. However, when information is easily obtained through the internet, people can type in a question to any search engine and find a plethora of factual and fictional information. It can be difficult for many to use a discerning eye and evaluate the information presented to determine whether the data provided are accurate (Weir, 2017). Vaccines have become a topic of interest with the increase in accessible knowledge. Meyer and Lum (2017) highlight that most participants viewed the importance of vaccination as a lower priority and unnecessary for low-risk populations. Another set of opinions, as reported by Swaney and Burns (2018), had four views on vaccines: a feeling of safety from the disease, thoughts that highly educated people can make their own informed decisions regarding healthcare, concerns that vaccines are high risk in comparison to contracting the disease itself, and a lack for the current need of herd immunity for influenza.

Scholars agree that the trust of the providers by patients is essential to help decrease vaccine hesitancy. Verger, Bocquier, Vergelys, Ward, and Peretti-Watel (2018) illustrated patients trusted their providers' medical opinions but did not trust government agencies that created vaccines. Meyer and Lum (2017) also showed an increase in the correlation between provider trust and vaccine use. Kerneis et al. (2017) indicated that 34% of a medical student body felt ill-prepared to provide education and have discussions about vaccines with patients.

Compulsory vaccines could help encourage vaccine use but may decrease many other vaccines' widespread use. Betsch and Bohm (2015) claim that by mandating one specific vaccine for a population, people within the population are less likely to receive additional voluntary vaccines. This was especially true if vaccine hesitancy was already present in the individual. Partouche, Gilberg, Renard, and Saint-Lary (2019) point out that mandatory vaccines in France have increased pediatric vaccine compliance but may be leading to lower herd immunity as people are forgetting or refusing to receive vaccines after the mandatory period ends. Providers' proper education was vital in ensuring that adults receive vaccines, but patients felt education was lacking from their providers.

Education and shared decision making are critical ways to help decrease vaccine hesitancy whenever possible. Partouche et al. (2019) explained that compulsory vaccines were not effective for increasing vaccine use. This study was compared to medical providers who could teach and help patients make decisions about vaccines rather than enforcing mandated vaccines. Yeung, Lam, and Coker (2016) agree with this as they highlight that understanding of influenza vaccine through education by health professionals, and families can help decrease overall vaccine hesitancy.

Alternatively, Betsch and Bohm (2015), and Henrikson et al. (2015), showed that neither compulsory vaccines nor physician-led vaccine education alone led to an increase in vaccine use or a decrease in vaccine hesitancy. Like the public, PWID have differing opinions on vaccines. Sira et al. (2019) concluded that education in service centers, including medical clinics, could increase vaccine acceptance during adolescence, especially in high-risk populations. Newman et al. (2014) discussed how almost half of PWID sample populations were interested in mandatory

vaccines to protect themselves from diseases. In comparison, Day et al. (2010) showed a decrease in vaccine interest by PWID.

Gap in Research

The main gap in evidence was within the population of PWID. PWID were included in multiple articles but were not the focus of the research. These individuals had risks about illicit drug use and fear of being reprimanded or even reported to the authorities by medical providers. Providers need to understand the needs of this vulnerable population, be non-judgmental, and give consistency in the form of supportive and preventative care specific to their needs (Cornford, 2016; Falade-Nwulia et al., 2019).

Project Design and Implementation Plan

The design for this study was a pre- and post-intervention survey. Participants answered questions during the pre-intervention phase that focused on their view of the influenza vaccine (Appendix E). The information gathered was used to create an educational pamphlet and poster to help personalize the intervention, and to answer questions and misconceptions the participants may have verbalized in the pre-intervention survey. The poster was used to help attract individuals to the researcher for additional education. The pamphlet was given during the educational intervention portion of the study. The researcher discussed essential topics about the influenza vaccine during the educational intervention and how it affected PWID. Once the intervention was completed, a post-intervention survey was done in the same manner as the pre-intervention survey. Survey questions used in the post-intervention survey are found in Appendix F.

Procedures

Phase one of the study was conducted over the two weeks agreed upon with the syringe exchange program director. The researcher approached, greeted PWID, and asked if participants were willing to answer a few questions. If the participants agreed to answer, they were asked the questions in Appendix E. The final question asked the participant to "Tell me your thoughts about you receiving influenza vaccine" to gather data for phase two. The data were gathered over the two weeks of phase one and then reviewed by the researcher for similar topics that would be used in the education intervention.

Phase two education materials were created based on phase one results and the current CDC guidelines (2020a) to personalize the educational pamphlet and poster for phase two, as seen in Appendix B and Appendix C. The pamphlet was provided to participants over two weeks during the educational intervention to improve disseminating education. The researcher educated about the influenza vaccine, including how it helped prevent influenza, discussed the side effects of influenza and influenza vaccine, and why it was essential to obtain the vaccine regularly. Information was also given about where to find influenza vaccine at no cost.

Phase three of the study was conducted over two weeks agreed upon with the syringe exchange program after the educational intervention phase. A post-intervention survey was completed that focused-on participants' views on vaccine hesitancy. The researcher approached, greeted participants, and asked if they were willing to answer a few questions. If the participants agreed to answer, they were asked the questions in Appendix F. The data were analyzed using descriptive statistics and other statistical analysis.

Phase one and phase three surveys were analyzed to correlate demographics, age-range, and the highest level of education. These surveys were compared to participants' view and

history with influenza vaccine, receipt of last year's vaccine status, and the influenza vaccine view. The researcher analyzed the results and personal views of participants regarding the influenza vaccine. Once the analysis was complete, a presentation was developed and shared with the organization to disseminate the findings. Demographics included the categorical data of male or female, education level completed, and age range.

Sample

The anticipated number of participants required for the study was determined based on the approximate number of people who use the syringe exchange clinic per week. The organization saw approximately 200 participants a week in the syringe exchange program. It was anticipated that 50% of the participants would agree to the survey, creating a sample of 100 participants. The researcher had a goal of 50% participation from participants who attended the clinic to complete the survey for phase one, the pre-intervention survey, and phase three, the post-intervention survey. The final participant count was n=310.

A convenience sample was used as the sampling method due to the ease of accessing these individuals with the syringe exchange program. The organization's method of syringe exchanges changed as needed due to COVID-19 health and safety recommendations by the CDC (G. Clark, Personal Communication, May 22, 2020). The safety recommendations included the need for social distancing, cloth face masks, and not gathering in large groups (CDC, 2020c). As the organization continued to alter how services were provided, methods were implemented to ensure participants', volunteers', and employees' safety. Social distancing and other safety procedures led the organization to alter the amount of time and number of days used for syringe exchange to keep the number of participants low at any specific time.

Setting

The setting for this study was a syringe exchange clinic in Tennessee. The organization has a building dedicated to the syringe exchange portion of the organization. In this building, a section was designated for educational materials for any participant to read. The organization was enforcing social distancing by requiring participants who did not commute together to be at least six feet apart while waiting for their turn with the program. The organization decreased the number of people congregating in a single place by requiring an appointment for syringe exchanges due to the COVID-19 pandemic (G. Clark, Personal Communication, May 22, 2020). In January of 2021, this appointment restriction was lifted to allow anyone to come during regular syringe exchange hours.

Timeline

The timeline of the project began in January 2020 with a final goal of dissemination in August 2021. The timeline of events for this project can be found in Appendix G.

Human Subjects Protection

The researcher interviewed participants as a means of obtaining data. All privacy and confidentiality granted through the health insurance portability and accountability act (HIPAA) were protected and honored during the entirety of the program (United States Department of Health and Human Services, 2017). The researcher followed all rules and regulations regarding human subject protection related to this study and the rules required by the organization.

IRB Requirements

The letter of approval from King Universities Institutional Review Board (IRB) can be seen in Appendix H. The organization allowing the study provided a letter of agreement, as seen in Appendix I.

Consent process

Implied consent was used for this study. Implied consent occurs when a participant agrees to and continues with any study activities (Cornell Research, n.d.). Participants were approached and asked to answer a few questions. The survey continued only if the participants agreed to answer questions. The individuals who refused or did not meet the inclusion criteria were thanked for their time spent and allowed to leave. While PWID was considered vulnerable, PWID are not restricted from giving consent for participating in the study. No assent was needed for PWID.

Risks to Participants

The probability of harm was minimal. Risks involved some physical discomfort when standing. Participants may have a fear of being identified by the research. Participants may have felt anxiety related to being asked questions in the syringe exchange. Other risks included mental discomfort with strangers as participants may not have felt comfortable talking with people who are not usually a part of the syringe exchange program staff.

To minimize the risk of physical discomfort, chairs were made available whenever possible. The precautions used to reduce the risk to participants being identified included de-identifying data gathered to ensure participants' confidentiality. Psychological risks, such as anxiety, were limited by ensuring the participants were interviewed privately and reassured participants would not be identified in the study. Further psychological risks were decreased by ensuring participants were greeted in a friendly manner and in the presence of the syringe exchange staff during the surveys.

Plans if Harm to Participant

If any harm came to participants, the researcher assisted them to support staff with the organization. Participants were able to discontinue the survey at any time by verbalizing a disinterest in continuing. If a person started to show any sign of aggression, agitation, or any other sign of discomfort while continuing the survey, the survey stopped, and the participant could leave.

Data Security, Privacy, and Confidentiality

The researcher collected the data by circling and handwriting the responses by the participants to ensure further anonymity. The researcher abided by all HIPAA guidelines throughout the study. Once the data were gathered, the researcher collected the surveys and kept them in a locked filing cabinet in the researcher's office. The participants were not placed at risk of identification due to confidentiality, privacy, or anonymity issues in the study materials, surveys, or spreadsheet. The researcher wrote the open-ended response to ensure no identifying handwriting markers could be used to identify a participant. At the end of each day, each survey was placed in a locked box to ensure each participant's privacy.

The information from the survey was recorded in a spreadsheet for phase one and phase three. The recorded digital data were put in a secure Dropbox account folder behind both password protection and 2-step authentication security. The SPSS program was used to create the statistical analysis. The data's physical copies shall be kept in a folder for three years in the researcher's home office, locked in a cabinet. Once three years have passed from completing this study, the digital forms will be purged, and the physical surveys incinerated.

Data Collection Procedures

Multiple reliable tools have been created to focus on vaccine hesitancy in adults, including the Parents Attitudes about Childhood Vaccines (PACV) survey tool. The researcher was given written permission for use in this study (D. Opel, Personal Communication, May 22, 2020). Permission for tool use can be seen in Appendix J. The tool was modified by extracting specific questions and altering the wording to focus on the influenza vaccine with the participant rather than their children.

Measurement Tool

Interrater reliability between phase one and phase three participants was demonstrated by surveying the same population of people. The validity of testing was demonstrated by face validity as the items written target vaccine hesitancy and were pulled and modified from the validated tool. The original tool showed both construct and predictive validity. The survey appears to measure vaccine hesitancy and participants who verbalize vaccine hesitancy in the survey may be more likely to refuse vaccines. Face reliability was demonstrated by using questions that focus on necessity of influenza vaccine (Opel, 2017).

Data Collection

Data collection began in phase one of the project. The survey in Appendix C was printed the day before the survey time with participants. The researcher would then fill out the survey by writing in the blanks under each question while asking the participants each item on the survey. The researcher collected and secured all surveys each day in a lockbox. Upon completion of phase one, the researcher entered the data into a spreadsheet program.

Phase two was the intervention phase of the project and involved the education being developed and presented to participants. The data summarized from phase one part of the presentation in the educational pamphlet and poster.

During phase three, the researcher collected and secured all surveys in a lockbox each day before leaving the site. Upon completion of phase three the researcher entered the data into a spreadsheet program.

Cost Analysis

The total estimated cost of the study was $352. The researcher covered all costs. Clipboards, pens, masks, survey forms, and hand sanitizer were available to the researcher for safe and effective data gathering following the CDC guidelines due to COVID-19 (CDC, 2020c). CDC guidelines for facial coverings and hand washing were followed (National Center for Immunization and Respiratory Diseases, Division of Viral Diseases, 2020). The researcher was the only person to touch the pens. Hand sanitizer was used between every survey taken and as frequently as needed, including after physically interacting with participants or staff. The pamphlet and poster were available for review by participants during the educational intervention. The data collection tools and protection equipment necessary for the researcher are listed in Appendix K with their cost.

Data Analysis

The data gathered were used to identify if education influenced vaccine hesitancy in PWID and were obtained through pre- and post-intervention surveys (n=310). The first four questions of the surveys gathered information from the participants, including gender, age, education level, and if the participant had received the influenza vaccine during the 2019 influenza season. The results of the four questions were analyzed using descriptive statistics. A

chi-square analysis was completed on the question that asked the participants if they felt the vaccine was necessary. The chi-square was used to see if there was a statistically significant change between the pre-intervention and post-intervention groups. The final question was an open-ended question about the participants' views on vaccines. The open-ended question was used to identify themes that could be used in the educational intervention and to compare participant views between the pre- and post-intervention groups.

Descriptive Statistics

Descriptive statistics were used to evaluate demographic data from the first four questions in the survey. There were no significant differences in gender, age range, or education level found in the results. There was a slightly significant difference ($p=0.09$) between the pre- and post-intervention groups' answers regarding whether the participants had received the influenza vaccine last year, 44.4% agreeing in the pre-intervention group and 35% agreeing in the post-intervention group (Appendix L).

Chi-Square Analysis

Chi-square statistics were used to compare the pre-intervention and post-intervention groups on question five of the survey, whether they felt the influenza vaccine was necessary (Appendix M). The result was 52.5% in the post-intervention group agreed with the question compared to the pre-group at 36.6% (Appendix N). There was a significant difference between the groups for thinking the influenza vaccination was necessary. In fact, the necessity decreased with the post group.

Identifying Themes

Question six of the survey analyzed using descriptive statistics to identify themes of how the participants viewed the influenza vaccine. The answers for the open-ended question at the

end of the pre- and post-intervention surveys were reviewed, tabulated, and categorized. A spreadsheet was developed to discuss the themes. Each category was created by summarizing themes in the open-ended question found in the survey. The categories of responses included (a) pro-vaccine, (b) I'm healthy, (c) makes me sick, (d) lack of trust, (e) financial/environmental, and (f) no response. Most topics broke out similarly between the pre-and post-intervention groups. A significant difference was noted in the (c) makes me sick category, showing 19.18% in the pre-intervention group and 29.70% in the post-intervention group (Appendix O). The pre-intervention results for question six can be seen in Appendix P, and the post-intervention results for question six can be seen in Appendix Q.

Results

One expected outcome of this research included recognition of the increased risk of the influenza virus by PWID. This outcome was not met as many participants continued to verbalize opinions in the third phase of the research about feeling sick from the vaccine and a lack of trust.

Explanations for participants not recognizing their increased risk of being affected by the influenza virus include a lack of interest in the education by the participants were or could be related to the difference in population between the pre-intervention group and post-intervention group. One reason for these results could be that the participants may feel as if the influenza virus is not something they should worry about and that their lifestyle choice does not put them at an increased risk. The lack of trust will require time and a close relationship with their providers to overcome the trust issue with the influenza vaccine if they choose to have one.

Another expected outcome of this research was for PWID to understand how vaccines can help decrease their risk of the influenza virus. The responses regarding the participants'

opinions only had significant changes in one category. The “Makes me sick” category increased from 36.3% to 63.4% after the educational intervention was completed.

Participants may not have understood the education or may not have been willing to change their views with an educational intervention and a pamphlet. They may have felt their lived experiences were more informative about whether they need a vaccine compared to education about how a vaccine could help them avoid the influenza virus. Individuals must be able to overcome these beliefs, but verbal and written education alone may not work to ensure this change of views by participants. Another method of education may need to be implemented to help ensure PWID can overcome vaccine hesitancy.

The next outcome of this research was to determine if education decreased PWID vaccine hesitancy. The originally expected outcome was that education in PWID would show a decrease in overall vaccine hesitancy. However, this was not the case in this research. There was a statistically significant decrease in the rate of participants believing that the influenza vaccine was necessary, from 52.5% in phase one to 36.6% in phase three. This data showed that individuals who were educated as part of the research decreased their interest in the influenza vaccine, the opposite of what was expected.

The data suggests that education is not always effective in changing a person’s mind about health care topics such as vaccines. Factual information and studies may need to be combined with other forms of education and personal experience to overcome vaccine hesitancy. Also, serial education may be necessary to ensure participants have time to grasp key concepts of the education.

Limitations

During this project, the global pandemic of COVID-19 occurred and required the entire world to alter almost every aspect of daily life. Health care changed to include required medical screenings prior to being able to see a provider in many instances. Many organizations closed for public health reasons. Completion of this project was almost completely halted as the entire organizations that supported that syringe exchange program had to reorganize how and if they were planning on continuing the program during the pandemic. Through scheduling changes by the organization as well as special requirements like masks and appointments, the organization (and the research) was able to continue through the pandemic.

Another limitation was the organizations response to COVID-19. The syringe exchange program altered their hours of operation as well as their normal method of syringe exchange from open hours to allow syringe exchanges to a range of different scheduled appointments. The changes in hours of operations included (a) scheduled walk up hours then (b) appointments only, (c) changed locations to at least two different areas around the city, (d) reopened walk-up hours, and then (e) an online only scheduling system and a singular location in the city. While clients were frustrated with the changes, the number of participants for the syringe exchange continued to grow.

A limitation of this research was the availability of the population of PWID. The sample would often not come to every syringe exchange during the research. Many individuals who were present for phase one of the study would not be present for phase two or three because of the casual nature of the population regarding the syringe exchange. By not being present for all three phases, the participants may not have received the full impact of the education provided or be able to discuss the education with their peers. While the information was meant to be

disseminated amongst peers, many participants may have chosen to stay away from others in their community due to health policies like social distancing.

Participants may not have had a willingness to learn as vaccines were a controversial subject during the COVID-19 pandemic. There were changing regulations put forth by various organizations such as the CDC. Many organizations had differing views on vaccines as it became a political topic during the presidential elections (Kaplan & Milstein, 2021). Political views could have also altered the view of necessity of the vaccine. Cognitive learning theory requires a willingness to adopt new information and this population may not have been open to that during the syringe exchange (Braungart & Braungart, 2018).

The socioeconomic factors of the sample of PWID were also a limitation. A key concept affecting the participants would be the social and community context in relation to the social determinants of health (Healthy People 2030, n.d.). How a society interacts with these individuals can range from marginalization up to and including criminalization (Avert, 2019). The participants may not have felt like their opinion mattered or would have identified them as a person who injected drugs to law enforcement. The viewpoints of other individuals in different socioeconomic standings should be taken into consideration in future research.

Discussion

A population sample of PWID from Tennessee was used to study if the participants were able to decrease vaccine hesitancy using education as an intervention. The results from the study showed that vaccine hesitancy actually increased rather than decreased after the educational intervention was completed. Acceptance to view the influenza vaccine as a necessity to healthcare decreased from 52.5% to 36.6% comparing pre- and post-intervention phases. This

may be because of the perception of decreased influenza occurrence during the COVID-19 pandemic even though they may not have received the vaccine.

According to the CDC (2021c), a decrease has been noted in influenza diagnoses peak from 7.1% of the United States population in the 2019-2020 influenza season to a peak of 1.5% in the 2020-2021 influenza season. This has been attributed to increased handwashing, personal protective equipment uses including regular mask use, and increased uptake of the influenza vaccine. However, many of the participants may feel like the influenza virus is not dangerous compared to the COVID-19 pandemic.

During the research individuals were able to verbalize their feelings about the influenza vaccine being necessary both before and after the education occurred. The topics verbalized by participants during phase three showed a decrease in understanding of how vaccines work. There was a notable decrease in individuals who categorized themselves as "pro-vaccine" and "I'm healthy" between phases one and three. There was also a notable increase in individuals who felt the influenza vaccine "Makes me sick" from 19.18% to 29.7%. The organization can use the results to show a need for additional interventions to help the population understand their healthcare needs beyond just verbal education. Public opinion and participants view on vaccines need to be overcome using other methods to ensure that vaccine hesitancy is overcome, especially in these high-risk population.

The organization where the research was conducted was interested in using the results to apply for grant money for increasing availability of medical treatments. By understanding if their clients were interested in medical treatments, they could apply for funding to ensure access to preventive care including vaccines.

Further interventions including education should be used to ensure an increased understanding of the purpose of the influenza vaccine. The educational material including the poster and pamphlet can be used by the organization to help continue education about the influenza vaccine and the risk PWID have when they do not have the influenza vaccine. Other methods to help reinforce understanding include serial education, synchronous and asynchronous online lectures, and more posters and pamphlets. More educational methodologies can help different participants with different methods of learning styles be able to understand the material better. By continuing to educate the population about their risk for complications from the influenza virus due to their lifestyle on more than a single occurrence, individuals may be able to overcome vaccine hesitancy.

Conclusions

This study focused on the ability of PWID to overcome vaccine hesitancy using an educational intervention. The intervention consisted of a poster and pamphlet filled with information regarding the participants' viewpoints about the influenza vaccine. The participants' viewpoints came from a pre-intervention survey. While participants were willing to listen to the education provided, vaccine hesitancy increased.

While hesitancy increased, this research shows that education cannot be the only tool used to overcome hesitancy. Even if created to overcome the participants' false views, educating individuals with facts can increase participant hesitancy.

Overall, vaccine hesitancy is not something that was improved with this study. While education should help people understand how vaccines work, vaccine hesitancy cannot be overcome with a single educational intervention. A lack of understanding may not be the only barrier to overcoming vaccine hesitancy. Further studies are necessary to identify the cause of

vaccine hesitancy, followed by research about what types of education work best in the PWID population. This study can help guide future studies of overcoming vaccine hesitancy by showing the need for further research on different interventions.

Implications for Practice

Vaccines are necessary to help protect individuals from preventable diseases such as influenza and COVID-19. Vaccines can help protect some, but most of the population needs to be vaccinated against a disease to create herd immunity to protect those around them immunized who cannot be vaccinated for whatever reason (D'Souza & Dowdy, 2021). Whether the individuals are immunocompromised or vaccine-hesitant, they would be protected by herd-immunity.

Education is a method to help ensure individuals recognize the need for vaccination, but simply informing individuals about vaccines and herd immunity is not enough. Vaccine hesitancy effects need to be brought to the public's attention through educational methods such as serial education in which participants are informed about vaccines over multiple visits, compared to a single educational intervention. Using these results in practice can help providers find new and informative ways to help patients understand the need for vaccines and how they work to protect themselves and others.

Dissemination of vaccine information should be done by individuals who understand the information and are trusted by the population. As this research showed, a single educational intervention can cause a negative effect on a population. Education about vaccines should continue and must evolve to help participants grasp their choices in the healthcare setting. Overcoming vaccine hesitancy will require more than just an understanding of vaccines. It will also require the ability to gain the individual's trust, learn the cause of their hesitancy, and design

methods to help everyone overcome the causes of vaccine hesitancy to ensure the population can be protected from preventable diseases. Advanced practice registered nurses (APRN) are in a unique situation to help participants understand their risk factors for diseases. APRN can also help their clients recognize what risk factors clients have that increase their likelihood of being affected by a vaccine-preventable disease and how the client's lifestyle choices could lead to complications related to that disease process.

Future Research

The continuation of this research is important due to the current state of vaccine hesitancy in the United States. As vaccine-preventable diseases that were once considered controlled begin to reemerge and new disease variants such as COVID-19 are set up in the population, vaccine hesitancy must be overcome (D'Souza & Dowdy, 2021). Based on these results, different methods of educating a population, especially those at high risk of complications like PWID, must be considered and researched to find the best methods to overcome the hesitancy to the vaccine. Other vaccines could also be used in research to determine if specific vaccines cause more hesitancy than others. Research could also be conducted on whether individuals can identify falsehoods or policy information about vaccines.

During the COVID-19 pandemic some states even offered monetary incentive to help people be vaccinated against the COVID-19 virus. States like Ohio and California offered lotteries to those who were willing to receive the vaccine. Ohio offered both full ride scholarships to college or a $1 million prize, based on the winners age (Ohiovaxamillion, 2021). California is offering a $1.5 million dollar grand prize and multiple $50,000 lottery prizes for those who are vaccinated (KCRA Staff, 2021). While this may not be plausible for a research project, it may help alleviate some of the vaccine hesitancy present in the general populace.

Dissemination

The director of the syringe exchange was presented with the findings, implications of the findings, and the educational materials created for this project, including the poster and pamphlets. The final manuscript is being submitted to the Journal of Social Science and Medicine for publication consideration. The manuscript will also be sent to the Virginia Henderson repository for nursing research. The researcher has created a poster for a presentation that will be submitted to future poster presentations that may include Sigma Theta Tau research days and the 15th Vaccine Congress of 2021. Public speaking events focused on vaccine uptake and hesitancy may be used to continue to talk about vaccine hesitancy. While the research did not show that education alone can alter vaccine hesitancy, it did show that researchers should continue to focus on new methods of education to help overcome vaccine hesitancy in high-risk populations.

References

Akdeniz, C., Bacanlı, H., Baysen, E., Çakmak, M., Çeliköz, N., Doğruer, N., ... Yalın, H. (2016). Cognitive learning theories. In Z. Kaya & A. Akdemir, *Learning and teaching: Theories, approaches and models* (pp. 31-46). Retrieved from https://www.researchgate.net/publication/304119354_Learning_and_Teaching_Theories_Approaches_and_Models

Alpren, C., Dawson, E., John, B., Cranston, K., Panneer, N., Fukuda, D., ... Buchacz, K. (2020, January). Opioid use fueling HIV transmission in an urban setting: An outbreak of HIV infection among people who inject drugs- Massachusetts, 2015-2018. American Journal of Public Health, 110(1), 37-44.

American Journal of Managed Care Perspectives. (2020). Assessing the cost of vaccine-preventable diseases. Retrieved from https://www.ajmc.com/view/assessing-the-cost-of-vaccinepreventable-diseases

Arede, M., Bravo-Araya, M., Bouchard, E., Gill, G., Plajer, V., Shehraj, A., & Shuaib, Y. (2019, January 14). Combating vaccine hesitancy: Teaching the next generation to navigate through the post truth era. Frontiers in Public Health, 381. http://dx.doi.org/10.3389/fpubh.2018.00381

Avert. (2019). People who inject drugs, HIV and AIDS. Retrieved from https://www.avert.org/professionals/hiv-social-issues/key-affected-populations/people-inject-drugs

Bandura, A. (1971). Social Learning Theory. New York City, New York: General Learning Press.

Berger, P., & Luckmann, T. (1966). The social construction of reality. London, England: Penguin Books.

Berkeley Graduate Division. (n.d.). Social constructivism. Retrieved from https://gsi.berkeley.edu/gsi-guide-contents/learning-theory-research/social-constructivism/

Betsch, C., & Bohm, R. (2015, August 21). Detrimental effects of introducing partial compulsory vaccination: Experimental evidence. *The European Journal of Public Health*, *26*(3), 378-381. http://dx.doi.org/10.1093/eurpub/ckv154

Braungart, M., & Braungart, R. (2018). Educational and learning theories. *Philosophies and theories for advanced nursing practice* (3rd ed. (pp. 199-239). Burlington, MA: Jones & Bartlett Learning.

Centers for Disease Control and Prevention. (2018). Polio vaccination. Retrieved from https://www.cdc.gov/vaccines/vpd/polio/index.html

Centers for Disease Control and Prevention. (2019). Influenza vaccine safety information. Retrieved from https://www.cdc.gov/flu/prevent/vaccinesafety.htm

Centers for Disease Control and Prevention, (2020a). Disease burden of influenza. Retrieved from https://www.cdc.gov/flu/about/burden/index.html

Centers for Disease Control and Prevention. (2020b). Recommended adult immunization schedule for ages 19 years or older, United States, 2020. Retrieved from https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html

Centers for Disease Control and Prevention. (2020c). Coronavirus disease 2019 (COVID-19): Going out. Retrieved May 23, 2020, from https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/going-out.html

Centers for Disease Control and Prevention. (2021a). What are the benefits of the flu vaccination? Retrieved from https://www.cdc.gov/flu/prevent/vaccine-benefits.htm

Centers for Disease Control and Prevention. (2021b). Misconceptions about seasonal flu and flu vaccines. Retrieved from https://www.cdc.gov/flu/prevent/misconceptions.htm

Centers for Disease Control and Prevention. (2021c). National, regional, and state level outpatient illness and viral surveillance. Retrieved from https://gis.cdc.gov/grasp/fluview/fluportaldashboard.html

Choice Health Network. (2020). https://choicehealthnetwork.org

Cornell Research. (n.d.). IRB FAQs. Retrieved from https://researchservices.cornell.edu/resources/irb-faqs

Cornford, C. (2016, June). The physical health of people who inject drugs: Complexities, challenges, and continuity. *British Journal of General Practice*, 66(647), 286-287. http://dx.doi.org/10.3399/bjgp16X685333

Day, C., White, B., Dore, G., Beek, I., Rodgers, C., Cunningham, P., ... Maher, L. (2010, January 4). Hepatitis B virus among injecting drug users in Sydney, Australia: Prevalence, vaccination and knowledge of status. *Drug and Alcohol Dependence*, *108*, 134-137. http://dx.doi.org/10.1016/j.drugalcdep.2009.11.013

D'Souza, G., & Dowdy, D. (2021). What is herd immunity and how can we achieve it with COVID-19? Retrieved from https://www.jhsph.edu/covid-19/articles/achieving-herd-immunity-with-covid19.html

Easton, J. (2019). Why do so many people avoid influenza vaccine? Retrieved from https://www.uchicagomedicine.org/forefront/health-and-wellness-articles/why-do-so-many-people-avoid-the-flu-vaccine

Falade-Nwulia, O., Irvin, R., Merkow, A., Sulkowski, M., Niculescu, A., Olsen, Y., ... Mehta, S. (2019, May). Barriers and facilitators of hepatitis C treatment uptake among people who inject drugs enrolled in opioid treatment programs in Baltimore. *Journal of Substance Abuse Treatment*, 100, 45-51. http://dx.doi.org/10.1016/j.jsat.2019.01.021

Gavi: The Vaccine Alliance. (2020). What is herd immunity? Retrieved from https://www.gavi.org/vaccineswork/what-herd-immunity

Healthy People 2030. (n.d.). Social determinants of health. Retrieved May 24th, 2021, from https://health.gov/healthypeople/objectives-and-data/social-determinants-health

Henrikson, N., Opel, D., Grothaus, L., Nelson, J., Scrol, A., Dunn, J., ... Grossman, D. (2015, July). Physician communication training and parental vaccine hesitancy: A randomized trial. *Pediatrics*, *136*(1), 70-79. http://dx.doi.org/10.1542/peds.2014-3199

Kadets, L. (2019). Lower health care costs act highlights the value of vaccines. Retrieved from https://www.hivma.org/news_and_publications/hivma_news_releases/2019/lower-health-care-costs-act-highlights-the-value-of-vaccines/

Kaplan, R., & Milstein, A. (2021, March 9). Influence of a COVID-19 vaccine's effectiveness and safety profile on vaccination acceptance. Proceedings of the National Academy of Sciences of the United States of America, 118(10), 1-5. http://dx.doi.org/10.1073/pnas.2021726118

KCRA Staff. (2021). California to offer $116M in coronavirus vaccine prize money. Retrieved June 1, 2021, from https://www.kcra.com/article/gov-newsom-covid-19-vaccine-incentives-may-27/36560914

Kerneis, S., Jacquet, C., Bannay, A., May, T., Launay, O., Verger, P., & Pulcini, C. (2017). Vaccine education of medical students: A nationwide cross-sectional survey. *American Journal of Preventive Medicine, 53*(3), e97-e104. http://dx.doi.org/10.1016/j.amepre.2017.01.014

Lewis, R., Baughner, A., Finlayson, T., Wejnert, C., & Sionean, C. (2019, January 8). Systematic review of HIV treatment adherence research among people who inject drugs in the United States and Canada: evidence to inform pre-exposure prophylaxis (PrEP) adherence interventions. BioMed Central Public Health, 19(1), S420-S428. http://dx.doi.org/ 10.1186/s12889-018-6314-8

Lunan, C. (2020). 5 false claims about vaccines. Retrieved January 31, 2021, from https://www.novanthealth.org/healthy-headlines/5-false-claims-about-vaccines

MacDonald, N. (2015, August 14). Vaccine hesitancy: Definition, scope, and determinants. *Vaccine*, 33(34), 4161-4164. http://dx.doi.org/10.1016/j.vaccine.2015.04.036

Mayo Clinic. (2019). Influenza shot: Your best bet for avoiding influenza. Retrieved from https://www.mayoclinic.org/diseases-conditions/influenza/in-depth/influenza-shots/art-20048000

Mayo Clinic. (2021). Influenza (Flu). Retrieved March 10th, 2021, from https://www.mayoclinic.org/diseases-conditions/flu/symptoms-causes/syc-20351719

McSpadden, J. (2021). Vaccine hesitancy among older adults, with implications for COVID-19 vaccination and beyond. Retrieved from https://www.aarp.org/ppi/info-2021/vaccine-hesitancy-among-older-adults.html

Meyer, S., & Lum, R. (2017). Explanations for not receiving the seasonal influenza vaccine: An Ontario Canada based survey. *Journal of Health Communications, 22*, 506-514. http://dx.doi.org/10.1080/10810730.2017.1312720

National Center for Immunization and Respiratory Diseases, Division of Viral Diseases. (2020). Use of cloth face coverings to help slow the spread of COVID-19. Retrieved from https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html

Newman, P., Lee, S., Rudy, E., Diamant, A., Duan, N., Nakazano, T., & Cunningham, W. (2014, January 25). Endorsement of compulsory HIV vaccination policy among populations at high risk of HIV exposure. *Prevention Science*, *15*, 428-435. http://dx.doi.org/10.1007/s11121-014-0463-5

O'Brien, S. (2017). Getting influenza can wreak havoc on your finances. Retrieved from https://www.cnbc.com/2017/10/30/the-flu-costs-the-us-economy-10-point-4-billion.html

Ohiovaxamillion. (2021). https://ohiovaxamillion.com/

Opel, D. (2017). The parent attitudes about childhood vaccines (PACV) survey tool. Retrieved from https://www.sabin.org/sites/sabin.org/files/opel_iaim_verfinal_dist_redacted.pdf

Oxford University Press. (n.d.). Social constructionism. Retrieved from https://www.oxfordreference.com/view/10.1093/oi/authority.20110803100515181

Pajares, F. (2002). Social Cognitive Theory Illustration. Retrieved From https://www.uky.edu/~eushe2/Pajares/eff.html

Partouche, H., Gilberg, S., Renard, V., & Saint-Lary, O. (2019). Mandatory vaccination of infants in France: Is that the way forward? *European Journal of General Practice*, 25(1), 49-54. http://dx.doi.org/10.1080/13814788.2018.1561849

Sira, J., Brown, M., Ambegaokar, S., Modin, L., & Kelly, D. (2019). The necessity of education and hepatitis B vaccination for young people: A study of high risk behaviour for blood borne viruses in the United Kingdom. *Journal of Child Health Care*, *23*(3), 437-445. http://dx.doi.org/10.1177/1367493519831499

Swaney, S., & Burns, S. (2018). Exploring reasons for vaccine-hesitancy among higher-SES parents in Perth, Western Australia. *Health Promotion Journal of Australia*, 30, 143-152. http://dx.doi.org/10.1002/hpja.190

The College of Physicians of Philadelphia. (n.d.). The history of vaccines. Retrieved from https://www.historyofvaccines.org/timeline/all

The Editors of Encyclopedia Britannica. (2019). Gestalt psychology. Retrieved from https://www.britannica.com/science/Gestalt-psychology

The Immunisation Advisory Centre. (2020). A brief history of vaccination. Retrieved from https://www.immune.org.nz/vaccines/vaccine-development/brief-history-vaccination

United States Department of Health and Human Services. (2017). Research. Retrieved from https://www.hhs.gov/hipaa/for-professionals/special-topics/research/index.html

United States Department of Health and Human Services. (2018). Five important reasons to vaccinate your child. Retrieved from https://www.vaccines.gov/get-vaccinated/for_parents/five_reasons

United States Department of Health and Human Services. (2020a). Vaccine safety. Retrieved January 31st, 2021, from https://www.vaccines.gov/basics/safety

United States Department of Health and Human Services. (2020b). Vaccines work. Retrieved from https://www.vaccines.gov/basics/work

Vasylyeva, T., Smyrnov, P., Strathdee, S., & Friedman, S. (2020, July 1). Challenges posed by COVID-19 to people who inject drugs and lessons from other outbreaks. Journal of International AIDS Society, 23(7), e25583. http://dx.doi.org/10.1002/jia2.25583

Verger, P., Bocquier, A., Vergelys, C., Ward, J., & Peretti-Watel, P. (2018). Influenza vaccination among patients with diabetes: Motives, perceptions, trust, and risk culture - a qualitative survey. *BMC Public Health, 18,* 1-10. http://dx.doi.org/10.1186/s12889-018-5441-6

Vygotsky, L.S. (1978). *Mind in Society.* Cambridge, MA: Harvard University Press

Weir, K. (2017, May). Why we believe alternative facts. *Monitor on Psychology*, 48(5), 24. Retrieved from https://www.apa.org/monitor/2017/05/alternative-facts

Wertheimer, M. (1923). Laws of organization in perceptual forms. First published as Untersuchungen zur Lehre von der Gestalt II, in *Psycologische Forschung, 4*, 301-350. Translation published in Ellis, W. (1938). *A source book of Gestalt psychology* (pp. 71-88). London: Routledge & Kegan Paul.

Wills, E., & McEwen, M. (2019). Learning Theories. In Theoretical basis for nursing (5th ed., pp. 409-433). Philadelphia, PA: Wolters Kluwer.

World Health Organization. (n.d.a). People who inject drugs. Retrieved from https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/populations/people-who-inject-drugs

World Health Organization. (n.d.b). Ten threats to global health in 2019. Retrieved from https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019

Yeung, M., Lam, F., & Coker, R. (2016, January 6). Factors associated with the uptake of seasonal influenza vaccination in adults: A systematic review. *Journal of Public Health, 38*(4), 746-753. http://dx.doi.org/10.1093/pubmed/fdv194

Appendix A

Cognitive Learning Theory Illustration

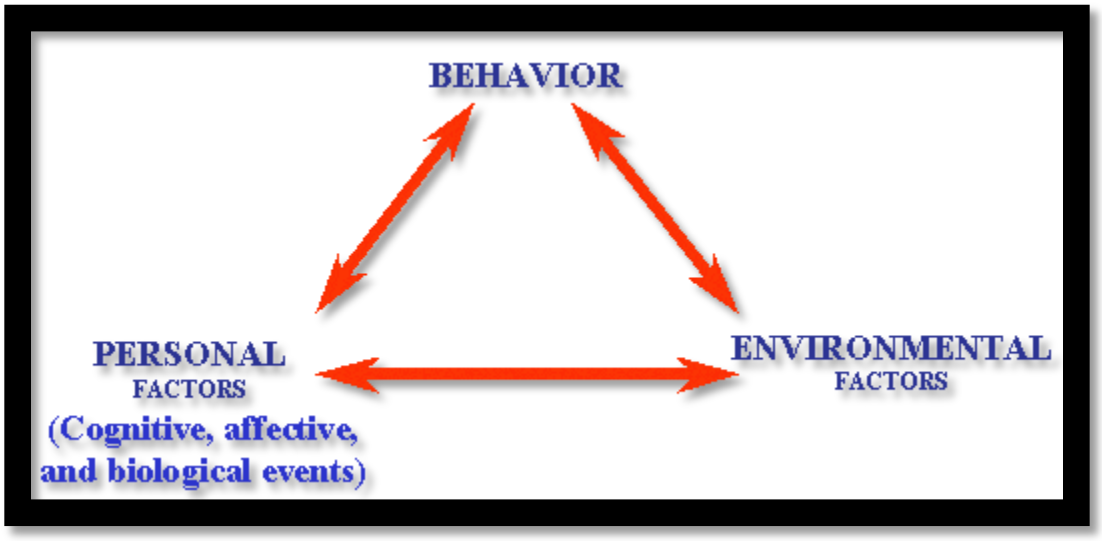


Figure 1. Social Cognitive Theory Illustration (Pajares, 2002)

Appendix B

Educational Pamphlet

What is the Flu?

An illness that can make you sick every year leading to :

High body temperatures, feeling like you want to throw up, sleepiness, coughing, headache, chills, sore throat, runny nose, and diarrhea.

(American Lung Association, 2020)

What is the flu shot?

The flu shot is a medicine that is made up of dead flu parts. Your body remembers the flu in the medicine so it can fight the real virus if you ever have it enter your body.

(Cavaco, 2020)

Can the Flu shot cause the Flu?

No, your body may feel sick for a short period as a side-effect of the shot. However, if you do come down with the flu shortly after the shot you probably had it in your body before the vaccine was present. The shot can still help decrease how sick you become and how long it lasts.

(CDC, 2020)

How to Prevent the Flu

Wash your hands

Get the flu shot yearly

Stay away from those that are sick

Cover your face with your elbow, NOT your hand, when coughing or sneezing

Avoid touching your eyes, nose, and mouth

(Defense against the flu by James Steinberg, 2018, The New York Times)

The Flu and You

Why do you NEED the flu shot?

The flu shot helps you protect yourself and others from the flu every year. It helps stop you from needing to go to the hospital and can decrease the time yo are sick if you do get the flu after the shot.

(Cavaco, 2020)

American Lung Association. (2020). Flu symptoms, causes, and risk factors. Retrieved June 6th, 2020, from https://www.lung.org/lung-health-diseases/lung-disease-lookup/influenza/symptoms-causes-and-risk?gclid=Cj0KCQjw_ez2BRCyARIsAIfp_ktdkpq8xrcT13i8BRdut2hET7I4RuhSWH-O0IhAnMi6QSa5s3rdtnMcaAt4jEALw_wcB. Cavaco, J. (2020). What are flu vaccines made of and why? Retrieved November 26, 2020, from https://www.medicalnewstoday.com/articles/321207

Appendix B Continued

Educational Pamphlet

Appendix C

Educational Poster

Appendix D

Literature Review

Reference, Date	Design	Sample/Method	Variables	Measurement	Results	Conclusion
Meyer & Lum, 2017	Questionnaire	n=304 Convenience Sample	Vaccine Refusal Reason	Response Review	46.8% of people did not perceive vaccines necessary. 19.4% reject on moral/religious grounds. 14.5% reject on previous experience. 5.1% reject on risk assessment.	New prevention education is needed
Swaney & Bruns, 2018	Interview	n=18 Convenience Sample	Vaccine Refusal Reason	Response Review	country is protected from disease, herd immunity not understood, natural remedies better	Require Vaccine compulsion, increase vaccine education, Media utilized for education
Newman et al., 2014	Questionnaire	n=1225 Three stage probability	Status of mandatory vaccine support	Likert Scale	Compulsory vaccine endorsement YES=590 NO=635 People who inject Drugs 34.1% endorsement of vaccines for HIV	Voluntary HEP B vaccine uptake suboptimal, HIV vaccine may require a government mandate
Day et al., 2010	Interview, Serology	n=229 Convenience Sample of IV drug use	Vaccine Status, Demographics	HBV status and vaccine uptake	HBV Vaccine- 31% HBV Negative- 29%, 27% immunization, 43% reported immunity	Immunization understanding & uptake low in PWID
Sira, Brown, Ambegaokar, Modin, & Kelly, 2019	Questionnaire, serology	n=65 Convenience Sample	Hepatitis, HIV status high-risk activities, sexual activity	Hepatitis and HIV serology, High-risk activities questions	Illicit drug use=60 Needle Sharing=28 Sexually Active=61 100% negative HIV, HBV, HCV	Education and immunization best completed as adolescents
Henrikson et al., 2015	RCT	n=211 Physicians n=347 mothers Convenience Sample	communication strategies, vaccine hesitancy	PACV validated tool, surveys	No change in view noted after vaccine education in parents	Physician education does not alter parental views on vaccines
Betch & Bohm, 2015	RCT	n=297 Incentive Convenience Sample	Vaccine interest post mandatory vaccines and anger of mandatory vaccine	Anger = Numeric scale 1-7, Vaccine interest question	Anger Mean= 2.14, Decrease interest in vaccines with mandatory requirements	Mandatory vaccines lead to negative view of vaccines leading to further vaccine refusal

Appendix D- Continued

Literature Review

Reference, Date	Design	Sample/Method	Variables	Measurement	Results	Conclusion
Partouche, H., Gilberg, S., Renard, V., & Saint-Lary, O. , (2019)	Opinion	Public articles Opinion review			Older articles= mandating vaccines, newer articles= communication	Joint decision making and communication is key to vaccine adherence
Verger, P., Bocquier, A., Vergelys, C., Ward, J., & Peretti-Watel, P., (2018)	Questionnaire	n=19 adults with diabetes, Convenience Sample	Demographics, personal belief on vaccines, source of vaccine information	Thematic grouping	Trivialization, relativization, and vaccine risk used to deny vaccine need	Influenza vaccine refusal is stable over time, multiple arguments used to justify refusal. Education needed by physicians about vaccines
Kerneis et al., 2017	Questionnaire	n=2118 Convenience Sample medical students	Vaccine education styles, demographics, attitude toward vaccines	Descriptive Analysis	49%=vaccinated vs influenza 99% favorable to vaccines, 21% want more anti-vaccine arguments in courses	Communication skill education skills are lacking in Frances' medical schools
Yeung, Lam, & Coker, 2016	Systematic Literature Review	Databases: Embase, MEDLINE, and the Cochrane Library.	Keywords influenzavaccine, human, accept*, attitude, intent*, perception, and seasonal influenzavaccine.		2235 articles, 23 fulfilled inclusion criteria. Most quantitative observational studies	Perception of vaccines efficacy, safety, availability of advice and free vaccine are changeable factors ininfluenzaencing vaccine uptake

Appendix E

Pre-Intervention Survey

Visible Gender?

MALE

FEMALE

1) "Are you willing to answer a few questions today?"

   a) YES
   b) NO (Do not ask anymore questions)

2) What is your age range?

   a) 18-28 (If under 18 do not ask anymore questions)
   b) 29-39
   c) 40-50
   d) Over 50

3) Highest level of education completed?

   a) Elementary
   b) Middle School/Junior High
   c) High School
   d) College

4) Did you receive influenza vaccine last year (2019)?

   a) Yes
   b) No
   c) Unsure

5) Do you feel that the yearly influenza vaccine is necessary?

   a) Yes
   b) No
   c) Unsure

6) Tell me your thoughts about you receiving influenza vaccine? (OPEN)

Appendix F

Post-Intervention Survey

Visible Gender?

MALE

FEMALE

1) "Are you willing to answer a few questions today?"

   a) YES
   b) NO (Do not ask anymore questions)

2) What is your age range?

   a) 18-28 (If under 18 do not ask anymore questions)
   b) 29-39
   c) 40-50
   d) Over 50

3) Highest level of education completed?

   a) Elementary
   b) Middle School/Junior High
   c) High School
   d) College

4) Did you receive influenza vaccine last year (2019)?

   a) Yes
   b) No
   c) Unsure

5) Do you trust that the yearly influenza vaccine is necessary?

   a) Yes
   b) No
   c) Unsure

6) Tell me your thoughts about you receiving influenza vaccine? (OPEN)

Appendix G

Project Timeline

Project Step	Resources Needed	Person Responsible	Start Date	End Date
Prospectus	Microsoft Office	DMA	01/2020	05/2020
study Revisions	Microsoft Office	DMA, LO	05/2020	06/2020
Submit IRB	IRB Application	DMA	07/2020	08/2020
IRB Approval	IRB Application	IRB	07/2020	09/2020
study Proposal Defense	PowerPoint, Full committee	DMA, LO, TC, LC	05/2020	07/2020
Set data collection date	Conversation with CHN leaders	DMA, TC, LC	08/ 2020	05/ 2021
Train assistants as needed	Data collection tool & instruction sheet	DMA	08/ 2020	12/ 2020
Collect data from Participants in Phase one	Printed Data Collection tool clipboards, pens	DMA	01/2021	01/2021
Complete education Phase two	Influenza education pamphlet and poster	DMA	01/2021	01/2021
Collect post-intervention data Phase three	Printed Data Collection tool clipboards, pens	DMA	02/2021	02/2021
Data Analysis	Data Results, Internet, Textbooks	DMA	02/2021	06/ 2021

Appendix G Continued

Project Timeline

Chair Review of Data Analysis	study, Data Results	DMA, LO	05/ 2021	07/ 2021
Data Conclusion & Implications	Data Results, Internet, Textbooks	DMA	05/ 2021	07/ 2021
Revision of study Paper	Data Results, Internet, Textbooks	DMA	05/ 2021	08/ 2021
Project Presentation Defense	Full committee, PowerPoint presentation	DMA, LO, LC, TC	05/ 2021	08/2021
Project Dissemination	Organizational Leaders, Homeless Coalition DNP journal, Colloquium, Virginia Henderson Repository	DMA	08/ 2021	08/ 2021

KEY

DMA	David Arnopole
LO	Dr. Louann O'Dell
TC	Dr. Terry Cooper
LC	Dr. Lindy Clapp
IRB	IRB Committee

Appendix H

King University IRB Approval

KING UNIVERSITY

ESTABLISHED IN 1867

Memorandum

To: David Arnopole

From: Sheri McRae, DNP, RN, CPHQ, NEA-BC
Chair, Human Subject Research Review Committee / Institutional Review Board

Date: October 22, 2020

Re: King University HSRR/IRB Committee Review

Thank you for your recent submission of your research proposal entitled,

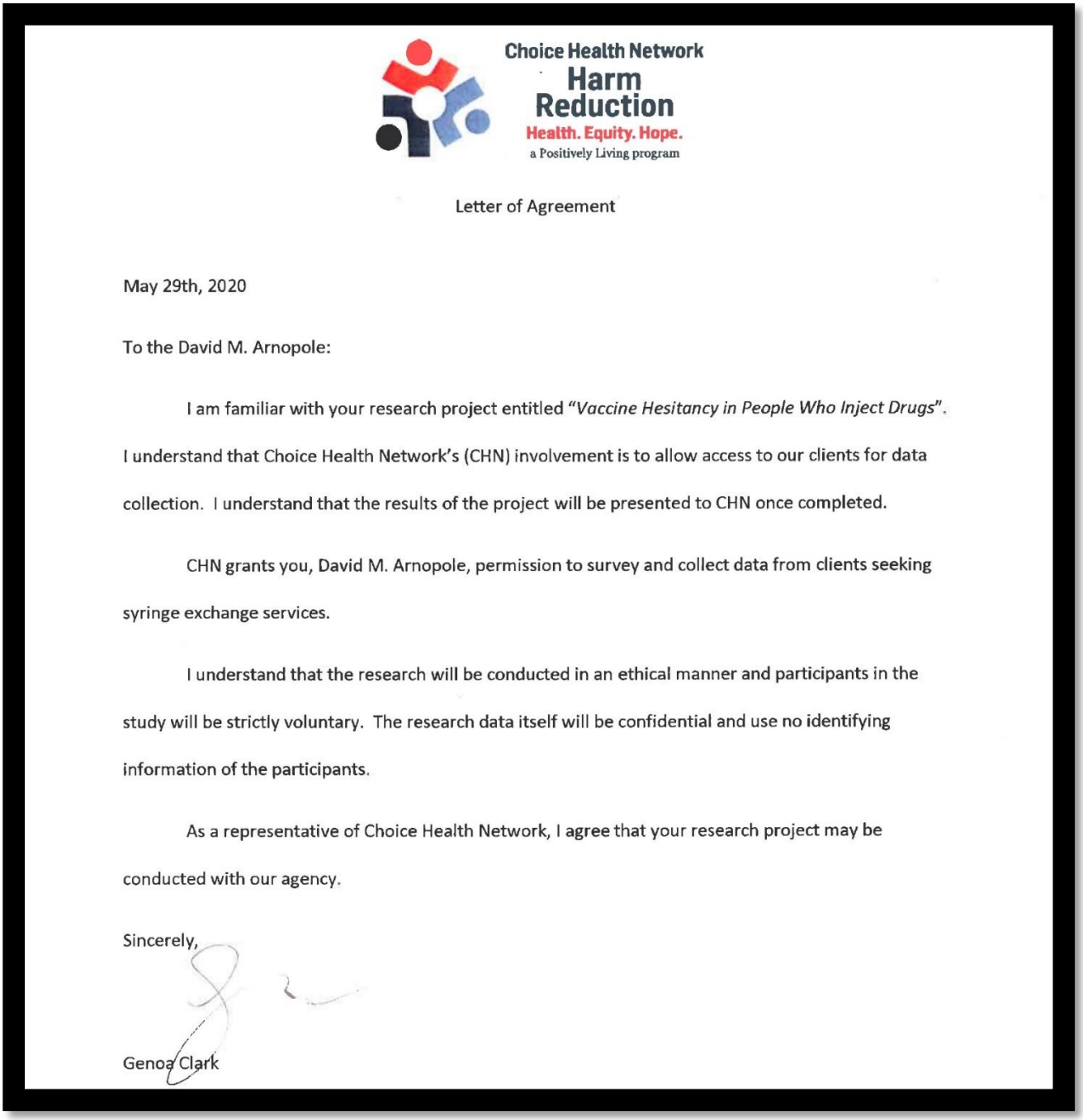
Vaccine Hesitancy in People Who Inject Drugs

I am pleased to inform you that your proposal was approved by the King University HSRR/IRB Committee and you may begin your research.

Please remember to contact the HSRR/IRB Committee for approval if you make major changes to your research project, particularly with any methodology or documents that pertain to your research. If you have any additional questions, please feel free to contact me further at king-irb@king.edu..

Appendix I

Organization Letter of Agreement



Choice Health Network
Harm Reduction
Health. Equity. Hope.
a Positively Living program

Letter of Agreement

May 29th, 2020

To the David M. Arnopole:

I am familiar with your research project entitled "*Vaccine Hesitancy in People Who Inject Drugs*". I understand that Choice Health Network's (CHN) involvement is to allow access to our clients for data collection. I understand that the results of the project will be presented to CHN once completed.

CHN grants you, David M. Arnopole, permission to survey and collect data from clients seeking syringe exchange services.

I understand that the research will be conducted in an ethical manner and participants in the study will be strictly voluntary. The research data itself will be confidential and use no identifying information of the participants.

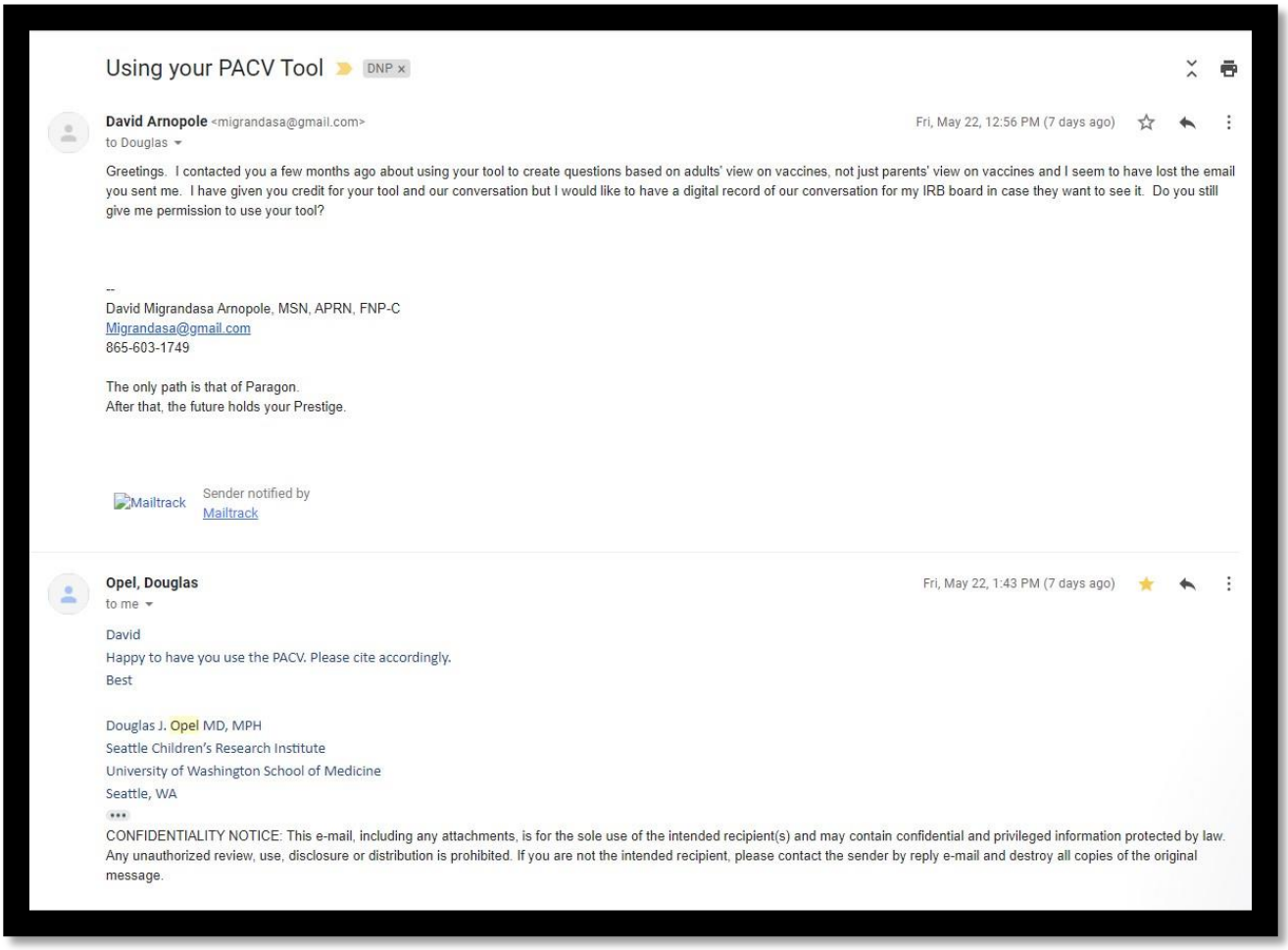
As a representative of Choice Health Network, I agree that your research project may be conducted with our agency.

Sincerely,

Genoa Clark

Appendix J

PACV Tool Permission



Using your PACV Tool DNP ×

David Arnopole <migrandasa@gmail.com> Fri, May 22, 12:56 PM (7 days ago)
to Douglas

Greetings. I contacted you a few months ago about using your tool to create questions based on adults' view on vaccines, not just parents' view on vaccines and I seem to have lost the email you sent me. I have given you credit for your tool and our conversation but I would like to have a digital record of our conversation for my IRB board in case they want to see it. Do you still give me permission to use your tool?

--
David Migrandasa Arnopole, MSN, APRN, FNP-C
Migrandasa@gmail.com
865-603-1749

The only path is that of Paragon.
After that, the future holds your Prestige.

Mailtrack Sender notified by Mailtrack

Opel, Douglas Fri, May 22, 1:43 PM (7 days ago)
to me

David
Happy to have you use the PACV. Please cite accordingly.
Best

Douglas J. Opel MD, MPH
Seattle Children's Research Institute
University of Washington School of Medicine
Seattle, WA

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Appendix K

Budget for Study Implementation

Resource	Provision	Unit Cost	Total Cost
Organization	Director of Organization	4-8 hours	$0.00
Study Leader	David Arnopole	80 hours	$0.00
Data Collection Tools	Printed Surveys, Clipboard, pens, lockbox	$40	$40
Influenza Vaccine Pamphlet and Poster	Pamphlets, Poster	$1.21 (Office Depot)	$242
Hand Sanitizer	Bottles	$8	$32
Masks	Masks	$10	$40
Total Costs			$352

*All costs covered by researcher

Appendix L

Comparison of Pre- and Post- Intervention Groups

Variable	Pre-intervention	Post-intervention	*p*-value
Gender (female)	74 (50.7%)	78 (44.1%)	0.24
Age			
18-28	21 (14.4%)	22 (13.4%)	
29-39	66 (45.2%)	63 (38.4%)	
40-50	38 (26.0%)	60 (36.6%)	
Over 50	21 (14.4%)	19 (11.6%)	0.25
Education			
Elementary	1 (0.7%)	1 (0.6%)	
Middle school	26 (17.8%)	39 (23.8%)	
High school	92 (63.0%)	104 (63.4%)	
College	27 (18.5%)	20 (12.2%)	0.34
Flu vaccine last year	64 (44.4%)	57 (35.0%)	0.09

Appendix M

Chi-Square Analysis

Pearson Chi-Square	7.778[a]	1	.005
Continuity Correction	7.146	1	.008
Likelihood Ratio	7.799	1	.005
Fisher's Exact Test			
Linear-by-Linear Association	7.753	1	.005
N of Valid Cases	305		
Pearson Chi-Square	7.778[a]	1	.005
Continuity Correction[b]	7.146	1	.008
Likelihood Ratio	7.799	1	.005
Fisher's Exact Test			
Linear-by-Linear Association	7.753	1	.005
N of Valid Cases	305		
Pearson Chi-Square	7.778[a]	1	.005

Note: People in the post-intervention group had 0.52 times lesser odds of thinking the influenza vaccination was necessary (95% CI 0.33 – 0.83) versus those in the pre-intervention group. Frequency and percentage statistics were used to give context to the inferential analyses. Unadjusted odds ratio (OR) with 95% confidence interval (95% CI) was calculated as a measure of effect size when statistical significance was detected. All analyses were performed using SPSS Version 26 (Armonk, NY: IBM Corp.) and statistical significance was assumed at an alpha value of 0.05.

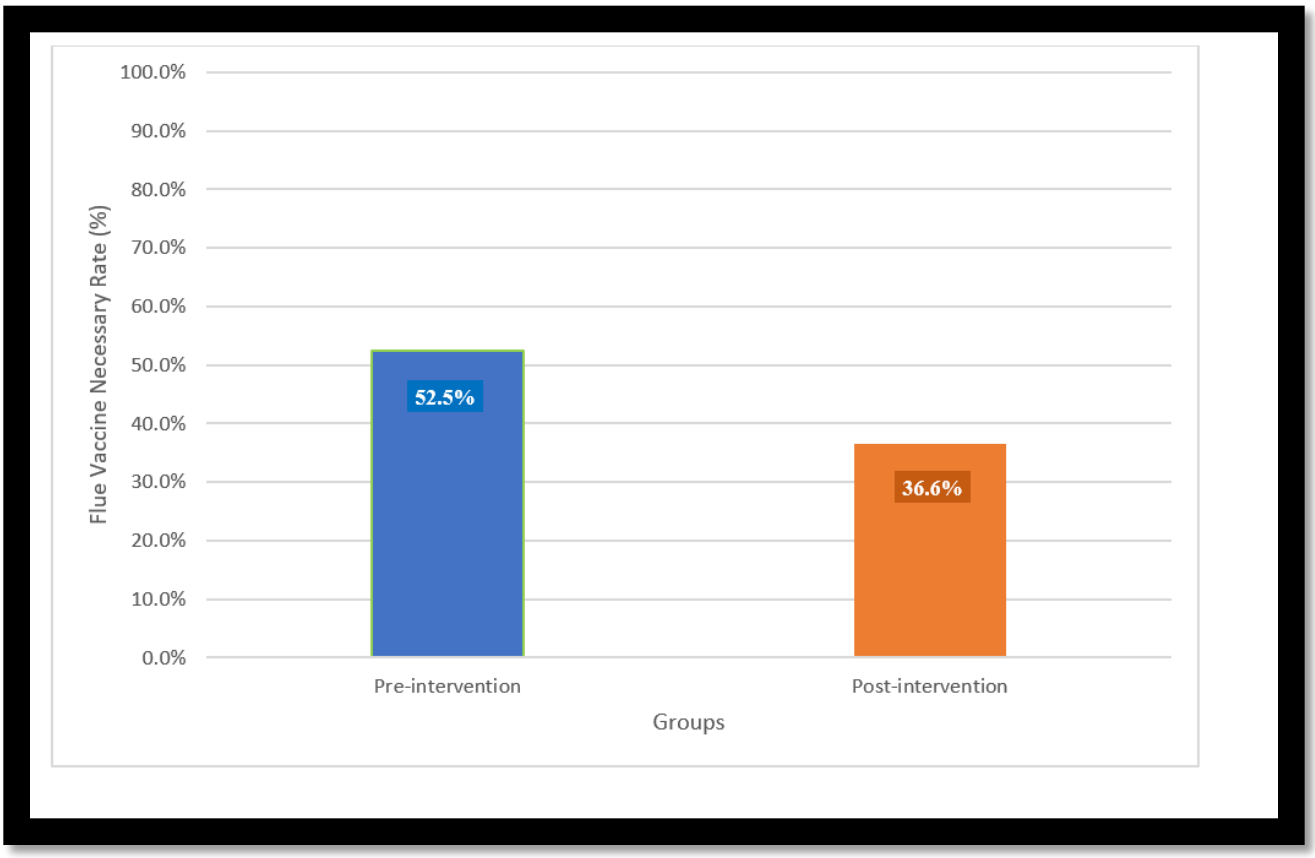
Appendix M Continued

Risk Estimate

	Value	Lower	Upper
Odds Ratio for Group (Pre/Post)	.522	.330	.826
For cohort FluVaccineNecessary = No	.749	.608	.923
For cohort FluVaccineNecessary = Yes	1.435	1.111	1.852
N of Valid Cases	305		

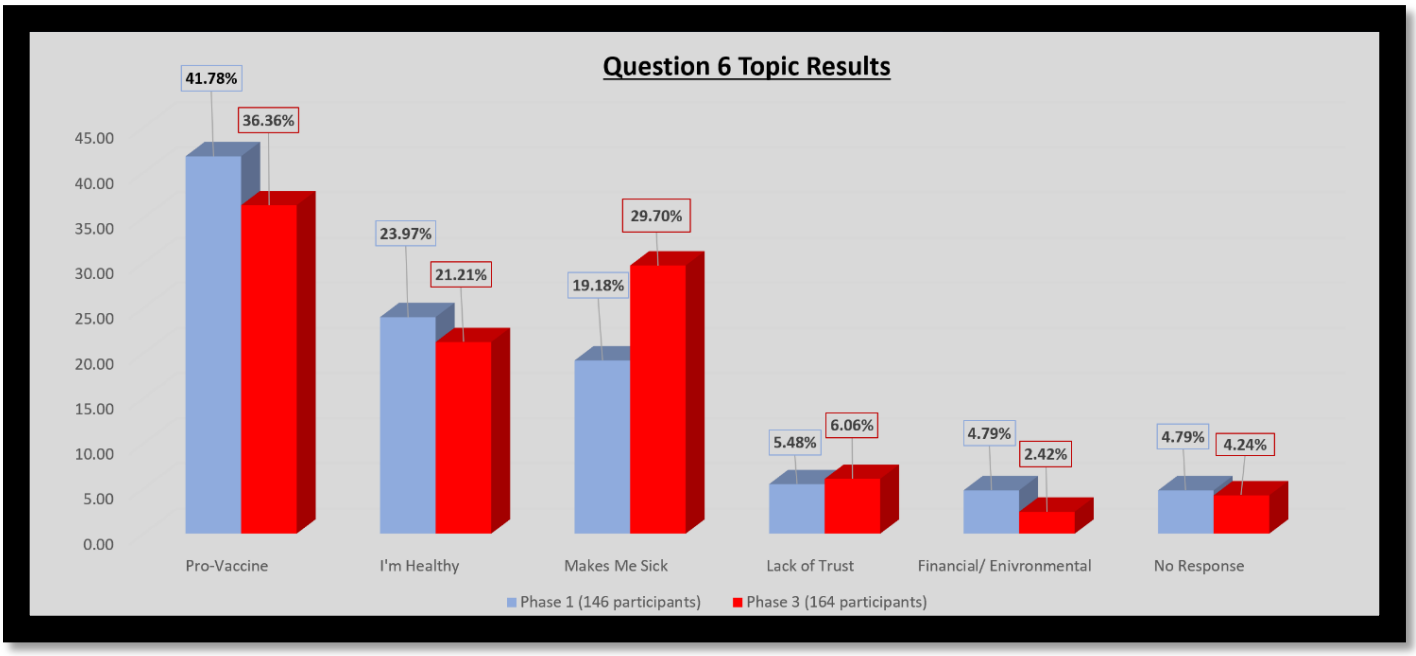
Appendix N

Chi-Square Graph of Pre- and Post-Intervention Vaccine Necessity



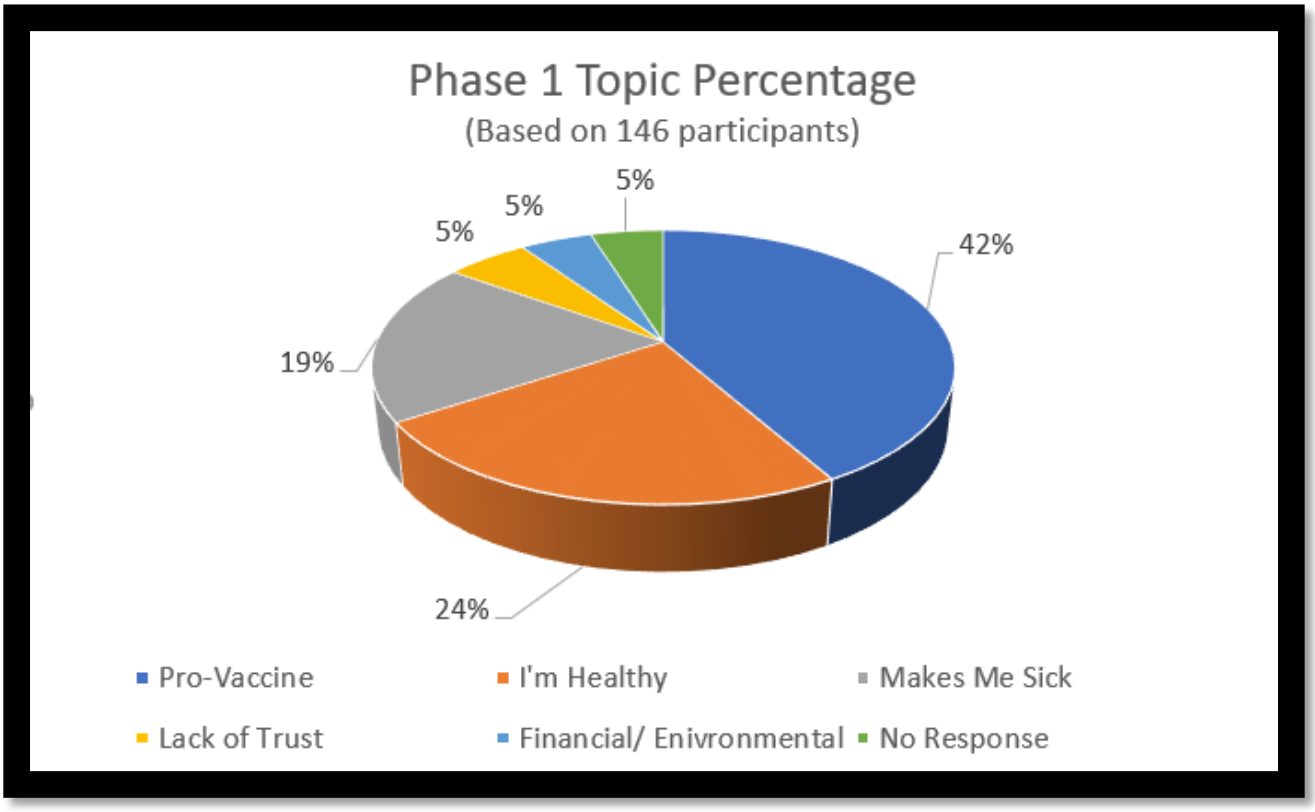
Appendix O

Percentage of Topics Presented by Participants Regarding Their Thoughts on the Influenza Vaccine Before and After the Educational Intervention



Appendix P

Percentage of all responses in Pre-Intervention for Question 6



Appendix Q

Percentage of all responses in Post-Intervention for Question 6