RISK PERCEPTION AND MEDICAL DECISION MAKING ON VACCINATION

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ABSTRACT

People all over the world face the moment of decision making every day in many aspects of life including health and medical decision making. People usually make decisions in the direction of avoiding risk, but sometimes take risks intentionally or without being aware of it. This study examined risk perception on vaccines and diseases that could be prevented by vaccines and explored how people make decisions on vaccination, especially for flu vaccine and premium vaccines (e.g., pneumonia vaccine and meningitis vaccine). I have reviewed the previous theory (e.g., fuzzy-trace theory) and research on risk perception and decision making. Fuzzy-trace theory (FTT) is a dual-process theory of memory, reasoning, judgment, and decision-making, and FTT contrasts two types of judgement: gist and verbatim mental representations. Gist representation reflects a subject, intuitive, and impressionistic understanding of an event, whereas verbatim representation reflects precise words, numbers, and objective facts. To examine the theory in the vaccination decision-making area, a total of 141 participants in many age groups were recruited in this research and completed a survey by providing answers to the online questionnaires, and the results were statistically analyzed. Results indicated that risk perception of being vaccinated was negatively correlated to the previous vaccination decision and future intention, whereas risk perception on not being vaccinated was positively correlated to the past and future vaccination decision. The risk of being infected had a positive correlation with the past and future vaccination only pneumonia showed significant relationships. Also, it was found that gist was found to have relatively higher dominance than verbatim does in vaccination decisions of flu and pneumonia in total sample and students sample.

BIOGRAPHICAL SKETCH

Bomi Yoon received her Bachelor's degree in Chemical Engineering from Yonsei University (Seoul, Korea) in Feb 2006, and the 2nd Bachelor's degree in Pharmacy from Ewha Womans University (Seoul, Korea). She began her Master's degree at Cornell University, with Dr. Valerie Reyna as her thesis advisor, in August 2020. After completing her Master's degree, she will be continuing her job at a Multi-national Pharmaceutical Company in the Quality Assurance department.

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TABLE OF CONTENTS

Contents

Introduction

Vaccine and medical decision-making

In November 2019, novel coronavirus was discovered and started to spread across the world, which has been a tremendous threat to people causing significant disruption of physical and mental health. The severe acute respiratory distress syndrome coronavirus-2 (SARS-CoV-2) caused several respiratory symptoms such as dry cough, difficulty in breathing, and pneumonia which may lead to hospitalization and even death. As World Health Organization (WHO) declared it as a pandemic in March 2020, COVID-19 has become a problem not only for one country but for all human beings causing a huge impact on people's every aspect of life. Amid the spread of the virus with 259 million positive cases and more than 5 million deaths cases worldwide (as of November 2021, WHO Coronavirus (COVID-19) Dashboard) the newly developed vaccines are expected to decrease the spreading of the virus. The vaccine has been proven as the most efficient and effective public health measure to prevent diseases and the role of vaccines is becoming more important than ever. Some people are willing to get the COVID-19 vaccine because they feel the risk of virus infection is relatively high, while others might not want to get vaccinated before the safety of the vaccine is fully verified. Then, how do people judge the risk of vaccines and diseases? What is the psychological basis for that judgment (e.g., scientific information from experts, or previous experience) when people make vaccination decisions? Does risk perception of vaccination impact decision-making? To answer these questions, the previous research was reviewed, and the survey was conducted with a set of questionnaires asking about risk perception and vaccination decision-making.

This study examines vaccination decision-making based on the risk perception of vaccination or not vaccination, vaccine products, and diseases. Vaccination decision-making was

analyzed by the distinction of gist-based risk perception (e.g. general and global risk perception) and verbatim-based risk perception (e.g., specific quantitative risk).

Background

Research on Medical decision-making and vaccination

There has been much research on the psychological background of vaccination which more focuses on why people have vaccine hesitancy. Determinants of vaccine hesitancy are not simple, but complex and context-specific - varying across time, geographic region, political background, sex, knowledge background, and type of vaccines. (Larson et al., 2014) The common causes of vaccine hesitancy are perceived risk, communication and media environment (e.g., exposure to vaccine hesitancy contents), knowledge of vaccines, and experience with past vaccination (Larson et al., 2015) The Strategic Advisory Group of Experts on Immunization (SAGE) of WHO defined "vaccine hesitancy" as A behavior, influenced by several factors including issues of confidence (e.g., do not trust vaccine or provider), complacency (e.g., do not perceive a need for a vaccine, do not value the vaccine), and convenience (e.g., accessibility). (WHO SAGE working group, 2014) Vaccine hesitancy is not limited to one vaccine, such as the flu vaccine, but can be applied to several other types of vaccines. Vaccine-hesitant individuals are various types of groups who hold varying degrees of indecision about specific vaccines or vaccination in general. (World Health Organization, 2014）

Vaccination is known as the most effective way to prevent more than 20 life-threatening diseases and is one of the most important achievements of public health. (World Health Organization, 2021）It is regarded by healthcare providers as one of the safest, most cost-effective, and powerful means of preventing diseases and improving the quality of life. (Remy, Zollner, and Heckmann, 2015) In particular, the development of vaccines is considered a much faster and effective measure against the further spread of COVID-19 than the development of curing medicine, given that COVID-19 is caused by a specific type of virus. (Centers for Disease

Control and Prevention, 2021) Currently, there are no therapeutic agents licensed and available for COVID-19, while several COVID-19 vaccines are available. (World Health Organization, 2020) It is worth promoting the vaccination to prevent specific diseases area (e.g., flu, pneumonia), especially under the COVID-19 pandemic situation to reduce hospitalization and social cost caused by flu and pneumonia. The most common and easily accessible vaccine is the flu vaccine, which prevented approximately 105,000 hospitalizations and 6,300 influenza-associated deaths in the United States in the 2019-2020 flu season. (Centers for Disease Control and Prevention, 2021). However, the flu vaccination rate among adults (age 18 years and older) in the US is less than 50%, and there seems to be more room for improvement. (CDC, 2021)

While there is no official definition or grouping of vaccines, premium vaccines, also classified as Innovator vaccines, are different from traditional vaccines for several aspects. (WHO, 2018) Premium vaccines, also known as Innovator vaccines, are relatively newly developed vaccines with a higher price per dose than conventional vaccines. Premium vaccines are not always mandatory vaccines in National Immunization Plan (NIP) for some age groups, while traditional vaccines are mandatory to almost all age groups in almost all countries. Considering those characteristics, vaccinations of premium vaccines are more dependent upon individuals' decision-making and more autonomy is required when choosing vaccination of premium vaccines. Among several types of premium vaccines, four types of premium vaccines were pre-selected as the research scope based on comprehensive criteria, including the prevalence of disease prevented by a vaccine, the rate of vaccination, and the unit price of the vaccine. Among the four pre-selected types, vaccines that are ambiguous with the premium vaccine's criteria (e.g., Hep A vaccine) and vaccines the vaccination decision criteria of which are strongly affected by other factors than risk perception (e.g., HPV vaccines) were excluded.

For this reason, I selected two premium vaccines, Pneumonia and Meningitis vaccines, for research topics to develop more robust evidence testing fuzzy-trace theory (FTT) in medical decision-making, along with research on seasonal flu vaccination. When choosing to get or not get those premium vaccines, decision-making is based on several factors such as perceived risk and benefit of specific vaccines, background knowledge, cost, and accessibility.

Theoretical background on Fuzzy-Trace theory

A Fuzzy-trace theory (FTT) is a dual-process theory of memory, reasoning, judgement, and decision making, and FTT contrasts two types of thinking: verbatim and gist-based mental representations. (Reyna, 2012). Verbatim representation reflects the memory of the precise words or numbers, objective facts, whereas the gist representation reflects a subjective, intuitive, and impressionistic interpretation and understanding of an event or stimulus. (Reyna, 2008) Generally, an individual's decision-making is influenced by various factors, such as background knowledge, mental representation, that are distinct by an individual (Reyna, 2011). Medical decision-making is determined by an individual's risk perception and judgments. For example, an individual's decision-making on a medical issue is affected by the individual's recognition of risk factors, estimation of the magnitude of the risks, and extent of avoidance of the risks. In the previous research, there has been accumulating evidence that FTT could be applied in several medical decision-making areas such as decision making on flu vaccination, treatment with antibiotics, treatment of diabetes, or taking specific types of medicine, that people tend to make decisions based on the gist representation rather than verbatim representation, and also tend to avoid the higher perceived risk (for a review, see Blalock & Reyna, 2016). It is important to note that gist representations of information influence judgments and decisions more than verbatim

representations even when verbatim information can be remembered or is physically present. (Reyna, 2021) Despite such consensus, there has been little attention devoted to several types of vaccines that can prevent severe diseases (e.g., pneumonia, meningitis) by a simple vaccination. Review on existing studies on vaccination reveals that, while much effort has been made to examine the contribution of FTT to medical decisions on traditional vaccination (e.g., MMR vaccine and flu vaccine), rare efforts have been made to explore the potential role of FTT in medical decision making of high-priced adult vaccines that have been relatively recently developed. Therefore, I have selected innovator or premium vaccines (e.g., pneumonia vaccine and meningitis vaccine) as a research topic to examine the correlation between risk perception and vaccination decision making. Also, I would like to verify whether FTT could be applied to not only the flu vaccine but also many other types of innovator vaccines.

This study examines 1) the correlation between risk perception and medical decision making, and 2) whether already developed FTT measures, used to study flu vaccination, could be expanded to the other types of vaccines by the questionnaire survey and statistical analysis. The items such as Gist principles and Global risk and benefit questions used in the questionnaire for Pneumonia and Meningitis were based on prior items (e.g., Reyna, 2008; Reyna, Estrada, et al., 2011). The other survey items were prepared and adapted from the already existing questionnaire items created by Dr. Valerie Reyna (e.g., flu items), published (e.g., Reyna, 2012, Vaccine) and unpublished. Based on the flu vaccine items, questionnaires for pneumonia and meningitis vaccines were prepared to compare the results of the flu vaccine and the two premium vaccines. This study will also explore how such risk perception and vaccination attitude may combine with effective public health communication messages. The results are expected that correlations will be consistent with the previous research, that is, people will make decisions based on their risk

perception and to avoid the perceived risk. Also, individual differences in age, background knowledge, or belief may influence medical decision making. In summary, I hypothesize that people tend to make vaccination decisions based on their risk-perception on vaccines and diseases prevented by vaccines, that is, the decision making will be in the direction to minimize perceived risk (e.g., risk avoidance or risk reduction). That is, for all types of vaccines studied in this research, lower risk perception for vaccines and vaccination will result in more vaccination decisions, whereas higher risk perception for disease will generate more vaccination decisions. Also, I hypothesize that people will rely on more gist-based decision-making rather than precise mental representations of words or numbers.

Method

Participants and Recruitment

In total 141 adult participants (e.g., above 18 years) were recruited from four different countries – the USA, South Korea, Hong Kong, and China – for this study, and the incomplete responses of 2 participants were excluded. The sample comprises individuals between 18 to 71 years of age, and 73% were female. (total sample 139, 102 women, 37 men, Mean age=24.4, age range: 18-71 years). To examine the existence of significant differences in responses between age groups and regional differences, I attempted to recruit respondents of various age groups from at least two different countries.

Younger adults (85 women, 31 men, mean age=20.28 years, SD=1.22, age range: 18-23 years) were all undergraduate students recruited via SONA system at Cornell University. Middle-aged and older adults (17 women, 6 men, Mean age=45.4 years, age range: 28-71 years) were recruited on a voluntary basis through a variety of means, including senior centers or local adult organizations (e.g. Kiwanis Club Horseheads branch, GIAC Adult 60+ Senior Program at City of Ithaca, Family Home Care Services), the friends and family members, or advertisements in the newsletter in older adult residence area (e.g. Kendal at Ithaca, Appleridge Residences) in upper New York State area. There was no monetary compensation to participants, but university students were compensated for their time with extra credit through Cornell University's SONA system. In total, the questionnaire lasted about 30 minutes. Due to the COVID-19 pandemic situation, all surveys were conducted online via the Qualtric survey system. Considering the older adults were not familiar with an online survey, recruitment for the older adults group was limited, so the sample sizes varied across age groups.

Survey Questionnaire

The survey was conducted using a set of question items and demographic questions. Subjects were asked to answer the set of questions including the intention of vaccination, perceived risk of vaccination and not vaccination, perceived risk of diseases that could be prevented by each vaccine, and the knowledge on vaccination. Perceived risk questions were divided into gist-based questions and verbatim-based questions. (See Appendix B for a full questionnaire)

The questionnaire includes nine vaccine behavior and intentions questions for the flu vaccine (e.g., "Have you ever gotten vaccinated for the flu in your lifetime including in the past year?" and "Do you plan to get vaccinated for the flu in the next flu season?"), seven vaccine behavior and intentions questions for two different premium vaccines (Pneumonia vaccine and Meningitis vaccine), respectively. The behavioral question was "Yes"/ "No" questions asking the previous vaccination and the future intention of vaccination or willingness to vaccination.

Participants were asked to answer gist and verbatim questions (the gist and verbatim scales were based on the already developed items (e.g., Reyna, 2008; Reyna, Estrada et al., 2011; Reyna, 2012) adapted to reflect vaccine-related questions. Gist measures were designed to ask global attitudes toward vaccination and related diseases, and gist measures were designed to draw more intuitive perceptions from the respondents. Gist measures included a Global Risk and Benefits question, the Categorical gist scale, and the Gist Principles of vaccines and diseases, and maintaining status quo scale. In the first part of Gist measures, there were 5 questions of global risk and benefit questions for each type of vaccine. The global risks questions were the question asking personal risk perception, for example, "Overall, for you, what are the risks of getting the specific type of vaccine?", and the responses were *None, Low, Medium*, and *High*.

The global benefit question was "Overall, for you, what are the benefits of getting the specific type of vaccine?" responses were *None, Low, Medium*, and *High*. The set of Categorical gist questions consisted of 6 questions asking the risk of flu, pneumonia, and meningitis (e.g., "It only takes once to get the flu") rated on a 7-point scale ranging from *strongly disagree* to *strongly agree*. For the gist principle of maintaining status quo by not vaccinating questions, there were five questions asking preference of status quo (e.g., "If I feel fine, the vaccine is not needed and might make me sick") rated on a 7-point scale ranging from *strongly disagree* to *strongly agree*. Gist principle measures about vaccines and diseases which can be prevented by the vaccine contained 18 questions (e.g., "When it comes to health, natural is good" or "Getting vaccinated benefits society") with a 7-point scale ranging from *strongly disagree* to *strongly agree*. For all gist measures, a higher score or higher agreement is considered as representing a greater perception of risk.

Verbatim measures were developed to draw more specific or quantitative judgments. Quantitative risk consisted of twelve questions (e.g., "What are your chances of getting very sick or dying from the flu?") rated on a 0%-100% scale indicating that higher scores reflect higher perceived risk and likelihood. In the verbatim measures, the participants were asked to select a specific percentage of the probability of getting the disease, getting very sick from that disease, or getting very sick from the vaccine.

Knowledge questions were followed, specifically, 19 questions asking general knowledge on vaccines and diseases (e.g., "The flu vaccine can give you the flu", "The flu has no cure") with a 7-point scale ranging from *strongly disagree* to *strongly agree*. Agreement with true items as true, and false items as false were reflected on the knowledge score.

Finally, demographics including age, ethnicity, sex, region, education level, and occupation were asked to the participants.

Results

Data Analysis

A total of 141 people answered the questionnaire, and 2 people who did not complete the answers were excluded. The majority of respondents were undergraduate students in their 20s, and the mean age of the total participants was 24.44. (SDSD=10.608). Among those who participated in the survey, 117 (84%) were aged between 18 and 29, 11 (7%) were in their 30s, 4 (3%) were in their 40s, and 7 (5%) were in their 50s or older. The total number of undergraduate students respondents (e.g., also named as Student sample, or SONA respondents) was 116, with their mean age 20.28 (SD=1.222). The number of female respondents was 85 which took up 73.30% (mean= .7338, SDSD= .4436) of the SONA respondents, and the number of male respondents was 31. The total number of non-student respondents (e.g., also named as Non-student sample, or Non-SONA sample) was 23. The mean age of non-student respondents was 45.39 (SD=12.17). The number of female respondents was 17 which took up 73.90% of the non-student respondents, and the number of male respondents was 6. Among the total respondents, 67 (48%) participants identified themselves as White or Caucasian, 49 (35%) as Asian, 10 (7%) as black, and 13 (9%) as others.

The proportion of vaccinated for flu in the past year was almost 90% (mean= .8993, SD= .302). The number of respondents that have received pneumonia vaccination in the past was similar to the number of respondents that have not (mean= .5108, SD= .5017). The majority of respondents responded that they have received meningitis vaccination in the past (mean= .8201, SD= .3855). In general, the vaccination rate for flu vaccine was generally higher than the vaccination rate for 2 premium vaccines. The vaccination rate for the Meningitis vaccine was higher than the Pneumonia vaccine, and one of the reasons could be more schools or workplaces

of the participants mandatorily requested the vaccination of the Meningitis vaccine. Among the participants whose school or work does not require them to get vaccinated, 90.6% (29 out of 32) of them got the flu vaccine, 32.0% (31 out of 97) got Pneumonia vaccine, and 51.3% (20 out of 39) already got Meningitis vaccine.

The mean value of vaccination intentions somewhere in the future for flu vaccine was around 2.78 points (n=139, SD=.574, from 0 to 3 scale, none=0, low=1, medium=2, high=3). For the other 2 premium vaccines, the future vaccination intention of participants who have not been vaccinated before was 1.71 point (n=73, SD=0.858) for the Pneumonia vaccine and 1.71 point (n=31, SD=0.980) for the Meningitis vaccine. Interestingly, much higher vaccination intention was observed if vaccines are easy and affordable. For the question "Are you WILLING to get vaccinated if it is easy and affordable?" vaccination intention was increased to 127 (91%) for the flu vaccine, 128 (92%) for the Pneumonia vaccine, and 134 (96%) for Meningitis vaccine, respectively. For students' samples, vaccination intention was increased to 92% for the flu vaccine, 93% for the Pneumonia vaccine, and 95% for the Meningitis vaccine. For non-students samples, vaccination intention was increased to 87% for the flu vaccine, 87% for the Pneumonia vaccine, and 87% for the Meningitis vaccine.

For the overall risk and benefit of vaccination (0-3 scale, *None, Low, Medium*, and *High*) question set, the mean risk of getting flu vaccine was 0.57 point (SD=.649) and the mean benefits of getting flu vaccine benefit were 2.48 point (SD=.746). The result represents that the sample participants generally feel the benefit is higher than the risk of flu vaccination. The risk and benefit of not getting flu vaccine was 1.81 point (SD=.839) and 0.57 point (SD=.826) respectively, which means that there is more risk than benefit along with not vaccinating of the flu. The risk score of getting the flu was 1.58 point (SD=.850).

Similarly, the mean risk of getting Pneumonia vaccine (0-3 scale, *None, Low, Medium*, and *High*) was 0.61 point (SD=.596) and the mean benefits of getting Pneumonia vaccine benefit was 2.38 point (SD=.838). The mean risk of getting the Meningitis vaccine (0-3 scale, *None, Low, Medium*, and *High*) was 0.68 point (SD=.714) and the mean benefits of getting the Meningitis vaccine benefit was 2.39 point (SD=.847). Similar to the flu vaccine results, the participants feel the benefits of the vaccine are higher than the risk of premium vaccines. Risk and benefit of not getting Pneumonia vaccine was 1.68 point (SD=.965) and 0.56 point (SD=.743) respectively, and risk and benefit of not getting Meningitis vaccine was 1.75 point (SD=.956) and 0.49 point (SD=.685). The risk score of not getting vaccination was generally higher than the benefit score of not getting a vaccination. The risk score of getting Pneumonia was 1.58 point (SD=.850) and getting Meningitis was 1.52 point (SD=.943).

The participants were also asked quantitative risk of several questions regarding vaccination and related diseases with 0% to 100% scale. The chances of getting flu were 46.48 on average, which is much higher than the chances of getting Pneumonia (22.19) or Meningitis (18.76). The chances of getting very sick or dying from flu was 14.29 (SD=15.71), which is lower than the chances of getting very sick dying from Pneumonia (21.21, SD=23.07) or Meningitis (23.16, SD=25.27). Although the survey respondents felt that the probability of getting flu was higher than that of other diseases (e.g., pneumonia and meningitis), they thought pneumonia and meningitis have a higher risk for the severity of the disease.

The chances of getting very sick or dying from flu vaccine were generally low (Mean=7.35, SD=14.44), while very sick or dying from not getting flu vaccine showed higher quantitative risk (Mean=22.81, SD=22.54). The quantitative risk of not getting the vaccine was 23.44, (SD=22.15) for the Pneumonia vaccine, 23.59 (SD=24.53) for the Meningitis vaccine.

The risk of getting vaccination was 7.25 (SD=12.35) for the Pneumonia vaccine, 7.69 (SD=13.68) for the Meningitis vaccine. In other words, respondents rated the overall risk of getting vaccinated as low as less than 10% and thought that the risk of not getting vaccinated was above 20%. It can be interpreted that this might affect the overall higher vaccination rate in the past and vaccination intention.

The responses of global risk and benefit questions set showed a similar tendency with those of quantitative risk (Scale: *None=0, Low=1, Medium=2*, and *High=3*). Perceived risk for vaccination was between none to low (flu vaccine: Mean=0.57, SD=0.65; pneumonia vaccine: Mean=0.61, SD=0.60; meningitis vaccine: Mean=0.68, SD=0.71), while perceived risk for not vaccination was near mid-point (not getting flu vaccine: Mean=1.81, SD=0.84; not getting pneumonia vaccine: Mean=1.68, SD=0.96; not getting meningitis vaccine: Mean=1.75, SD=0.96). Global risk for disease were also higher than global risk for vaccines (flu: Mean=1.58, SD=0.85; pneumonia: Mean=1.58, SD=0.85; meningitis: Mean=1.52, SD=0.94). Again, the perceived risk of not vaccinating and perceived risk for diseases was higher than the perceived risk of vaccination, which might lead to the decision making of getting a vaccination.

The gist about the vaccine and the disease it prevents was measured on a scale of 1 to 7 depending on the degree of disagreement and agreement with the question “think about your feeling about vaccine in general” (1=strongly disagree, 7=strongly agree). The gist score of general vaccine risk was 4.2 on average. The distribution was normally bell-shaped and not skewed (mean=4.194, SD=1.434). Gist score of flu risk was 5.3, pneumonia risk was 5.1, and meningitis risk was 5.1. The mean of each of the three diseases was slightly above 5, while the standard deviation of each of the three diseases was around 1.3-1.4. All three distributions were slightly skewed to the left. The gist of status quo was measured by a question set asking how

respondents feel when they are in the current situation without getting vaccinated. This variable was measured without the distinguishment of the three diseases. The distribution was concentrated in the center, showing a high bell shape. (Mean= 3.5899, SD=0.8749).

Knowledge was measured as answers to questions about vaccine-related knowledge and disagree or agree to specific sentences were asked with 1~7 scale (1=strongly disagree, 7=strongly agree). That is, the degree of agreement with the true item as true, and the false item as false was measured. Mean knowledge scores were 5.2 for the flu vaccine, 5.0 for the pneumonia vaccine, and 4.9 for the meningitis vaccine.

Regression Analysis

Binary logistics regression analyses using IBM SPSS Statistics were conducted to ascertain the effects of predictor variables on vaccination decisions. To evaluate risk perception and medical decision making, new measures were derived based on the survey items. First, risk perception on disease (e.g., Flu, Pneumonia, Meningitis) were derived by combining global risk on each disease, categorical gist on each disease, and quantitative risk on each disease. (RiskFlu_Combine, RiskPneumo_Combine, RiskMeningitis_Combine) Secondly, risk perception on vaccines was derived by combining three measures, which are the global risk on each type of vaccine, categorical gist on each type of vaccine, and quantitative risk on each type of vaccine. (RiskFluVaxCombine, RiskPneumoVaxCombine, RiskMenVaxCombine) Likewise, risk perception of not vaccinating was derived by combining two factors, which are the global risk of not getting each vaccine and the specific risk of not getting each type of vaccine. (RiskNotVax_flu, RiskNotVax_Pneumo, RiskNotVax_Men) Vaccination decision-making was evaluated by past vaccination history and future intention of vaccination. Other factors such as

age, gender, knowledge level were controlled in the regression analysis. I summarized the significant results in this part, while full results are described in Appendix A. To summarize, for all three types of diseases, past and future vaccination had consistency in the direction of correlation with the respondents' (1) risk perception of being or not being vaccinated and (2) the risk perception of being infected. First, as expected, the risk of being vaccinated showed a negative correlation with the past and future vaccination. However, the degree of significance varied by the types of disease and whether the vaccination is of the past or future. Specifically, future intention for the flu vaccine (B=-0.0847, p< .001) showed a negative correlation with the risk of being vaccinated. The past vaccination of flu vaccine showed a marginally significant correlation (B=-0.0484, p= .072) with the risk of being vaccinated. Pneumonia vaccination decisions in the past did not show a significant correlation with the risk of being vaccinated, whereas the future intention for Pneumonia vaccination showed a negative correlation. For the Meningitis vaccine, vaccination decision in the past (B=-0.0374, p= .037) and future intention for the Meningitis vaccine (B=-0.0565, p= .008) showed a significant negative correlation with the perceived risk of being vaccinated. Second, the risk of not being vaccinated, on the other hand, showed an overall strong positive correlation ($p<0.05$) with all types of vaccination. I observed only one exception at the past flu vaccination, where the significance was not definite. (B=0.0461, p= .081). Third, the risk of being infected had positive correlation with the past and future vaccination, but only pneumonia showed significant relationships.

The next section is the result of the logistic regression analysis I conducted by separating student samples (e.g., SONA sample) and non-student (e.g., non-SONA) respondents.

Logistic regression was analyzed in the same way for student samples (e.g., SONA samples), and the entire results are described in Appendix A. For the flu vaccine, it was shown

that there was a negative association with both past and future vaccination decisions when the perceived risk of the vaccine was high. (past flu vaccination: *B*= -.097, p= .025; future intention flu: *B*= -.122, p= .002) The same association was also found in the response of the Meningitis vaccine (past Meningitis vaccination: *B*=-.056, p= .018; future intention: *B*=-.074, p= .014), but no significant association was found in the response of the Pneumonia vaccine. In general, when it is judged that the risk of the vaccine itself is low, the vaccination decision in the past and future intention increases. Interestingly, both the past and future vaccine decisions increased when the perceived risk of not receiving the vaccine was high for two premium vaccines. (Past Pneumonia vaccination: *B*=.034, p= .001; future intention for Pneumonia vaccine: *B*=.045, p= .000; Past Meningitis vaccination: *B*=.035, p= .016; future intention for Meningitis vaccine: *B*=.038, p= .051) For two premium vaccine cases, the perceived risk of not vaccinating (e.g. when the severity of the disease is high, or the probability of getting the disease is high) is higher, the greater vaccination decision making was observed compared to the flu vaccine. In addition, in case of Pneumonia, there was a marginally significant result that future intention has been increased as the perceived risk of the disease itself increased (*B*=.034, p= .054).

For the non-SONA sample, when the same regression analysis was conducted, significant results were hardly found. In only the Pneumonia vaccine case, an increase in the risk caused by being infected by pneumonia was significantly associated with an increased likelihood of past pneumonia vaccination. (*B*=.106, p= .038). However, the overall result for the non-student sample, significant results were not derived due to some limitations (e.g., the limited number of samples).

Role of Gist and Verbatim on Vaccination Decision

In this study where I separated risk perception measured by gist and verbatim, the gist was found to have relatively higher dominance than verbatim does in vaccination decisions. Yet, the results provided partial support of the hypothesis in that such dominance of gist was not observed in all experiments. First, the analysis conducted to the entire sample showed that the risk perception of flu measured by gist was significantly associated with the future flu vaccination plan (β= .710, p= .012), and the risk perception of pneumonia measured by gist was significantly associated with both the past pneumonia vaccination rate (β= .589, p= .003) and future pneumonia vaccination plan (β= .837, p= .002). Second, the dominant role of gist in vaccination decision was consistently observed in the analysis conducted to SONA sample only. The risk perception of flu measured by gist showed significant association with the future flu vaccination plan (β= .609, p= .043). The risk perception of pneumonia measured by gist showed significant association with both the past vaccination rate (β= .444, p= .034) and future vaccination plan (β= .936, p= .002) of pneumonia. The risk perception of flu measured by verbatim showed a marginally significant association with the future flu vaccination plan (β= .720, p= .065), which was the only notable role of verbatim in predicting past or future vaccination. In the analysis of non-SONA sample, no significant relationship was found other than the marginally significant association between the risk perception of pneumonia measured by gist (β=1.902, p= .069) and verbatim (β=1.771, p= .096) with the past pneumonia vaccination rate.

Discussion

The results provided evidence that risk perception is associated with medical decision making not only for flu vaccine but also for Pneumonia and Meningitis vaccination decisions. The correlation between risk perception and vaccination decision making was analyzed by binary logistic regression. The predicted result of the hypothesis was that the more serious the disease risk and the lower the risk perception of the vaccine, the higher the likelihood of making a vaccination decision. Also, a positive correlation between the perceived risk of not getting vaccination and vaccination intention was predicted. In addition, it was predicted that the higher the preference for status quo and the lower the risk perception of not vaccination, the lower the likelihood of making a vaccination decision.

As predicted, the risk of being vaccinated showed a negative correlation with the past and future vaccination. the risk of not being vaccinated, on the other hand, showed an overall strong positive correlation ($p<0.05$) with the vaccination. The risk of being infected had positive correlation with the past and future vaccination only pneumonia showed significant relationships. In other words, the higher perceived risk for the disease and the higher risk perception for not vaccination, the higher vaccination rate was shown by the respondents. In contrast, when the participants showed the higher perceived risk for the vaccine and a higher preference for the status quo, then the response showed a lower vaccination rate and lower vaccination intention. Results were generally consistent for all three types of vaccines examined in this study.

In addition, the results showed that gist-based decision making was dominant than verbatim-based decision making in vaccination decisions. Especially the risk perception of flu measured by gist was significantly associated with the future flu vaccination plan ($\beta= .710$, $p= .012$), and the risk perception of pneumonia measured by gist was significantly associated

with both the past pneumonia vaccination rate (β= .589, p= .003) and future pneumonia vaccination plan (β= .837, p= .002). The dominance in gist-based decision-making was not observed for the meningitis vaccine and non-SONA samples (e.g., older-aged samples).

Like all other studies, there are several limitations in this study as well. First, the analysis of differences in vaccination decision-making by age was limited due to insufficient recruitment for older people. Due to the extended COVID-19 pandemic period, all surveys were conducted online, so the online survey using a computer or mobile phone was limited to older people over 65 to participate. The tendency of older adults to make decisions based on gist rather than quantitative risk has not been confirmed as predicted, since the number of samples of older adults (non-SONA sample) was not sufficient. It is suggested to recruit a greater number of older adults in future studies and conduct paper surveys as well as online surveys. Secondly, the language barrier may act as a limitation to the respondents outside of the United States. Since the survey was conducted in English, the meaning of the survey questions might not be fully conveyed accurately to the people who participated outside of the U.S. Especially questions asking gist-based reasoning might not be interpreted as the exact meaning. For students who responded through SONA might have fewer language issues. Lastly, since more than half of participants were university students who already got flu and meningitis vaccines due to university health requirements, the past vaccination rate of participants was higher than the national average rate. (lack of variability) Moreover, as university students are highly recommended to get a flu vaccine every year by university healthcare, their vaccination intention and rate could be generally higher than other samples. That means the sample participants of this study do not necessarily represent all the population and the sample variability was limited for this study. I suggest expanding the samples to broader age groups and regions in the future study.

When communicating risk to a cancer patient, theoretically, it is good to explain it in terms of numbers and objective factors, but in reality, risk perception can vary depending on the emotions of the patients (Klein, Ferrer, & Kaufman, 2020). Klein et al. (2020) argued that risk perceptions are rooted in emotion, intuition, social comparisons, and social identities rather than evidence and numbers. Therefore, when making an effective risk communication with patients, social factors, emotional factors, and motivational factors should be included in the risk communication.

Risk perception and decision-making process could be actively used in health policy communication especially for vaccine communications including pneumonia and COVID-19 vaccine. The government in many countries promotes vaccines by giving many benefits or incentives to those who have already completed the COVID-19 vaccine when establishing a policy, while there have been voices that personal decisions on COVID-19 vaccination should be respected. As discussed above, we need to understand the way people make vaccination decisions – more dependency on gist representation of scientific information and numeracy – so the policymaker should approach promoting vaccines in a way that is easy for laypeople to understand and remember in their memory.

A survey conducted in May 2020 of over 10,000 adults by Pew Research Center showed that around 72% of adults showed vaccination intentions to get the COVID-19 vaccine. (Funk and Tyson, 2021) Based on the theory and the results of this study, we can predict that higher vaccination intention might be due to a higher risk perception of COVID-19. In other words, since it is thought that COVID-19 is highly contagious and causes severe symptoms or even death, the intention for the COVID-19 vaccine appears to be high. I suggest expanding the future studies to examine COVID-19 vaccination decisions to a broader sample.

Communication about the COVID-19 vaccine needs to be approached in a way more efficient and easily understandable communication. Since the COVID-19 vaccine was conditionally approved immediately after development, information on long-term safety has yet to be verified. However, if immunity is formed by a vaccine, it is expected to be of tremendous help to public health such as reducing mortality, reducing hospitalization, and forming herd immunity. Therefore, a message for personal protection (e.g., developing immunity through vaccination reduces the risk of illness and helps fight off the virus) as well as public health promotion (e.g., less likely to transmit the virus to others) should be presented.

When people make decisions on vaccination, the decisions could be affected by multiple factors such as knowledge, emotion, experience, physician's advice, friends' experience, media exposure, and another person's stories. Vaccine hesitancy defined by WHO is to delay in acceptance or refusal of vaccines despite the availability of vaccine services. (WHO, 2014) Vaccine hesitancy is complex and context-specific varying across time, place, and vaccines. Thus, the public-health responsible person and policymaker should make communication messages more focused on the promotion of public benefits such as developing herd immunity by vaccination, safety, and effectiveness of vaccination (Reyna, 2012). Fuzzy-trace theory on vaccination could be expanded to research on COVID-19 vaccination to make effective communication messages and promote the vaccination. Healthcare providers should emphasize gist-based information and understandings when explaining the benefits of vaccination.

When participants were asked "Are you WILLING to get vaccinated if it is easy and affordable?" more than 90% of participants showed the vaccination intention (91% for the flu vaccine, 92% for the Pneumonia vaccine, and 96% for Meningitis vaccine, respectively). Therefore, if vaccine accessibility is increased, the vaccine rate might be expected to increase.

The policymakers and healthcare providers should consider increasing their support for flu and pneumonia vaccines, especially during the coronavirus pandemic to reduce overall hospitalization.

Implications for Vaccination decision making

According to Reyna (2020), vaccination decision-makers are often misled by misinformation, and in many cases, decisions are made based on a gist that reflects misinformation rather than scientific information. FTT has been studied extensively in several areas including health and medical decision making. Within medical decision-making areas, FTT supports the understanding of risk perception and is also applied to areas related to prevention of disease, diagnosis of a severe disease like cancer, and treatment. Example areas include the genetic risk of breast cancer, selection of medication for arthritis, prescription of antibiotics, and vaccination decision making. (Fraenkel et al., 2012; Wolfe et al., 2015 in Medical Decision Making) This study demonstrated that FTT could be expanded to decision making of not only flu vaccine but also two premium vaccines.

FTT can be applied to avoid vaccine hesitancy and to lead individuals to desirable decisions of vaccination. In addition, FTT can be applied for the development of communication strategies to lead patients to make decisions on other health-related matters in ways that are more beneficial to the patient.

As discussed earlier in this thesis, as people get older, dependence on gist representation increases in decision making (Reyna & Brainerd, 2011). Consequently, gist representations of information have more influence on judgment or medical decision making than verbatim representation. Specifically, it is expected that among adult vaccination subjects, older adults

will show more vaccination decision making by gist representation than verbatim representation. However, due to the limited sample size of older adults, the age difference in vaccination decision making has not been proved in this study.

Patients with severe cancer (with a high mortality rate) are more likely to make decisions to participate in clinical trials of newly developed live-saving medicine. Because the mortality rate of cancer itself is high, the patients may choose the risky option to take a chance of getting better. ("Why not take a risk" (WNTAR) provided by Reyna, 2020). Likewise, we can apply FTT to the vaccination decision, especially for the vaccines that prevent severe diseases such as COVID-19 and pneumonia. The more severe the disease is prevented by the vaccine and the higher the mortality rate of that disease, the higher the chance of getting the vaccine. This is because the risk of not getting the vaccine appears to be much greater than the risk of getting the vaccine.

Conclusion

People make decisions to avoid or minimize the perceived risk. Fuzzy-Trace theory provides dual-process mental representations, gist, and verbatim, and explains that people rely more on gist than verbatim mental representations when making decisions. (Reyna, 2008) This study was to test whether the risk perception and vaccination decision making are significantly correlated, and Fuzzy-Trace Theory can be applied to decisions of not only flu vaccine but also two premium vaccines. The significant results to prove the hypothesis was observed for vaccination decision making.

In addition, FTT can be applied for the development of communication strategies that might lead people to make vaccination decisions in ways that are more beneficial to the patient. For example, a gist-based communication message on the risk of diseases, risk of not getting vaccination would be more efficient to promote vaccination decisions.

In the new normal era triggered by the COVID-19 pandemic, we can anticipate that many people will choose to get the COVID-19 vaccine because of the higher risk perception of getting virus infection and severity of symptoms. Based on this study, we can also predict that people will make vaccination decisions based on risk perception and gist understanding of scientific information of the newly developed COVID-19 vaccine. As promoting COVID-19 vaccines as well as conventional vaccines is getting more important, policymakers and healthcare providers should focus on more gist-based effective communication messages.

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Appendix A

Regression Analysis for Total samples

First, I conducted logistic regression on the respondents' risk perception of flu or flu vaccination and past flu vaccination. I found that a higher level of risk perception of being vaccinated had a negative regression coefficient (B=-0.0484, p= .072). On the other hand, a higher level of risk perception of not being vaccinated had a positive regression coefficient (B=0.0537, p=.079). Yet, the significances were at the verge of a statistically significant threshold. The risk of being infected by flu showed a positive regression coefficient, but the extent of association was not significant (B=-0.207, p=0.700).

Second, I conducted logistic regression on the respondents' risk perception of flu or flu vaccination and future plan for flu vaccination. I found that a higher level of risk perception of being vaccinated had a strong negative regression coefficient (B=-0.0847, p< .001). On the other hand, a higher level of risk perception of not being vaccinated had a strong positive regression coefficient (B=0.0384, p= .029). The risk of being infected by flu showed a positive regression coefficient. Yet, the significance was ambiguous (B=0.0461, p= .081). The gist of maintaining status quo showed a negative regression coefficient, but the extent of association was not significant (B= -0.282, p=0.403).

Third, I conducted logistic regression on the respondents' risk perception of pneumonia or pneumonia vaccination and past pneumonia vaccination. I found that a higher level of risk perception of being vaccinated had a negative regression coefficient. Yet, the extent of association was not significant (B=-0.0178, p= .244). On the other hand, a higher level of risk perception of not being vaccinated had a strong positive regression coefficient (B=0.02989,

p= .001). The risk of being infected by pneumonia showed a strong positive regression coefficient (B=0.0348, p= .010). The gist of maintaining status quo showed a negative regression coefficient, but the extent of association was not significant (B=-0.073, p=0.735).

Fourth, I conducted logistic regression on the respondents' risk perception of pneumonia or pneumonia vaccination and future plan for pneumonia vaccination. I found that a higher level of risk perception of being vaccinated had a negative regression coefficient. Yet, the extent of significance was ambiguous (B=-0.0284, p= .090). On the other hand, a higher level of risk perception of not being vaccinated had a strong positive regression coefficient (B=0.0489, p< .001). The risk of being infected by pneumonia showed a strong positive regression coefficient (B=0.0357, p= .019). The gist of maintaining status quo showed a negative regression coefficient, but the degree of association was not significant (B=-0.272, p= .243).

Fifth, I conducted logistic regression on the respondents' risk perception of meningitis or meningitis vaccination and past meningitis vaccination. I found that a higher level of risk perception of being vaccinated had a strong negative regression coefficient (B=-0.0374, p= .037). On the other hand, a higher level of risk perception of not being vaccinated had a strong positive regression coefficient (B=0.0323, p= .011). The risk of being infected by meningitis showed a positive regression coefficient. Yet, the degree of significance was not strong (B=0.0210, p= .131). The gist of maintaining status quo showed a negative regression coefficient, but the degree of association was not significant (B=-0.144, p= .599).

Sixth, I conducted logistic regression on the respondents' risk perception of meningitis or meningitis vaccination and future plan for meningitis vaccination. I found that a higher level of risk perception of being vaccinated had a strong negative regression coefficient (B=-0.0565, p= .008). On the other hand, a higher level of risk perception of not being vaccinated had a

strong positive regression coefficient (B=0.0466, p= .006). The risk of being infected by meningitis showed a positive regression coefficient. Yet, the degree of significance was not strong (B=0.0185, p= .249). The gist of maintaining status quo showed a negative regression coefficient, but the degree of association was not significant (B=-0.156, p= .619).

Regression Analysis for student samples

The results for student samples (e.g., SONA sample) are as follows.

Past vaccination for Flu

First, logistic regression was performed to ascertain the effects of the Gist Status Quo. The logistic regression model was statistically not significant, $\chi 2(4) = 2.511$, p= .643. The model explained 8.30% (Nagelkerke R2) of the variance in past flu vaccination, and correctly classified 96.6% of cases. Increase in Gist Status Quo was associated with a decreased likelihood of past flu vaccination, but the extent of association was not significant. (*B*= -.450, p= .513)

Second, logistic regression was performed to ascertain the effects of the risk caused by being infected by flu. The logistic regression model was not statistically significant, $\chi 2(4) = 2.622$, p= .623. The model explained 8.60% (Nagelkerke R2) of the variance in past flu vaccination, and correctly classified 96.6% of cases. An increase in the risk caused by being infected by flu was associated with an increased likelihood of past flu vaccination, but the extent of association was not significant. (*B*=.033, p= .479)

Third, a logistic regression was performed to ascertain the effects of the risk caused by receiving a flu vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 7.816$, p= .099. The model explained 25.10% (Nagelkerke R2) of the variance in past flu vaccination, and correctly classified 97.4% of cases. Increase in the risk caused by receiving flu

vaccination was significantly associated with a decreased likelihood of past flu vaccination. (*B*= -.097, p= .025)

Fourth, logistic regression was performed to ascertain the effects of the risk caused by not receiving a flu vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 3.578$, p= .466. The model explained 11.7% (Nagelkerke R2) of the variance in past flu vaccination, and correctly classified 96.6% of cases. Increase in the risk caused by not receiving flu vaccination was associated with an increased likelihood of past flu vaccination, but the extent of association was not significant. (*B*=.036, p= .246)

Future vaccination intention for Flu

First, a logistic regression was performed to ascertain the effects of Gist Status Quo. The logistic regression model was not statistically significant, $\chi 2(4) = 3.270$, p= .514. The model explained 6.30% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 91.4% of cases. An increase in Gist Status Quo was associated with a decreased likelihood of future plans for flu vaccination, but the extent of association was not significant. (*B*= -.204, p= .635)

Second, logistic regression was performed to ascertain the effects of the risk caused by being infected by flu. The logistic regression model was not statistically significant, $\chi 2(4) = 4.082$, p= .395. The model explained 7.8% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 91.4% of cases. Increase in the risk caused by being infected by flu was associated with an increased likelihood of future plans for flu vaccination, but the extent of association was not significant. (*B*=.030, p= .324)

Third, a logistic regression was performed to ascertain the effects of the risk caused by receiving a flu vaccination. The logistic regression model was statistically significant, $\chi 2(4) =$

18.37, p= .001. The model explained 33.0% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 94.8% of cases. Increase in the risk caused by receiving flu vaccination was significantly associated with a decreased likelihood of future plans for flu vaccination. (*B*= -.122, p= .002)

Fourth, logistic regression was performed to ascertain the effects of the risk caused by not receiving a flu vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 4.20$, p= .379. The model explained 8.0% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 91.4% of cases. Increase in the risk caused by not receiving flu vaccination was associated with an increased likelihood of future plans for flu vaccination, but the extent of association was not significant. (*B*=.020, p= .292)

Past vaccination for Pneumonia

First, logistic regression was performed to ascertain the effects of Gist Status Quo. The logistic regression model was not statistically significant, $\chi 2(4) = 8.657$, p= .070. The model explained 9.6% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 62.1% of cases. An increase in the Gist Status Quo was associated with a decreased likelihood of past pneumonia vaccination, but the extent of association was not significant. (*B*= -.175, p= .464)

Second, a logistic regression was performed to ascertain the effects of risk caused by not receiving pneumonia vaccination. The logistic regression model was statistically significant, $\chi 2(4) = 21.338$, p< .001. The model explained 22.40% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 70.7% of cases. An increase in the risk caused by not receiving pneumonia vaccination was significantly associated with an increased likelihood of past pneumonia vaccination. (*B*=.034, p= .001)

Third, a logistic regression was performed to ascertain the effects of risk caused by being infected by pneumonia. The logistic regression model was statistically significant, $\chi 2(4) = 10.296$, $p = .036$. The model explained 11.30% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 60.3% of cases. An increase in the risk caused by being infected by pneumonia was associated with an increased likelihood of past pneumonia vaccination, but the extent of association was not significant. ($B = .022$, $p = .147$)

Fourth, logistic regression was performed to ascertain the effects of risk caused by receiving a pneumonia vaccination. The logistic regression model's statistical significance was ambiguous, $\chi 2(4) = 9.430$, $p = .051$. The model explained 10.40% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 60.3% of cases. An increase in the risk caused by receiving pneumonia vaccination was associated with a decreased likelihood of past pneumonia vaccination, but the extent of association was not significant. ($B = -.020$, $p = .255$)

Future vaccination intention for Pneumonia

First, a logistic regression was performed to ascertain the effects of Gist Status Quo. The logistic regression model was statistically significant, $\chi 2(4) = 13.503$, $p = .009$. The model explained 15.10% (Nagelkerke R2) of the variance in the future plan for pneumonia vaccination, and correctly classified 69.8% of cases. An increase in the Gist Status Quo was associated with a decreased likelihood of future plans for pneumonia vaccination, but the extent of association was not significant. ($B = -.256$, $p = .319$)

Second, logistic regression was performed to ascertain the effects of risk caused by not receiving pneumonia vaccination. The logistic regression model was statistically significant, $\chi 2(4) = 29.435$, $p < .001$. The model explained 30.70% (Nagelkerke R2) of the variance in the

future plan for pneumonia vaccination, and correctly classified 68.1% of cases. Increase in the risk caused by not receiving pneumonia vaccination was significantly associated with an increased likelihood of future plans for pneumonia vaccination. (*B*= .045, p= .000)

Third, logistic regression was performed to ascertain the effects of risk caused by being infected by pneumonia. The logistic regression model was statistically significant, $\chi 2(4) = 16.636$, p= .002. The model explained 18.30% (Nagelkerke R2) of the variance in the future plan for pneumonia vaccination, and correctly classified 71.6% of cases. An increase in the risk caused by being infected by pneumonia was associated with an increased likelihood of future plans for pneumonia vaccination, but the extent of association was ambiguous. (*B*=.034, p= .054)

Fourth, logistic regression was performed to ascertain the effects of risk caused by receiving a pneumonia vaccination. The logistic regression model was statistically significant, $\chi 2(4) = 13.339$, p= .010. The model explained 14.90% (Nagelkerke R2) of the variance in the future plan for pneumonia vaccination, and correctly classified 72.4% of cases. Increase in the risk caused by receiving pneumonia vaccination was associated with a decreased likelihood of future plans for pneumonia vaccination, but the extent of association was not significant. (*B*=-.017, p= .364)

Past vaccination for Meningitis

First, logistic regression was performed to ascertain the effects of gist status quo. The logistic regression model was not statistically significant, $\chi 2(4) = 2.067$, p= .723. The model explained 3.20% (Nagelkerke R2) of the variance in the past meningitis vaccination, and correctly classified 86.2% of cases. An increase in the gist status quo was associated with a decreased likelihood of past meningitis vaccination, but the extent of association was not significant. (*B*=.309, p= .345)

Second, logistic regression was performed to ascertain the risk caused by being infected by meningitis. The logistic regression model was not statistically significant, $\chi 2(4) = 2.153$, p= .708. The model explained 3.30% (Nagelkerke R2) of the variance in the past meningitis vaccination, and correctly classified 86.2% of cases. Increase in the risk caused by being infected by meningitis was associated with an increased likelihood of past meningitis vaccination, but the extent of association was not significant. (*B*=.016, p= .332)

Third, logistic regression was performed to ascertain the risk caused by receiving meningitis vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 7.137$, p= .129. The model explained 10.8% (Nagelkerke R2) of the variance in the past meningitis vaccination, and correctly classified 87.1% of cases. Increase in the risk caused by receiving meningitis vaccination was significantly associated with a decreased likelihood of past meningitis vaccination. (*B*=-.056, p= .018)

Fourth, logistic regression was performed to ascertain the risk caused by not receiving meningitis vaccination. The logistic regression model's statistical significance was ambiguous, $\chi 2(4) = 8.238$, p= .083. The model explained 12.4% (Nagelkerke R2) of the variance in the past meningitis vaccination, and correctly classified 86.2% of cases. Increase in the risk caused by not receiving meningitis vaccination was significantly associated with an increased likelihood of past meningitis vaccination. (*B*=.035, p= .016)

Future vaccination intention for Meningitis

First, logistic regression was performed to ascertain the effect of gist status quo. The logistic regression model was not statistically significant, $\chi 2(4) = 2.044$, p= .728. The model explained 4.20% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 92.2% of cases. Increase in the gist status quo was associated with a

decreased likelihood of future plans for meningitis vaccination, but the extent of association was not significant. (*B*=-.261, p= .540)

Second, logistic regression was performed to ascertain the effect of the risk caused by being infected by meningitis. The logistic regression model was not statistically significant, $\chi 2(4) = 2.032$, p= .730. The model explained 4.10% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 92.2% of cases. Increase in the risk caused by being infected by meningitis was associated with an increased likelihood of future plans for meningitis vaccination, but the extent of association was not significant. (*B*=.012, p= .552)

Third, logistic regression was performed to ascertain the effect of the risk caused by receiving meningitis vaccination. The logistic regression model's statistical significance was ambiguous, $\chi 2(4) = 8.427$, p= .077. The model explained 16.70% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 93.1% of cases. Increase in the risk caused by receiving meningitis vaccination was significantly associated with a decreased likelihood of future plans for meningitis vaccination. (*B*=-.074, p= .014)

Fourth, logistic regression was performed to ascertain the effect of the risk caused by not receiving meningitis vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 6.412$, p= .170. The model explained 12.80% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 92.2% of cases. Increase in the risk caused by not receiving meningitis vaccination was associated with an increased likelihood of future plans for meningitis vaccination, but the extent of association was ambiguous. (*B*=.038, p= .051)

Regression Analysis for non-student samples

The results for non-student samples are as follows.

Past vaccination for Flu

First, logistic regression was performed to ascertain the effects of Gist Status Quo. The logistic regression model was statistically not significant, $\chi2(4) = 1.212$, p= .876. The model explained 17.10% (Nagelkerke R2) of the variance in past flu vaccination, and correctly classified 95.7% of cases. Increase in Gist Status Quo was associated with an increased likelihood of past flu vaccination, but the extent of association was not significant. (*B*=1.180, p= .534)

Second, logistic regression was performed to ascertain the effects of the risk caused by being infected by flu. The logistic regression model was not statistically significant, $\chi2(4) = 1.749$, p= .782. The model explained 24.40% (Nagelkerke R2) of the variance in past flu vaccination, and correctly classified 95.70% of cases. Increase in the risk caused by being infected by flu was associated with an increased likelihood of past flu vaccination, but the extent of association was not significant. (*B*=.169, p= .513)

Third, logistic regression was performed to ascertain the effects of the risk caused by receiving a flu vaccination. The logistic regression model was not statistically significant, $\chi2(4) = .997$, p= .910. The model explained 14.10% (Nagelkerke R2) of the variance in past flu vaccination, and correctly classified 95.7% of cases. Increase in the risk caused by receiving flu vaccination was associated with an increased likelihood of past flu vaccination, but the extent of association was not significant. (*B*=.042, p= .620)

Fourth, logistic regression was performed to ascertain the effects of the risk caused by not receiving a flu vaccination. The logistic regression model was not statistically significant, $\chi2(4) = 4.043$, p= .400. The model explained 53.60% (Nagelkerke R2) of the variance in past flu

vaccination, and correctly classified 95.70% of cases. Increase in the risk caused by not receiving flu vaccination was associated with an increased likelihood of past flu vaccination, but the extent of association was not significant. (*B*=.230, p= .451)

Future vaccination intention for Flu

First, logistic regression was performed to ascertain the effects of Gist Status Quo. The logistic regression model was not statistically significant, $\chi 2(4) = 3.139$, p= .535. The model explained 21.20% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 82.60% of cases. Increase in Gist Status Quo was associated with a decreased likelihood of future plans for flu vaccination, but the extent of association was not significant. (*B*=-.165, p= .784)

Second, logistic regression was performed to ascertain the effects of the risk caused by being infected by flu. The logistic regression model was not statistically significant, $\chi 2(4) = 7.291$, p= .121. The model explained 45.00% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 73.90% of cases. Increase in the risk caused by being infected by flu was associated with an increased likelihood of future plans for flu vaccination, but the extent of association was not significant. (*B*=.189, p= .232)

Third, logistic regression was performed to ascertain the effects of the risk caused by receiving a flu vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 6.437$, p= .169. The model explained 40.50% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 87.00% of cases. Increase in the risk caused by receiving flu vaccination was associated with a decreased likelihood of future plans for flu vaccination, but the extent of association was not significant. (*B*=-.071, p= .139)

Fourth, logistic regression was performed to ascertain the effects of the risk caused by not receiving a flu vaccination. The logistic regression model was statistically significant, $\chi 2(4) = 13.835$, p= .008. The model explained 75.00% (Nagelkerke R2) of the variance in the future plan for flu vaccination, and correctly classified 91.3% of cases. Increase in the risk caused by not receiving flu vaccination was associated with an increased likelihood of future plans for flu vaccination, but the extent of association was ambiguous. (*B*=.211, p= .060)

Past vaccination for Pneumonia

First, logistic regression was performed to ascertain the effects of Gist Status Quo. The logistic regression model was not statistically significant, $\chi 2(4) = 6.161$, p= .187. The model explained 31.50% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 73.90% of cases. Increase in the Gist Status Quo was associated with an increased likelihood of past pneumonia vaccination, but the extent of association was not significant. (*B*=.517, p= .433)

Second, logistic regression was performed to ascertain the effects of risk caused by not receiving pneumonia vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 5.644$, p< .227. The model explained 29.20% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 78.30% of cases. Increase in the risk caused by not receiving pneumonia vaccination was associated with an increased likelihood of past pneumonia vaccination, but the extent of association was not significant. (*B*=.010, p= .674)

Third, logistic regression was performed to ascertain the effects of risk caused by being infected by pneumonia. The logistic regression model was statistically significant, $\chi 2(4) = 13.907$, p= .008. The model explained 60.80% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 82.60% of cases. Increase in the risk caused by

being infected by pneumonia was significantly associated with an increased likelihood of past pneumonia vaccination. (*B*=.106, p= .038)

Fourth, logistic regression was performed to ascertain the effects of risk caused by receiving a pneumonia vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 5.472$, p= .242. The model explained 28.40% (Nagelkerke R2) of the variance in past pneumonia vaccination, and correctly classified 73.90% of cases. Increase in the risk caused by receiving pneumonia vaccination was associated with an increased likelihood of past pneumonia vaccination, but the extent of association was not significant. (*B*=.003, p= .947)

Future vaccination intention for Pneumonia

First, logistic regression was performed to ascertain the effects of Gist Status Quo. The logistic regression model was statistically significant, $\chi 2(4) = 10.064$, p= .039. The model explained 50.10% (Nagelkerke R2) of the variance in the future plan for pneumonia vaccination, and correctly classified 82.60% of cases. Increase in the Gist Status Quo was associated with a decreased likelihood of future plans for pneumonia vaccination, but the extent of association was not significant. (*B*=-.253, p= .735)

Second, logistic regression was performed to ascertain the effects of risk caused by not receiving pneumonia vaccination. The logistic regression model was statistically significant, $\chi 2(4) = 14.692$, p=005. The model explained 66.70% (Nagelkerke R2) of the variance in the future plan for pneumonia vaccination, and correctly classified 87.00% of cases. Increase in the risk caused by not receiving pneumonia vaccination was associated with an increased likelihood of future plans for pneumonia vaccination, but the significance of the extent of association was ambiguous. (*B*=.093, p= .079)

Third, logistic regression was performed to ascertain the effects of risk caused by being infected by pneumonia. The logistic regression model was statistically significant, $\chi 2(4) = 10.871$, p= .028. The model explained 53.20% (Nagelkerke R2) of the variance in the future plan for pneumonia vaccination, and correctly classified 73.90% of cases. Increase in the risk caused by being infected by pneumonia was associated with an increased likelihood of future plans for pneumonia vaccination, but the extent of association was not significant. (*B*=.039, p= .359)

Fourth, logistic regression was performed to ascertain the effects of risk caused by receiving a pneumonia vaccination. The logistic regression model was statistically significant, $\chi 2(4) = 13.742$, p= .008. The model explained 63.60% (Nagelkerke R2) of the variance in the future plan for pneumonia vaccination, and correctly classified 78.30% of cases. Increase in the risk caused by receiving pneumonia vaccination was associated with a decreased likelihood of future plans for pneumonia vaccination, but the extent of association was not significant. (*B*=-.133, p= .116)

Past vaccination for Meningitis

First, logistic regression was performed to ascertain the effects of gist status quo. The logistic regression model was not statistically significant, $\chi 2(4) = 7.082$, p= .132. The model explained 35.90% (Nagelkerke R2) of the variance in the past meningitis vaccination, and correctly classified 65.20% of cases. Increase in the gist status quo was associated with an increased likelihood of past meningitis vaccination, but the extent of association was not significant. (*B*=.301, p= .609)

Second, logistic regression was performed to ascertain the risk caused by being infected by meningitis. The logistic regression model was statistically significant, $\chi 2(4) = 11.582$, p= .021. The model explained 53.60% (Nagelkerke R2) of the variance in the past meningitis

vaccination, and correctly classified 82.60% of cases. Increase in the risk caused by being infected by meningitis was associated with an increased likelihood of past meningitis vaccination, but the extent of association was ambiguous. (*B*=.077, p= .071)

Third, logistic regression was performed to ascertain the risk caused by receiving meningitis vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 6.806$, p= .147. The model explained 34.70% (Nagelkerke R2) of the variance in the past meningitis vaccination, and correctly classified 73.90% of cases. Increase in the risk caused by receiving meningitis vaccination was associated with a decreased likelihood of past meningitis vaccination, but the extent of association was not significant. (*B*=-.001, p= .971)

Fourth, logistic regression was performed to ascertain the risk caused by not receiving meningitis vaccination. The logistic regression model's statistical significance was ambiguous, $\chi 2(4) = 6.869$, p= .143. The model explained 35.00% (Nagelkerke R2) of the variance in the past meningitis vaccination, and correctly classified 73.90% of cases. Increase in the risk caused by not receiving meningitis vaccination was associated with an increased likelihood of past meningitis vaccination, but the extent of association was not significant. (*B*=.008, p= .801)

Future vaccination intention for Meningitis

First, logistic regression was performed to ascertain the effect of gist status quo. The logistic regression model was not statistically significant, $\chi 2(4) = 7.221$, p= .125. The model explained 37.10% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 78.30% of cases. Increase in the gist status quo was associated with an increased likelihood of future plans for meningitis vaccination, but the extent of association was not significant. (*B*=.198, p= .764)

Second, logistic regression was performed to ascertain the effect of the risk caused by being infected by meningitis. The logistic regression model was statistically significant, $\chi 2(4) = 10.483$, p= .033. The model explained 50.50% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 87.00% of cases. Increase in the risk caused by being infected by meningitis was associated with an increased likelihood of future plans for meningitis vaccination, but the extent of association was not significant. (*B*=.073, p= .138)

Third, logistic regression was performed to ascertain the effect of the risk caused by receiving meningitis vaccination. The logistic regression model was not statistically significant, $\chi 2(4) = 7.128$, p= .129. The model explained 36.70% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 78.30% of cases. Increase in the risk caused by receiving meningitis vaccination was associated with a decreased likelihood of future plans for meningitis vaccination, but the extent of association was not significant. (*B*=-.001, p= .987)

Fourth, logistic regression was performed to ascertain the effect of the risk caused by not receiving meningitis vaccination. The logistic regression model was statistically significant, $\chi 2(4) = 10.934$, p= .027. The model explained 52.20% (Nagelkerke R2) of the variance in the future plan for meningitis vaccination, and correctly classified 82.60% of cases. Increase in the risk caused by not receiving meningitis vaccination was associated with an increased likelihood of future plans for meningitis vaccination, but the extent of association was not significant. (*B*=.070, p= .095)

Appendix B: Survey Questions

Statement of Consent: I have read the above information and have received answers to any questions I asked. I agree that I am 18 years of age or older and consent to take part in the study.

- ○ I am over 18 and agree to participate in this study. (1)
- ○ I do not agree to participate in this study. (2)

Vaccine Behavior and Intentions

Q1 Did you get vaccinated for the flu in the **past year**?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q2 Have you **EVER** gotten vaccinated for the flu in your lifetime (**including** in the past year)?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q3 Do you **PLAN** to get vaccinated for the flu?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q4 Do you **WANT** to get vaccinated for the flu?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q5 Are you **WILLING** to get vaccinated for the flu if it is **easy and affordable**?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q6 What are the chances that you **WILL** get vaccinated for the flu in the **next** flu season?

- ○ None (1) (1)
- ○ Low (2) (2)
- ○ Medium (3) (3)
- ○ High (4) (4)

Q7 What are the chances that you WILL get vaccinated for the flu **at some point** in the future?

- None (1) (1)
- Low (2) (2)
- Medium (3) (3)
- High (4) (4)

Q8 Does your school or work **REQUIRE** you to get vaccinated for the flu?

- No (1) (1)
- Yes (2) (2)

Q9 Would you **CHOOSE** to get a flu vaccine if it was not required?

- No (1) (1)
- Yes (2) (2)

Premium Vaccine Behavior and Intentions - Pneumonia

Q10 Have you EVER gotten vaccinated for the Pneumonia in your lifetime (including in the past year)?

- No (1) (1)
- Yes (2) (2)

Q11 Do you **PLAN** to get vaccinated for the Pneumonia?

- ○ No (1) (1)
- ○ Yes (2) (2)
- ○ I have gotten the Pneumonia vaccine already (3) (3)

Q12 Do you **WANT** to get vaccinated for the Pneumonia?

- ○ No (1) (1)
- ○ Yes (2) (2)
- ○ I have gotten the Pneumonia vaccine already (3) (3)

Q13 Are you **WILLING** to get vaccinated for the Pneumonia if it is **easy and affordable**?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q14 What are the chances that you WILL get vaccinated for the Pneumonia **at some point** in the future?

- ○ None (1) (1)
- ○ Low (2) (2)
- ○ Medium (3) (3)
- ○ High (4) (4)
- ○ I have gotten the Pneumonia vaccine already (5) (5)

Q15 Does your school or work **REQUIRE** you to get vaccinated for the Pneumonia?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q16 Would you **CHOOSE** to get a Pneumonia vaccine if it was not required?

- ○ No (1) (1)
- ○ Yes (2) (2)

Premium Vaccine Behavior and Intentions - Meningitis

Q33 Have you EVER gotten vaccinated for the Meningitis in your lifetime (including in the past year)?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q34 Do you **PLAN** to get vaccinated for the Meningitis?

- ○ No (1) (1)
- ○ Yes (2) (2)
- ○ I have gotten the Meningitis vaccine already (3) (3)

Q35 Do you **WANT** to get vaccinated for the Meningitis?

- ○ No (1) (1)
- ○ Yes (2) (2)
- ○ I have gotten the Meningitis vaccine already (3) (3)

Q36 Are you **WILLING** to get vaccinated for the Meningitis if it is **easy and affordable**?

- ○ No (1) (1)
- ○ Yes (2) (2)

Q37 What are the chances that you WILL get vaccinated for the Pneumonia **at some point** in the future?

- None (1) (1)
- Low (2) (2)
- Medium (3) (3)
- High (4) (4)
- I have gotten the Meningitis vaccine already (5) (5)

Q38 Does your school or work **REQUIRE** you to get vaccinated for the Meningitis?

- No (1) (1)
- Yes (2) (2)

Q39 Would you **CHOOSE** to get a Meningitis vaccine if it was not required?

- No (1) (1)
- Yes (2) (2)

Global risks and benefits (flu, Pneumonia, Meningitis)

Q41 Think about risks and benefits **in the next year**. “Getting the vaccine” means **IF** you got the vaccine, what would the risks or benefits be to you.

	None (1) (1)	Low (2) (2)	Medium (3) (3)	High (4) (4)
OVERALL, for YOU, what are the RISKS of getting the flu vaccine? (1)	○	○	○	○
OVERALL, for YOU, what are the BENEFITS of getting the flu vaccine? (2)	○	○	○	○
OVERALL, for YOU, what are the RISKS of NOT getting the flu vaccine? (3)	○	○	○	○
OVERALL, for YOU, what are the BENEFITS of NOT getting the flu vaccine? (4)	○	○	○	○
OVERALL, for YOU, what are the RISKS of getting the flu? (5)	○	○	○	○

Q42 Think about risks and benefits **of Pneumonia vaccine**. “Getting the vaccine” means **IF** you got the vaccine, what would the risks or benefits be to you.

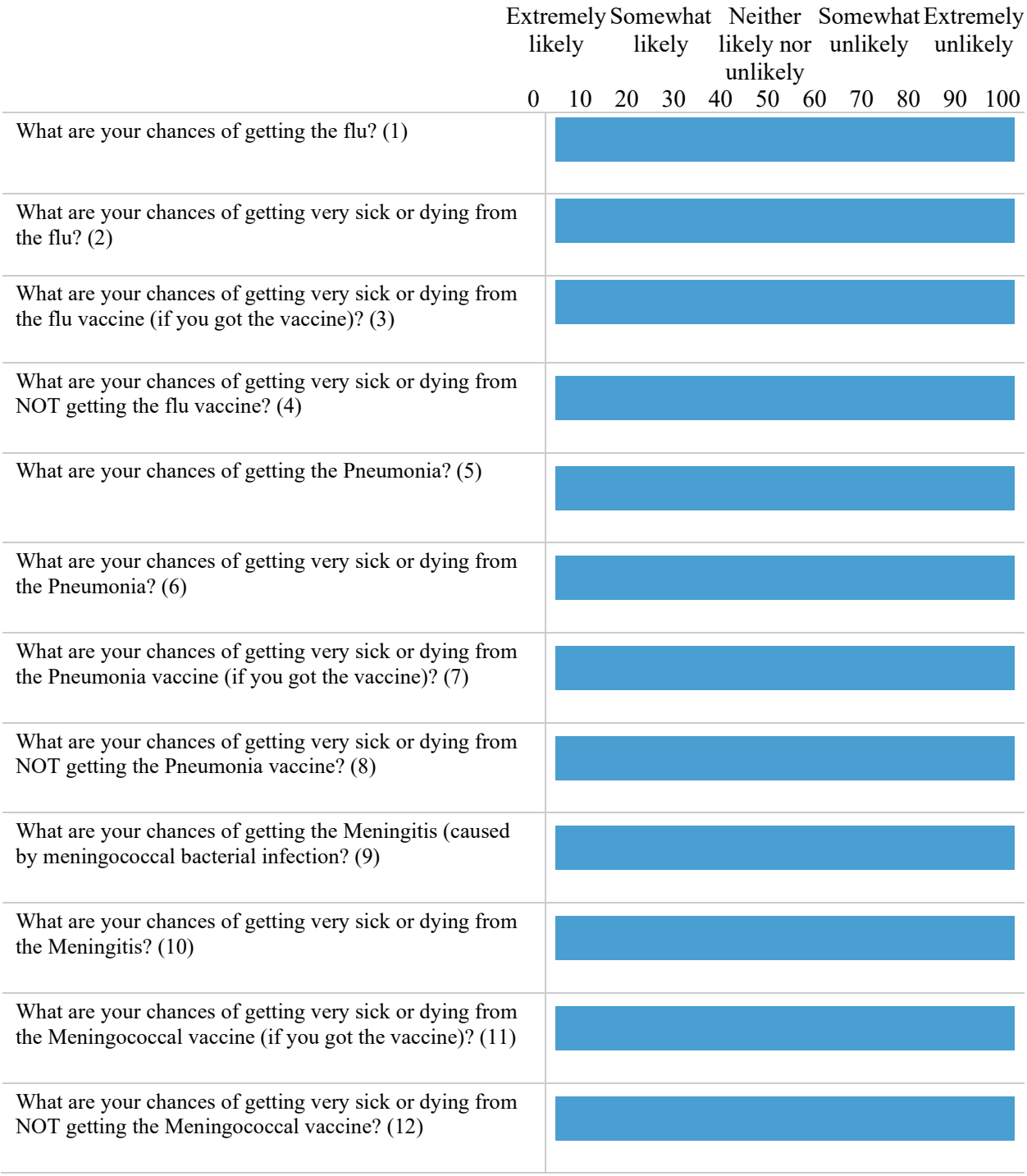
	None (1) (1)	Low (2) (2)	Medium (3) (3)	High (4) (4)
OVERALL, for YOU, what are the RISKS of getting Pneumonia vaccine? (1)	○	○	○	○
OVERALL, for YOU, what are the BENEFITS of getting the Pneumonia vaccine? (2)	○	○	○	○
OVERALL, for YOU, what are the RISKS of NOT getting the Pneumonia vaccine? (3)	○	○	○	○
OVERALL, for YOU, what are the BENEFITS of NOT getting the Pneumonia vaccine? (4)	○	○	○	○
OVERALL, for YOU, what are the RISKS of getting the Pneumonia? (5)	○	○	○	○

Q43 Think about risks and benefits **of Meningitis vaccine**. “Getting the vaccine” means **IF** you got the vaccine, what would the risks or benefits be to you.

	None (1) (1)	Low (2) (2)	Medium (3) (3)	High (4) (4)
OVERALL, for YOU, what are the RISKS of getting Meningitis vaccine? (1)	○	○	○	○
OVERALL, for YOU, what are the BENEFITS of getting the Meningitis vaccine? (2)	○	○	○	○
OVERALL, for YOU, what are the RISKS of NOT getting the Meningitis vaccine? (3)	○	○	○	○
OVERALL, for YOU, what are the BENEFITS of NOT getting the Meningitis vaccine? (4)	○	○	○	○
OVERALL, for YOU, what are the RISKS of getting the Meningitis? (5)	○	○	○	○

Quantitative Risks from the Flu and from Flu Vaccine, and other Premium Vaccines

Q29 Think about your **SPECIFIC risks in the next 12 months**. Use a scale from 0% to 100%. **0% means no chance at all, 50% means equally likely** to happen as not to happen, and **100% means that it will happen for sure**.



Start of Block: Categorical gist –flu risk

Q32 Think about your feelings about the flu and flu vaccine when answering the questions below. A few questions will be about childhood vaccines and about how you feel in general. Please let us know how much you **DISAGREE** or **AGREE** with the following statements. Think about the responses as increasing in **equal steps** from Strongly Disagree to strongly Agree. Remember, we will not know who you are, so please tell us what you really think.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
It only takes once to get the flu. (1)	○	○	○	○	○	○	○
It only takes once to give the flu to someone who might die from it. (2)	○	○	○	○	○	○	○
It only takes once to get very sick or die from a flu vaccine. (3)	○	○	○	○	○	○	○
It only takes once to have a bad reaction to a flu vaccine. (4)	○	○	○	○	○	○	○
It only takes once to get the pneumonia (5)	○	○	○	○	○	○	○
It only takes once to get the meningitis (6)	○	○	○	○	○	○	○

Start of Block: Gist principles of maintaining the status quo by not vaccinating

Q34 Think about your feelings about vaccine when answering the questions below. Please let us know how much you DISAGREE or AGREE with the following statements. Think about the responses as increasing in equal steps from Strongly Disagree to Strongly Agree. Remember, we will not know who you are, so please tell us what you really think.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
If I feel fine, the vaccine is NOT needed and might make me sick. (1)	○	○	○	○	○	○	○
If I feel fine, getting vaccinated is taking a risk. (2)	○	○	○	○	○	○	○
I might get lucky or unlucky, but either way, better safe than sorry by vaccinating. (3)	○	○	○	○	○	○	○
If I feel weak or sick, why not take a risk by vaccinating. (4)	○	○	○	○	○	○	○
If I get vaccinated, two things can happen and one of them is bad. (5)	○	○	○	○	○	○	○

Start of Block: Gist principles about vaccines/flu/pneumonia/meningitis

Q35 Think about your feelings about vaccine when answering the questions below. Please let us know how much you DISAGREE or AGREE with the following statements. Think about the

responses as increasing in equal steps from Strongly Disagree to Strongly Agree. Remember, we will not know who you are, so please tell us what you really think.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
When it comes to health, natural is good. (1)	○	○	○	○	○	○	○
When it comes to vaccinations, I don't want the government to tell me what to do. (2)	○	○	○	○	○	○	○
Getting the flu vaccine protects myself and my loved ones from the flu. (3)	○	○	○	○	○	○	○
I have a responsibility to myself to get the flu vaccine. (4)	○	○	○	○	○	○	○
I have a responsibility to my family to get the flu vaccine. (5)	○	○	○	○	○	○	○
Getting vaccinated benefits society. (6)	○	○	○	○	○	○	○
Getting vaccinated protects those around me. (7)	○	○	○	○	○	○	○
You should not hurt other people by giving them the flu. (8)	○	○	○	○	○	○	○
People should be free to choose to NOT get vaccinated. (9)	○	○	○	○	○	○	○
You should not hurt other people by giving them Pneumonia. (10)	○	○	○	○	○	○	○
You should not hurt other people by giving them Meningitis. (11)	○	○	○	○	○	○	○
People should be free to choose what they do about Pneumonia. (12)	○	○	○	○	○	○	○
People should be free to choose what they do about Meningitis. (13)	○	○	○	○	○	○	○
Parents are experts about whether their own child should get vaccinated. (14)	○	○	○	○	○	○	○

You cannot prove vaccines are safe. (15)	○	○	○	○	○	○	○
Science has been wrong before. (16)	○	○	○	○	○	○	○
Parents have a duty to protect their children from getting horrible diseases, such as polio. (17)	○	○	○	○	○	○	○
You should not hurt babies by exposing them to vaccines that are not 100% safe. (18)	○	○	○	○	○	○	○

End of Block: Gist principles about vaccines/flu/pneumonia/meningitis

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Start of Block: Knowledge

Q36 Please let us know how much you disagree or agree with the following statements. If you think a statement is **TRUE**, you **AGREE**. If you think a statement is **FALSE**, you

DISAGREE. Think about the responses as increasing in **equal** steps from Strongly Disagree to Strongly Agree.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
The flu vaccine reduces hospitalizations and deaths from the flu. (1)	○	○	○	○	○	○	○
The flu vaccine can give you the flu. (2)	○	○	○	○	○	○	○
Pregnant women should get the flu vaccine. (3)	○	○	○	○	○	○	○
The flu has no cure. (4)	○	○	○	○	○	○	○
Flu can spread by touching things with flu germs on them. (5)	○	○	○	○	○	○	○
Washing your hands lowers your risk of getting the flu. (6)	○	○	○	○	○	○	○
The flu can be spread by sharing drinks or food. (7)	○	○	○	○	○	○	○
Getting a flu vaccine gives lifelong protection from the flu. (8)	○	○	○	○	○	○	○
The artificial immunity from the flu vaccine is less effective than natural immunity. (9)	○	○	○	○	○	○	○
The flu is about as bad as getting a cold. (10)	○	○	○	○	○	○	○

The flu vaccine contains toxic metals which can lead to (or make worse) diseases such as Multiple Sclerosis (MS). (11)	○	○	○	○	○	○	○
Some kinds of flu can be treated with antibiotics. (12)	○	○	○	○	○	○	○
Pneumonia is a vaccine-preventable disease (13)	○	○	○	○	○	○	○
Pneumonia can be transmitted by direct person-to-person contact via respiratory droplets. (14)	○	○	○	○	○	○	○
Pneumonia is caused by the specific bacterial infection (15)	○	○	○	○	○	○	○
Approximately 400,000 hospitalizations from pneumococcal pneumonia are estimated to occur annually in the United States. (16)	○	○	○	○	○	○	○
Meningitis is transmitted by respiratory droplet spread or by direct contact (17)	○	○	○	○	○	○	○
Meningitis is a vaccine-preventable disease (18)	○	○	○	○	○	○	○

Meningitis can be treated with antibiotics (19)	○	○	○	○	○	○	○

End of Block: Knowledge

Start of Block: Demographics

Age What is your age IN YEARS?

_____

Country In which country do you live?

_____

Race How would you describe your race?

- ☐ White or Caucasian (1)
- ☐ Black or African-American (2)
- ☐ American Indian, Aleut, Eskimo (3)
- ☐ Asian or Pacific Islander (4)
- ☐ Other race (Fill in): (5) _____

Sex Which of the following was your assigned gender at birth? Note: this may or may not match your gender identify.

- ○ Born female (1)
- ○ Born male (2)

Gender How would you describe your gender identity?

- ○ Same as gender at birth (1)
- ○ Transgender (2)
- ○ Gender fluid (3)
- ○ Prefer not to answer (4)
- ○ Other (Please specify): (5) _____

School What is the last grade or class that you completed in school?

- ○ None (1)
- ○ High school incomplete (2)
- ○ High school graduate (3)
- ○ Technical, trade, or vocational school after high school (4)
- ○ Some college, no 4-year degree (including 2 year Degree) (5)
- ○ College graduate (BS, BA, or other 4-year degree) (6)
- ○ Post-graduate training or professional schooling after college (e.g., toward a Master's Degree, PhD, or law/medical degree) (7)

Occ Which of the following best describes your current occupation?

- ○ Student (1)
- ○ Management (2)
- ○ Staff or aide (3)
- ○ Healthcare professional (4)
- ○ Other trained or licensed professional (5)
- ○ Services (food, sales, etc.) (6)
- ○ Self employed (7)
- ○ Other (Fill in): (8) _____

ParentChild Are you a parent of a child who still needs any vaccinations?

- ○ No (1)
- ○ Yes (2)

Region If you are in the U.S., which of the following regions are you responding from?

- ○ Northeast (1)
- ○ Southeast (2)
- ○ Midwest (3)
- ○ Northwest (4)
- ○ Southwest (5)
- ○ West (6)
- ○ Alaska/Hawaii (7)
- ○ US Territories (8)

○ I am outside the US (9)

End of Block: Demographics

Supplemental Tables

Table 1. Descriptive table for Total Sample

Variable (Total sample)	Mean	Std Deviation	Minimum	Maximum
Vaccination(past)_Flu	0.90	0.30	0.00	1.00
Vaccination(plan)_Flu	0.90	0.30	0.00	1.00
Vaccination(past)_Pneumonia	0.51	0.50	0.00	1.00
Vaccination(plan)_Pneumonia	0.65	0.48	0.00	1.00
Vaccination(past)_Meningitis	0.82	0.39	0.00	1.00
Vaccination(plan)_Meningitis	0.88	0.33	0.00	1.00
Age	24.44	10.61	18.00	71.00
Gender	0.73	0.44	0.00	1.00
Gist_Flu risk	5.35	1.31	2.00	7.00
Gist_Pneumo risk	5.09	1.42	1.00	7.00
Gist_Meningitis risk	5.13	1.41	1.00	7.00
Gist_Vaccine risk	4.19	1.43	1.00	7.00
Gist_Status Quo	3.59	0.87	1.00	6.00
RiskFluVaxCombine	28.74	14.19	4.76	88.33
RiskPneumoniaVaxCombine	29.18	12.36	4.76	66.03
RiskMeningitisVaxCombine	30.05	13.31	4.76	66.03
RiskFlu_Combine	47.80	13.92	19.38	87.67
RiskPneumonia_Combine	48.91	14.77	4.76	97.00
RiskMeningitis_Combine	49.01	17.85	4.76	90.00
RiskNotVax_Flu	41.62	20.56	0.00	99.00
RiskNotVax_Pneumonia	39.66	22.66	0.00	97.00
RiskNotVax_Meningitis	40.93	22.86	0.00	97.50

Table 2. Descriptive table for Student sample (SONA sample)

Variable (SONA sample)	Mean	Std Deviation	Minimum	Maximum
Gist_Flu risk	5.47	1.24	2.00	7.00
Gist_Men risk	5.23	1.32	2.00	7.00
Gist_Pneumo risk	5.22	1.33	2.00	7.00
Gist_Vaccine risk	4.27	1.38	1.00	7.00
Quantitative Risk_Flu	13.02	14.05	0.00	66.00
Quantitative Risk_Flu Vax	5.89	12.89	0.00	78.00
Quantitative Risk_Meningitis	22.89	25.25	0.00	100.00
Quantitative Risk_Meningitis Vax	6.56	12.96	0.00	98.00
Quantitative Risk_Pneumonia	20.96	22.37	0.00	96.00
Quantitative Risk_Pneumonia Vax	6.68	12.53	0.00	70.00

Table 3. Descriptive table for Non-Student sample (Non-SONA sample)

Variable (Non-SONA sample)	Mean	Std Deviation	Minimum	Maximum
Gist_Flu risk	4.68	1.49	2.00	7.00
Gist_Men risk	4.59	1.76	1.00	7.00
Gist_Pneumo risk	4.41	1.71	1.00	7.00
Gist_Vaccine risk	3.82	1.68	1.00	7.00
Quantitative Risk_Flu	21.09	21.78	0.00	75.00
Quantitative Risk_Flu Vax	15.14	19.42	0.00	65.00
Quantitative Risk_Meningitis	24.59	25.91	0.00	87.00
Quantitative Risk_Meningitis Vax	13.73	16.02	0.00	56.00
Quantitative Risk_Pneumonia	22.55	27.05	0.00	90.00
Quantitative Risk_Pneumonia Vax	10.27	11.12	0.00	49.00

Table 4. Correlation for Total Sample

	RiskFluVaxCombine	RiskPneumoVaxCombine	RiskMenVaxCombine	RiskFlu_Combine	RiskPneumo_Combine	RiskMen_Combine	RiskNotVax_flu	RiskNotVax_Pneumo	RiskNotVax_Men
RiskFluVaxCombine	1	.871**	.810**	0.089	0.137	0.166	0.012	-0.080	-0.097
RiskPneumoVaxCombine	.871**	1	.870**	0.059	0.122	.172*	-0.031	-0.063	-0.039
RiskMenVaxCombine	.810**	.870**	1	0.080	0.166	.227**	-0.027	-0.025	-0.063
RiskFlu_Combine	0.089	0.059	0.080	1	.502**	.446**	.429**	.408**	.231**
RiskPneumo_Combine	0.137	0.122	0.166	.502**	1	.682**	.320**	.492**	.290**
RiskMen_Combine	0.166	.172*	.227**	.446**	.682**	1	0.127	.272**	.409**
RiskNotVax_flu	0.012	-0.031	-0.027	.429**	.320**	0.127	1	.658**	.509**
RiskNotVax_Pneumo	-0.080	-0.063	-0.025	.408**	.492**	.272**	.658**	1	.720**
RiskNotVax_Men	-0.097	-0.039	-0.063	.231**	.290**	.409**	.509**	.720**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5. Correlation for Student Sample (SONA Sample)

	RiskFluVaxCombine	RiskPneumoVaxCombine	RiskMenVaxCombine	RiskFlu_Combine	RiskPneumo_Combine	RiskMen_Combine	RiskNotVax_flu	RiskNotVax_Pneumo	RiskNotVax_Men
RiskFluVaxCombine	1	.867**	.819**	0.089	0.137	0.176	-0.034	-0.058	-0.069
RiskPneumoVaxCombine	.867**	1	.880**	0.080	0.095	0.165	-0.032	-0.024	-0.005
RiskMenVaxCombine	.819**	.880**	1	0.122	0.159	.217*	-0.060	-0.020	-0.048
RiskFlu_Combine	0.089	0.080	0.122	1	.493**	.470**	.441**	.424**	.290**
RiskPneumo_Combine	0.137	0.095	0.159	.493**	1	.680**	.392**	.556**	.370**
RiskMen_Combine	0.176	0.165	.217*	.470**	.680**	1	.190*	.285**	.418**
RiskNotVax_flu	-0.034	-0.032	-0.060	.441**	.392**	.190*	1	.720**	.621**
RiskNotVax_Pneumo	-0.058	-0.024	-0.020	.424**	.556**	.285**	.720**	1	.759**
RiskNotVax_Men	-0.069	-0.005	-0.048	.290**	.370**	.418**	.621**	.759**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6. Correlation for Non-Student Sample (Non-SONA Sample)

	RiskFluVaxCombine	RiskPneumoVaxCombine	RiskMenVaxCombine	RiskFlu_Combine	RiskPneumo_Combine	RiskMen_Combine	RiskNotVax_flu	RiskNotVax_Pneumo	RiskNotVax_Men
RiskFluVaxCombine	1	.899**	.773**	0.091	0.155	0.189	0.025	-0.216	-0.165
RiskPneumoVaxCombine	.899**	1	.854**	-0.008	0.214	0.231	-0.155	-0.275	-0.163

RiskMenVaxCombine	.773**	.854**	1	-0.028	0.213	0.341	-0.132	-0.114	-0.062
RiskFlu_Combine	0.091	-0.008	-0.028	1	.524*	0.385	.469*	0.376	0.021
RiskPneumo_Combine	0.155	0.214	0.213	.524*	1	.714**	0.158	0.319	0.011
RiskMen_Combine	0.189	0.231	0.341	0.385	.714**	1	-0.078	0.246	0.353
RiskNotVax_flu	0.025	-0.155	-0.132	.469*	0.158	-0.078	1	0.315	0.041
RiskNotVax_Pneumo	-0.216	-0.275	-0.114	0.376	0.319	0.246	0.315	1	.547**
RiskNotVax_Men	-0.165	-0.163	-0.062	0.021	0.011	0.353	0.041	.547**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7. Results of Binary Logistic Regression

Variables (Dependent, Independent, & Control)	B	S.E.	Z	Sig.	Wald Test Chi-Square	95% CI
Vax Ever Flu						
Constant	2.79	4.99	0.56	0.576		
Gist Status Quo	-0.207	0.536	-0.39	0.700	0.15	(0.2843, 2.3264)
Knowledge Flu	0.367	0.733	0.50	0.617	0.25	(0.3431, 6.0665)
Age	-0.0144	0.0392	-0.37	0.714	0.13	(0.9127, 1.0645)
Sex	-0.33	1.15	-0.29	0.775	0.08	(0.0758, 6.8388)
Constant	0.55	4.10	0.13	0.894		
RiskFlu_Combine	0.0447	0.0422	1.06	0.290	1.12	(0.9626, 1.1359)
Age	-0.0042	0.0389	-0.11	0.914	0.01	(0.9226, 1.0748)
Knowledge_Flu	0.269	0.749	0.36	0.719	0.13	(0.3015, 5.6839)
Sex	-0.66	1.18	-0.56	0.577	0.31	(0.0511, 5.2447)
Constant	4.70	4.41	1.07	0.286		
RiskFluVaxCombine	-0.0484	0.0269	-1.80	0.072	3.24	(0.9038, 1.0043)
Age	-0.0067	0.0450	-0.15	0.881	0.02	(0.9095, 1.0848)
Knowledge_Flu	0.066	0.762	0.09	0.931	0.01	(0.2398, 4.7554)
Sex	0.11	1.21	0.09	0.930	0.01	(0.1037, 11.9367)
Constant	1.69	4.01	0.42	0.674		
RiskNotVax_flu	0.0537	0.0306	1.76	0.079	3.09	(0.9938, 1.1204)
Age	-0.0331	0.0403	-0.82	0.411	0.68	(0.8940, 1.0469)
Knowledge_Flu	0.255	0.761	0.34	0.737	0.11	(0.2904, 5.7401)
Sex	-0.87	1.20	-0.72	0.469	0.53	(0.0402, 4.3837)

Variables (Dependent, Independent, & Control)	B	S.E.	Z	Sig.	Wald Test Chi-Square	95% CI
Vax Plan Flu						
Constant	1.65	3.20	0.52	0.606		
Gist_Status Quo	-0.282	0.337	-0.84	0.403	0.70	(0.3896, 1.4603)
Age	-0.0268	0.0233	-1.15	0.250	1.32	(0.9300, 1.0191)
Sex	-0.795	0.803	-0.99	0.322	0.98	(0.0936, 2.1796)
Knowledge_Flu	0.572	0.475	1.20	0.229	1.45	(0.6982, 4.4983)
Constant	-1.14	2.65	-0.43	0.668		
RiskFlu_Combine	0.0461	0.0264	1.74	0.081	3.04	(0.9943, 1.1029)
Age	-0.0157	0.0235	-0.67	0.505	0.44	(0.9401, 1.0309)
Knowledge_Flu	0.507	0.487	1.04	0.297	1.09	(0.6401, 4.3104)
Sex	-1.144	0.826	-1.39	0.166	1.92	(0.0631, 1.6069)
Constant	5.39	3.22	1.68	0.093		
RiskFluVaxCombine	-0.0847	0.0239	-3.54	0.000	12.55	(0.8768, 0.9629)
Age	-0.0228	0.0277	-0.82	0.411	0.68	(0.9259, 1.0320)
Knowledge_Flu	0.087	0.534	0.16	0.871	0.03	(0.3831, 3.1050)
Sex	-0.132	0.864	-0.15	0.879	0.02	(0.1612, 4.7640)
Constant	-0.17	2.54	-0.07	0.945		
RiskNotVax_flu	0.0384	0.0175	2.19	0.029	4.80	(1.0040, 1.0754)
Age	-0.0374	0.0242	-1.54	0.123	2.38	(0.9186, 1.0102)
Knowledge_Flu	0.565	0.484	1.17	0.243	1.36	(0.6811, 4.5422)
Sex	-1.204	0.827	-1.46	0.145	2.12	(0.0594, 1.5160)

Variables (Dependent, Independent, & Control)	B	S.E.	Z	Sig.	Wald Test Chi-Square	95% CI
Vax Ever Pneumo						
Constant	-3.02	1.45	-2.09	0.037		
Gist_Status Quo	-0.073	0.214	-0.34	0.735	0.11	(0.6111, 1.4152)
Knowledge_Pneumo	0.657	0.208	3.15	0.002	9.94	(1.2822, 2.9018)
Age	0.0070	0.0176	0.40	0.689	0.16	(0.9729, 1.0424)
Sex	-0.191	0.410	-0.47	0.641	0.22	(0.3702, 1.8439)
Constant	-3.71	1.18	-3.14	0.002		
RiskNotVax_Pneumo	0.02989	0.00903	3.31	0.001	10.96	(1.0123, 1.0487)
Age	0.0052	0.0179	0.29	0.769	0.09	(0.9706, 1.0411)
Sex	-0.358	0.438	-0.82	0.414	0.67	(0.2963, 1.6496)
Knowledge_Pneumo	0.544	0.217	2.50	0.012	6.27	(1.1252, 2.6357)
Constant	-4.65	1.30	-3.57	0.000		
RiskPneumoCombine	0.0348	0.0136	2.56	0.010	6.58	(1.0082, 1.0633)
Age	0.0105	0.0181	0.58	0.564	0.33	(0.9752, 1.0471)
Sex	-0.323	0.422	-0.77	0.443	0.59	(0.3165, 1.6548)
Knowledge_Pneumo	0.596	0.214	2.78	0.005	7.72	(1.1921, 2.7630)
Constant	-2.68	1.25	-2.14	0.032		
RiskPneumVaxComb	-0.0178	0.0153	-1.16	0.244	1.36	(0.9533, 1.0122)
Age	0.0093	0.0176	0.53	0.597	0.28	(0.9751, 1.0447)
Sex	-0.098	0.417	-0.23	0.814	0.06	(0.4008, 2.0519)
Knowledge_Pneumo	0.616	0.211	2.92	0.004	8.51	(1.2241, 2.8030)

Variables (Dependent, Independent, & Control)	B	S.E.	Z	Sig.	Wald Test Chi-Square	95% CI
Vax Plan Pneumo						
Constant	-2.76	1.51	-1.82	0.069		
Gist_Status Quo	-0.272	0.233	-1.17	0.243	1.36	(0.4827, 1.2025)
Knowledge_Pneumo	0.835	0.229	3.65	0.000	13.31	(1.4716, 3.6095)
Age	0.0099	0.0209	0.47	0.637	0.22	(0.9693, 1.0522)
Sex	0.013	0.440	0.03	0.977	0.00	(0.4277, 2.3984)
Constant	-4.59	1.34	-3.42	0.001		
RiskNotVax_Pneumo	0.0489	0.0119	4.11	0.000	16.89	(1.0259, 1.0749)
Age	0.0097	0.0221	0.44	0.663	0.19	(0.9668, 1.0545)
Sex	-0.430	0.499	-0.86	0.389	0.74	(0.2446, 1.7303)
Knowledge_Pneumo	0.720	0.250	2.88	0.004	8.31	(1.2592, 3.3499)
Constant	-5.26	1.44	-3.65	0.000		
RiskPneumoCombine	0.0357	0.0152	2.34	0.019	5.48	(1.0058, 1.0678)
Age	0.0179	0.0219	0.82	0.412	0.67	(0.9754, 1.0627)
Sex	-0.196	0.451	-0.43	0.664	0.19	(0.3398, 1.9896)
Knowledge_Pneumo	0.789	0.234	3.37	0.001	11.35	(1.3909, 3.4831)
Constant	-2.93	1.34	-2.19	0.029		
RiskPneumVaxComb	-0.0284	0.0167	-1.70	0.090	2.88	(0.9407, 1.0044)
Age	0.0164	0.0213	0.77	0.442	0.59	(0.9749, 1.0599)
Sex	0.139	0.452	0.31	0.758	0.10	(0.4739, 2.7889)
Knowledge_Pneumo	0.791	0.232	3.41	0.001	11.63	(1.3998, 3.4751)

Variables (Dependent, Independent, & Control)	B	S.E.	Z	Sig.	Wald Test Chi-Square	95% CI
VaxEverMen						
Constant	1.59	1.69	0.94	0.349		
Gist_Status Quo	-0.144	0.273	-0.53	0.599	0.28	(0.5075, 1.4787)
Knowledge_Mening	0.426	0.262	1.63	0.104	2.65	(0.9163, 2.5599)
Age	-0.0606	0.0189	-3.21	0.001	10.28	(0.9070, 0.9767)
Sex	-0.010	0.543	-0.02	0.985	0.00	(0.3415, 2.8700)
Constant	0.30	1.42	0.21	0.834		
RiskMen_Combine	0.0210	0.0139	1.51	0.131	2.29	(0.9938, 1.0494)
Age	-0.0578	0.0184	-3.14	0.002	9.89	(0.9105, 0.9785)
Sex	-0.134	0.546	-0.25	0.806	0.06	(0.3002, 2.5490)
Knowledge_Mening	0.385	0.269	1.43	0.153	2.05	(0.8671, 2.4906)
Constant	2.10	1.44	1.46	0.145		
RiskMenVaxCombine	-0.0374	0.0180	-2.08	0.037	4.34	(0.9299, 0.9978)
Age	-0.0563	0.0184	-3.06	0.002	9.35	(0.9117, 0.9800)
Sex	0.164	0.552	0.30	0.767	0.09	(0.3993, 3.4733)
Knowledge_Mening	0.413	0.267	1.55	0.121	2.40	(0.8960, 2.5510)
Constant	-0.24	1.47	-0.16	0.870		
RiskNotVax_Men	0.0323	0.0127	2.55	0.011	6.52	(1.0075, 1.0588)
Age	-0.0571	0.0192	-2.97	0.003	8.82	(0.9096, 0.9808)
Sex	-0.296	0.569	-0.52	0.603	0.27	(0.2440, 2.2685)
Knowledge_Mening	0.482	0.281	1.71	0.087	2.93	(0.9324, 2.8096)

Variables (Dependent, Independent, & Control)	B	S.E.	Z	Sig.	Wald Test Chi-Square	95% CI
VaxPlanMen						
Constant	2.36	1.97	1.20	0.232		
Gist_Status Quo	-0.156	0.314	-0.50	0.619	0.25	(0.4622, 1.5833)
Knowledge_Mening	0.391	0.308	1.27	0.205	1.61	(0.8082, 2.7041)
Age	-0.0642	0.0200	-3.21	0.001	10.29	(0.9018, 0.9753)
Sex	0.063	0.631	0.10	0.921	0.01	(0.3094, 3.6654)
Constant	1.13	1.63	0.69	0.490		
RiskMen_Combine	0.0185	0.0160	1.15	0.249	1.33	(0.9872, 1.0512)
Age	-0.0607	0.0191	-3.19	0.001	10.15	(0.9066, 0.9769)
Sex	-0.064	0.630	-0.10	0.919	0.01	(0.2727, 3.2271)
Knowledge_Mening	0.350	0.316	1.11	0.267	1.23	(0.7645, 2.6360)
Constant	3.49	1.75	1.99	0.046		
RiskMenVaxCombine	-0.0565	0.0215	-2.63	0.008	6.93	(0.9061, 0.9857)
Age	-0.0609	0.0202	-3.02	0.003	9.10	(0.9044, 0.9789)
Sex	0.356	0.653	0.54	0.586	0.30	(0.3968, 5.1359)
Knowledge_Mening	0.377	0.321	1.17	0.240	1.38	(0.7771, 2.7337)
Constant	0.09	1.77	0.05	0.962		
RiskNotVax_Men	0.0466	0.0168	2.77	0.006	7.68	(1.0137, 1.0828)
Age	-0.0613	0.0206	-2.98	0.003	8.89	(0.9034, 0.9792)
Sex	-0.381	0.678	-0.56	0.574	0.32	(0.1809, 2.5786)
Knowledge_Mening	0.478	0.347	1.38	0.168	1.90	(0.8170, 3.1847)

Table 8. Result of Binary Logistic Regression - SONA

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Vax Ever Flu								
Gisk_Status Quo	-.450	.688	.428	1	.513	.638	.166	2.455
Knowledge_Flu	.317	.799	.157	1	.692	1.373	.287	6.577
Age	-.565	.462	1.499	1	.221	.568	.230	1.404
Sex	-.259	1.222	.045	1	.832	.772	.070	8.462
Constant	15.287	10.848	1.986	1	.159	4354681.773		
RiskFlu_Combine	.033	.046	.501	1	.479	1.033	.944	1.130
Knowledge_Flu	.448	.785	.326	1	.568	1.566	.336	7.289
Age	-.573	.466	1.516	1	.218	.564	.226	1.404
Sex	-.609	1.265	.232	1	.630	.544	.046	6.494
Constant	11.857	10.288	1.328	1	.249	141032.483		
RiskFluVaxCombine	-.097	.043	5.050	1	.025	.907	.833	.988
Knowledge_Flu	-.463	.888	.272	1	.602	.629	.110	3.588
Age	-.370	.521	.505	1	.477	.690	.249	1.918
Sex	.967	1.427	.459	1	.498	2.630	.160	43.124
Constant	16.113	11.980	1.809	1	.179	9945320.143		
RiskNotVax_flu	.036	.031	1.349	1	.246	1.036	.976	1.101
Knowledge_Flu	.369	.800	.213	1	.644	1.447	.302	6.943
Age	-.543	.463	1.373	1	.241	.581	.234	1.441
Sex	-.712	1.247	.326	1	.568	.490	.043	5.649
Constant	12.000	10.268	1.366	1	.243	162780.107		

Table 8. Result of Binary Logistic Regression - SONA (Continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Vax Plan Flu								
Gisk_Status Quo	-.204	.430	.225	1	.635	.815	.351	1.896
Knowledge_Flu	.639	.527	1.469	1	.225	1.895	.674	5.323
Age	-.221	.286	.597	1	.440	.801	.457	1.405
Sex	-.472	.847	.310	1	.577	.624	.119	3.282
Constant	4.758	6.726	.500	1	.479	116.558		
RiskFlu_Combine	.030	.030	.974	1	.324	1.030	.971	1.093
Knowledge_Flu	.654	.513	1.624	1	.202	1.924	.703	5.262
Age	-.228	.287	.634	1	.426	.796	.454	1.396
Sex	-.725	.873	.690	1	.406	.484	.087	2.680
Constant	2.889	6.349	.207	1	.649	17.967		
RiskFluVaxCombine	-.122	.039	10.018	1	.002	.885	.821	.955
Knowledge_Flu	-.214	.586	.133	1	.715	.808	.256	2.546
Age	.097	.318	.094	1	.759	1.102	.592	2.054
Sex	.867	.972	.795	1	.373	2.379	.354	15.977
Constant	5.008	7.012	.510	1	.475	149.638		
RiskNotVax_flu	.020	.019	1.111	1	.292	1.020	.983	1.058
Knowledge_Flu	.653	.512	1.628	1	.202	1.921	.705	5.239
Age	-.211	.288	.536	1	.464	.810	.461	1.424
Sex	-.727	.867	.702	1	.402	.484	.088	2.646
Constant	3.187	6.349	.252	1	.616	24.225		

Table 8. Result of Binary Logistic Regression - SONA (Continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Vax Ever Pneumo								
Gisk_Status Quo	-.175	.238	.537	1	.464	.840	.527	1.339
Age	-.019	.163	.014	1	.905	.981	.713	1.349
Knowledge_Pneumo	.566	.224	6.401	1	.011	1.761	1.136	2.729
Sex	-.282	.446	.400	1	.527	.754	.315	1.808
Constant	-1.576	3.821	.170	1	.680	.207		
RiskNotVax_Pneumo	.034	.010	11.459	1	.001	1.035	1.015	1.056
Age	.037	.175	.046	1	.831	1.038	.737	1.461
Knowledge_Pneumo	.464	.237	3.828	1	.050	1.590	.999	2.530
Sex	-.563	.487	1.336	1	.248	.569	.219	1.480
Constant	-3.961	3.964	.999	1	.318	.019		
RiskPneumo_Combine	.022	.015	2.098	1	.147	1.022	.992	1.053
Age	-.003	.164	.000	1	.987	.997	.723	1.375
Knowledge_Pneumo	.543	.226	5.767	1	.016	1.720	1.105	2.679
Sex	-.389	.453	.737	1	.391	.678	.279	1.648
Constant	-3.436	3.772	.830	1	.362	.032		
RiskPneumoVaxComb	-.020	.017	1.296	1	.255	.981	.948	1.014
Age	.000	.164	.000	1	1.000	1.000	.725	1.380
Knowledge_Pneumo	.540	.226	5.711	1	.017	1.716	1.102	2.673
Sex	-.181	.459	.155	1	.694	.835	.339	2.053
Constant	-1.993	3.710	.289	1	.591	.136		

Table 8. Result of Binary Logistic Regression - SONA (Continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Vax Plan Pneumo								
Gisk_Status Quo	-.256	.257	.991	1	.319	.774	.468	1.282
Age	-.176	.175	1.015	1	.314	.839	.596	1.181
Knowledge_Pneumo	.709	.240	8.715	1	.003	2.032	1.269	3.253
Sex	.091	.476	.036	1	.849	1.095	.431	2.783
Constant	1.548	4.067	.145	1	.704	4.700		
RiskNotVax_Pneumo	.045	.012	12.928	1	.000	1.046	1.021	1.072
Age	-.120	.193	.384	1	.535	.887	.607	1.296
Knowledge_Pneumo	.585	.262	4.999	1	.025	1.795	1.075	2.997
Sex	-.272	.524	.270	1	.603	.762	.273	2.126
Constant	-1.251	4.372	.082	1	.775	.286		
RiskPneumo_Combine	.034	.018	3.722	1	.054	1.035	.999	1.071
Age	-.153	.177	.749	1	.387	.858	.607	1.213
Knowledge_Pneumo	.666	.244	7.443	1	.006	1.947	1.206	3.141
Sex	-.083	.487	.029	1	.865	.921	.354	2.392
Constant	-1.171	4.027	.085	1	.771	.310		
RiskPneumoVaxComb	-.017	.018	.823	1	.364	.984	.949	1.019
Age	-.157	.176	.800	1	.371	.855	.606	1.206
Knowledge_Pneumo	.693	.242	8.195	1	.004	2.000	1.244	3.214
Sex	.162	.494	.108	1	.742	1.176	.447	3.095
Constant	.734	3.928	.035	1	.852	2.083		

Table 8. Result of Binary Logistic Regression - SONA (Continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
VaxEverMen								
Gisk_Status Quo	-.309	.327	.892	1	.345	.734	.387	1.394
Age	-.145	.226	.413	1	.521	.865	.556	1.347
Sex	.223	.608	.135	1	.713	1.250	.380	4.114
Knowledge_Meningitis	.192	.293	.428	1	.513	1.212	.682	2.154
Constant	4.843	5.246	.852	1	.356	126.810		
RiskMen_Combine	.016	.016	.940	1	.332	1.016	.984	1.048
Age	-.182	.228	.637	1	.425	.834	.533	1.304
Sex	.106	.607	.030	1	.862	1.112	.338	3.651
Knowledge_Meningitis	.184	.292	.395	1	.530	1.202	.677	2.131
Constant	3.824	4.996	.586	1	.444	45.766		
RiskMenVaxCombine	-.056	.024	5.580	1	.018	.946	.903	.991
Age	-.054	.240	.051	1	.821	.947	.592	1.515
Sex	.492	.641	.589	1	.443	1.636	.466	5.745
Knowledge_Meningitis	.248	.297	.698	1	.404	1.281	.716	2.293
Constant	3.152	5.270	.358	1	.550	23.380		
RiskNotVax_Men	.035	.015	5.790	1	.016	1.036	1.007	1.066
Age	-.144	.240	.362	1	.547	.865	.541	1.385
Sex	-.046	.632	.005	1	.942	.955	.277	3.293
Knowledge_Meningitis	.224	.319	.494	1	.482	1.251	.670	2.337
Constant	2.461	5.453	.204	1	.652	11.719		

Table 8. Result of Binary Logistic Regression - SONA (Continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
VaxPlanMen								
Gisk_Status Quo	-.261	.425	.376	1	.540	.771	.335	1.773
Age	-.356	.297	1.439	1	.230	.700	.391	1.253
Sex	.255	.773	.109	1	.742	1.290	.284	5.866
Knowledge_Meningitis	-.039	.389	.010	1	.920	.962	.449	2.060
Constant	10.756	6.997	2.363	1	.124	46931.089		
RiskMen_Combine	.012	.020	.353	1	.552	1.012	.973	1.053
Age	-.379	.297	1.625	1	.202	.685	.382	1.226
Sex	.168	.768	.048	1	.827	1.183	.263	5.330
Knowledge_Meningitis	-.035	.385	.008	1	.927	.965	.454	2.051
Constant	9.720	6.641	2.142	1	.143	16642.352		
RiskMenVaxCombine	-.074	.030	5.989	1	.014	.929	.875	.985
Age	-.245	.324	.572	1	.449	.783	.415	1.476
Sex	.656	.840	.609	1	.435	1.927	.371	9.999
Knowledge_Meningitis	.077	.388	.039	1	.843	1.080	.504	2.312
Constant	9.129	7.188	1.613	1	.204	9217.459		
RiskNotVax_Men	.038	.019	3.815	1	.051	1.039	1.000	1.079
Age	-.385	.311	1.537	1	.215	.680	.370	1.251
Sex	.030	.793	.001	1	.970	1.030	.218	4.871
Knowledge_Meningitis	-.081	.425	.037	1	.848	.922	.401	2.119
Constant	9.466	7.166	1.745	1	.186	12914.499		

Table 9. Result of Binary Logistic Regression – non-SONA samples	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Vax Ever Flu								
Gisk_Status Quo	1.180	1.898	.386	1	.534	3.253	.079	134.176
Knowledge_Flu	.847	2.449	.120	1	.729	2.334	.019	283.578
Age	.063	.134	.222	1	.638	1.065	.819	1.385
Sex	-19.151	15399.758	.000	1	.999	.000	.000	.
Constant	10.997	15399.768	.000	1	.999	59688.041		
RiskFlu_Combine	.169	.258	.427	1	.513	1.184	.714	1.964
Knowledge_Flu	-1.534	3.971	.149	1	.699	.216	.000	517.778
Age	.052	.165	.101	1	.751	1.054	.763	1.455
Sex	-18.016	14777.377	.000	1	.999	.000	.000	.
Constant	19.847	14777.386	.000	1	.999	416237436.31		
RiskFluVaxCombine	.042	.084	.245	1	.620	1.043	.884	1.229
Knowledge_Flu	.693	1.747	.157	1	.692	1.999	.065	61.362
Age	.027	.102	.072	1	.789	1.028	.842	1.254
Sex	-18.535	15843.086	.000	1	.999	.000	.000	.
Constant	15.315	15843.090	.000	1	.999	4478848.366		
RiskNotVax_flu	.230	.305	.569	1	.451	1.258	.692	2.287
Knowledge_Flu	.011	20.809	.000	1	1.000	1.011	.000	5.2E+17
Age	-.058	.206	.078	1	.780	.944	.630	1.414
Sex	-16.797	13782.741	.000	1	.999	.000	.000	.
Constant	14.646	13783.215	.000	1	.999	2295479.403		

Table 9. Result of Binary Logistic Regression – non-SONA samples (continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Vax Plan Flu								
Gisk_Status Quo	-.165	.602	.075	1	.784	.848	.261	2.757
Knowledge_Flu	.532	1.196	.198	1	.656	1.702	.163	17.729
Age	.011	.065	.027	1	.869	1.011	.889	1.149
Sex	-19.836	16342.920	.000	1	.999	.000	.000	.
Constant	18.431	16342.922	.000	1	.999	101078371.76		
RiskFlu_Combine	.189	.158	1.430	1	.232	1.209	.886	1.648
Knowledge_Flu	-1.661	2.270	.535	1	.464	.190	.002	16.256
Age	.077	.099	.607	1	.436	1.080	.890	1.311
Sex	-19.617	14681.895	.000	1	.999	.000	.000	.
Constant	18.443	14681.897	.000	1	.999	102271389.13		
RiskFluVaxCombine	-.071	.048	2.189	1	.139	.931	.847	1.023
Knowledge_Flu	.228	2.128	.011	1	.915	1.256	.019	81.293
Age	-.068	.086	.619	1	.431	.935	.790	1.106
Sex	-19.882	15394.966	.000	1	.999	.000	.000	.
Constant	25.737	15394.971	.000	1	.999	1.5E+11		
RiskNotVax_flu	.211	.112	3.550	1	.060	1.235	.992	1.538
Knowledge_Flu	.250	2.149	.014	1	.907	1.284	.019	86.758
Age	.070	.105	.439	1	.508	1.072	.873	1.317
Sex	-21.761	12555.324	.000	1	.999	.000	.000	.
Constant	9.588	12555.330	.000	1	.999	14595.759		

Table 9. Result of Binary Logistic Regression – non-SONA samples (continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Vax Ever Pneumo								
Gisk_Status Quo	.517	.659	.615	1	.433	1.677	.461	6.098
Age	.035	.049	.510	1	.475	1.035	.941	1.139
Sex	.074	1.169	.004	1	.950	1.077	.109	10.654
Knowledge_Pneumo	1.281	.692	3.427	1	.064	3.599	.928	13.961
Constant	-9.749	5.466	3.181	1	.074	.000		
RiskNotVax_Pneumo	.010	.025	.177	1	.674	1.010	.963	1.061
Age	.019	.044	.182	1	.670	1.019	.934	1.112
Sex	.504	1.140	.195	1	.659	1.655	.177	15.443
Knowledge_Pneumo	1.073	.656	2.673	1	.102	2.925	.808	10.590
Constant	-6.996	3.656	3.663	1	.056	.001		
RiskPneumo_Combine	.106	.051	4.316	1	.038	1.112	1.006	1.230
Age	-.018	.062	.082	1	.775	.983	.871	1.109
Sex	.014	1.381	.000	1	.992	1.014	.068	15.178
Knowledge_Pneumo	1.690	1.238	1.864	1	.172	5.422	.479	61.376
Constant	-12.189	6.063	4.041	1	.044	.000		
RiskPneumoVaxComb	.003	.039	.004	1	.947	1.003	.928	1.083
Age	.021	.047	.200	1	.655	1.021	.931	1.120
Sex	.396	1.105	.129	1	.720	1.486	.171	12.953
Knowledge_Pneumo	1.172	.664	3.120	1	.077	3.229	.879	11.860
Constant	-7.165	4.583	2.444	1	.118	.001		

Table 9. Result of Binary Logistic Regression – non-SONA samples (continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Vax Plan Pneumo								
Gisk_Status Quo	-.253	.746	.115	1	.735	.777	.180	3.352
Age	.060	.066	.830	1	.362	1.062	.933	1.207
Sex	-1.340	1.716	.610	1	.435	.262	.009	7.563
Knowledge_Pneumo	1.737	1.032	2.834	1	.092	5.678	.752	42.890
Constant	-8.522	5.280	2.605	1	.107	.000		
RiskNotVax_Pneumo	.093	.053	3.087	1	.079	1.098	.989	1.218
Age	.039	.073	.292	1	.589	1.040	.902	1.199
Sex	-2.490	2.129	1.368	1	.242	.083	.001	5.379
Knowledge_Pneumo	1.847	1.322	1.951	1	.162	6.339	.475	84.595
Constant	-11.434	5.846	3.825	1	.050	.000		
RiskPneumo_Combine	.039	.042	.840	1	.359	1.039	.957	1.129
Age	.052	.066	.622	1	.430	1.053	.926	1.198
Sex	-1.516	1.522	.992	1	.319	.220	.011	4.337
Knowledge_Pneumo	1.750	1.098	2.540	1	.111	5.754	.669	49.482
Constant	-10.704	5.652	3.586	1	.058	.000		
RiskPneumoVaxComb	-.133	.085	2.465	1	.116	.875	.741	1.034
Age	-.009	.086	.012	1	.914	.991	.837	1.173
Sex	-1.795	1.852	.939	1	.332	.166	.004	6.264
Knowledge_Pneumo	2.515	1.616	2.423	1	.120	12.370	.521	293.621
Constant	-4.994	5.859	.727	1	.394	.007		

Table 9. Result of Binary Logistic Regression – non-SONA samples (continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
VaxEverMen								
Gisk_Status Quo	.301	.589	.262	1	.609	1.352	.426	4.291
Age	-.095	.058	2.735	1	.098	.909	.812	1.018
Sex	-.976	1.266	.594	1	.441	.377	.031	4.507
Knowledge_Pneumo	1.297	.835	2.410	1	.121	3.658	.711	18.813
Constant	-2.114	4.572	.214	1	.644	.121		
RiskMen_Combine	.077	.043	3.249	1	.071	1.080	.993	1.175
Age	-.154	.073	4.393	1	.036	.858	.743	.990
Sex	-1.829	1.506	1.474	1	.225	.161	.008	3.076
Knowledge_Pneumo	1.825	1.236	2.178	1	.140	6.201	.550	69.960
Constant	-3.728	5.304	.494	1	.482	.024		
RiskMenVaxCombine	-.001	.039	.001	1	.971	.999	.925	1.078
Age	-.107	.059	3.298	1	.069	.899	.800	1.009
Sex	-.870	1.289	.455	1	.500	.419	.033	5.243
Knowledge_Pneumo	1.302	.862	2.281	1	.131	3.676	.679	19.917
Constant	-.603	4.634	.017	1	.896	.547		
RiskNotVax_Men	.008	.031	.063	1	.801	1.008	.949	1.070
Age	-.104	.056	3.492	1	.062	.901	.808	1.005
Sex	-.998	1.397	.511	1	.475	.369	.024	5.696
Knowledge_Pneumo	1.233	.888	1.928	1	.165	3.430	.602	19.535
Constant	-.607	3.569	.029	1	.865	.545		

Table 9. Result of Binary Logistic Regression – non-SONA samples (continued)

							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
VaxPlanMen								
Gisk_Status Quo	.198	.660	.090	1	.764	1.219	.335	4.444
Age	-.078	.064	1.479	1	.224	.925	.817	1.049
Sex	-.581	1.305	.198	1	.656	.559	.043	7.217
Knowledge_Pneumo	1.967	1.032	3.629	1	.057	7.148	.945	54.081
Constant	-6.025	4.985	1.461	1	.227	.002		
RiskMen_Combine	.073	.049	2.200	1	.138	1.076	.977	1.186
Age	-.139	.087	2.535	1	.111	.870	.733	1.033
Sex	-1.233	1.415	.759	1	.384	.291	.018	4.667
Knowledge_Pneumo	2.849	1.660	2.944	1	.086	17.269	.667	447.360
Constant	-9.659	6.486	2.218	1	.136	.000		
RiskMenVaxCombine	-.001	.041	.000	1	.987	.999	.922	1.083
Age	-.086	.064	1.787	1	.181	.918	.809	1.041
Sex	-.495	1.281	.149	1	.699	.610	.049	7.510
Knowledge_Pneumo	1.975	1.051	3.527	1	.060	7.203	.917	56.565
Constant	-5.064	4.873	1.080	1	.299	.006		
RiskNotVax_Men	.070	.042	2.785	1	.095	1.072	.988	1.164
Age	-.092	.067	1.886	1	.170	.912	.800	1.040
Sex	-2.010	1.684	1.424	1	.233	.134	.005	3.636
Knowledge_Pneumo	1.821	1.182	2.373	1	.123	6.176	.609	62.626
Constant	-5.001	4.148	1.454	1	.228	.007		

Table 10. Results of Binary Logistic Regression – Gist vs. Verbatim of Entire Sample

Variables (Dependent, Independent, & Control)	**β**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
Vax Ever Flu						
Flu Verbatim	1.621	1.250	1.682	1	0.195	5.059
Flu Knowledge	0.331	0.491	0.453	1	0.501	1.392
Sex	-0.757	1.164	0.422	1	0.516	0.469
Age	-0.235	0.415	0.322	1	0.571	0.790
Constant	4.504	1.331	11.453	1	0.001	90.355
Vax Plan Flu						
Flu Verbatim	0.226	0.253	0.802	1	0.370	1.254
Flu Knowledge	0.717	0.252	8.129	1	0.004	2.049
Sex	-0.317	0.534	0.352	1	0.553	0.728
Age	-0.123	0.212	0.335	1	0.562	0.884
Constant	1.865	0.479	15.135	1	0.000	6.457
Vax Ever Flu						
Flu Gist	0.347	0.525	0.437	1	0.509	1.415
Flu Knowledge	0.217	0.509	0.183	1	0.669	1.243
Sex	-0.506	1.156	0.192	1	0.661	0.603
Age	-0.058	0.412	0.020	1	0.888	0.943
Constant	3.770	1.063	12.582	1	0.000	43.367
Vax Plan Flu						
Flu Gist	0.710**	0.282	6.320	1	0.012	2.034
Flu Knowledge	0.588	0.270	4.758	1	0.029	1.801
Sex	-0.470	0.552	0.726	1	0.394	0.625
Age	0.036	0.223	0.026	1	0.873	1.036
Constant	2.114	0.516	16.814	1	0.000	8.280

Table 10. Results of Binary Logistic Regression – Gist vs. Verbatim of Entire Sample (continued)

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Pneumo						
Pneumo Verbatim	0.070	0.181	0.148	1	0.701	1.072
Sex	-0.227	0.408	0.310	1	0.578	0.797
Age	0.085	0.184	0.215	1	0.643	1.089
Pneumo Knowledge	0.618	0.193	10.288	1	0.001	1.855
Constant	0.214	0.351	0.373	1	0.542	1.239
Vax Plan Pneumo						
Pneumo Verbatim	0.260	0.248	1.101	1	0.294	1.297
Sex	-0.090	0.498	0.033	1	0.857	0.914
Age	0.001	0.238	0.000	1	0.996	1.001
Pneumo Knowledge	0.633	0.233	7.411	1	0.006	1.884
Constant	1.526	0.443	11.863	1	0.001	4.600
Vax Ever Pneumo						
Pneumo Gist	0.589***	0.201	8.598	1	0.003	1.802
Sex	-0.285	0.423	0.454	1	0.501	0.752
Age	0.121	0.195	0.386	1	0.534	1.129
Pneumo Knowledge	0.530	0.201	6.922	1	0.009	1.699
Constant	0.265	0.364	0.530	1	0.466	1.304
Vax Plan Pneumo						
Pneumo Gist	0.837***	0.266	9.921	1	0.002	2.308
Sex	-0.119	0.517	0.053	1	0.818	0.888

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Age	0.075	0.262	0.081	1	0.776	1.077
Pneumo Knowledge	0.481	0.235	4.207	1	0.040	1.618
Constant	1.708	0.473	13.027	1	0.000	5.516

Table 10. Results of Binary Logistic Regression – Gist vs. Verbatim of Entire Sample (continued)

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Men						
Men Verbatim	0.363	0.274	1.763	1	0.184	1.438
Sex	-0.114	0.542	0.044	1	0.833	0.892
Age	-0.629	0.195	10.344	1	0.001	0.533
Men Knowledge	0.427	0.247	2.990	1	0.084	1.533
Constant	1.793	0.485	13.656	1	0.000	6.008
Vax Plan Men						
Men Verbatim	0.578	0.404	2.045	1	0.153	1.783
Sex	-0.185	0.689	0.072	1	0.789	0.831
Age	-0.606	0.211	8.231	1	0.004	0.545
Men Knowledge	0.411	0.322	1.630	1	0.202	1.508
Constant	2.645	0.654	16.386	1	0.000	14.090
Vax Ever Men						
Men Gist	0.294	0.242	1.477	1	0.224	1.342
Sex	-0.106	0.541	0.038	1	0.845	0.900
Age	-0.607	0.194	9.791	1	0.002	0.545

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Men Knowledge	0.340	0.247	1.892	1	0.169	1.405
Constant	1.773	0.480	13.632	1	0.000	5.890
Vax Plan Men						
Men Gist	0.220	0.303	0.525	1	0.469	1.246
Sex	-0.086	0.672	0.016	1	0.898	0.917
Age	-0.576	0.207	7.744	1	0.005	0.562
Men Knowledge	0.313	0.310	1.018	1	0.313	1.367
Constant	2.477	0.607	16.634	1	0.000	11.905

* p < .10, ** p < .05, *** p < .01

Table 11. Results of Binary Logistic Regression – Gist vs. Verbatim of SONA Sample

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Flu						
Flu Verbatim	1.667	1.401	1.416	1	0.234	5.297
Sex	-0.707	1.219	0.336	1	0.562	0.493
Age	-0.684	0.562	1.484	1	0.223	0.504
Flu Knowledge	0.431	0.596	0.522	1	0.470	1.538
Constant	4.738	1.442	10.802	1	0.001	114.158
Vax Plan Flu						
Flu Verbatim	0.720*	0.389	3.414	1	0.065	2.053
Sex	-0.383	0.610	0.394	1	0.530	0.682
Age	0.061	0.263	0.053	1	0.817	1.063
Flu Knowledge	0.821	0.291	7.970	1	0.005	2.273
Constant	2.165	0.572	14.308	1	0.000	8.710

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Flu						
Flu Gist	0.159	0.566	0.079	1	0.779	1.173
Sex	-0.453	1.238	0.134	1	0.714	0.636
Age	-0.711	0.572	1.545	1	0.214	0.491
Flu Knowledge	0.345	0.542	0.405	1	0.525	1.412
Constant	3.941	1.189	10.990	1	0.001	51.478
Vax Plan Flu						
Flu Gist	0.609**	0.301	4.096	1	0.043	1.838
Sex	-0.387	0.621	0.388	1	0.534	0.679
Age	0.072	0.261	0.076	1	0.782	1.075
Flu Knowledge	0.679	0.296	5.253	1	0.022	1.971
Constant	2.159	0.578	13.958	1	0.000	8.660

Table 11. Results of Binary Logistic Regression – Gist vs. Verbatim of SONA Sample (continued)

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Pneumo						
Pneumo Verbatim	-0.109	0.199	0.303	1	0.582	0.896
Sex	-0.300	0.444	0.456	1	0.500	0.741
Age	-0.039	0.202	0.036	1	0.849	0.962
Pneumo Knowledge	0.535	0.206	6.714	1	0.010	1.707
Constant	0.218	0.380	0.330	1	0.566	1.244
Vax Plan Pneumo						
Pneumo Verbatim	0.167	0.262	0.406	1	0.524	1.181

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Sex	0.009	0.548	0.000	1	0.987	1.009
Age	-0.056	0.254	0.049	1	0.825	0.945
Pneumo Knowledge	0.610	0.253	5.826	1	0.016	1.841
Constant	1.449	0.479	9.146	1	0.002	4.259
Vax Ever Pneumo						
Pneumo Gist	0.444**	0.209	4.494	1	0.034	1.559
Sex	-0.392	0.457	0.737	1	0.391	0.676
Age	-0.042	0.203	0.043	1	0.836	0.959
Pneumo Knowledge	0.463	0.213	4.712	1	0.030	1.589
Constant	0.286	0.392	0.531	1	0.466	1.331
Vax Plan Pneumo						
Pneumo Gist	0.936**	0.306	9.389	1	0.002	2.550
Sex	-0.110	0.579	0.036	1	0.850	0.896
Age	-0.180	0.258	0.485	1	0.486	0.836
Pneumo Knowledge	0.395	0.254	2.411	1	0.120	1.484
Constant	1.740	0.533	10.677	1	0.001	5.698

Table 11. Results of Binary Logistic Regression – Gist vs. Verbatim of SONA Sample (continued)

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Men						
Men Verbatim	0.336	0.316	1.133	1	0.287	1.400
Sex	0.131	0.606	0.047	1	0.829	1.140
Age	-0.215	0.281	0.586	1	0.444	0.806
Men Knowledge	0.238	0.280	0.724	1	0.395	1.269

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Constant	1.805	0.522	11.975	1	0.001	6.080
Vax Plan Men						
Men Verbatim	0.645	0.579	1.241	1	0.265	1.906
Sex	0.652	0.821	0.630	1	0.427	1.919
Age	-0.383	0.398	0.925	1	0.336	0.682
Men Knowledge	-0.099	0.421	0.055	1	0.814	0.906
Constant	2.516	0.703	12.826	1	0.000	12.383
Vax Ever Men						
Men Gist	0.170	0.280	0.368	1	0.544	1.185
Sex	0.118	0.605	0.038	1	0.846	1.125
Age	-0.200	0.279	0.515	1	0.473	0.819
Men Knowledge	0.163	0.277	0.346	1	0.556	1.177
Constant	1.786	0.517	11.916	1	0.001	5.966
Vax Plan Men						
Men Gist	-0.044	0.412	0.012	1	0.914	0.957
Sex	0.698	0.816	0.732	1	0.392	2.010
Age	-0.334	0.408	0.668	1	0.414	0.716
Men Knowledge	-0.152	0.408	0.139	1	0.709	0.859
Constant	2.345	0.648	13.092	1	0.000	10.438

* p < .10, ** p < .05, *** p < .01

Table 12. Results of Binary Logistic Regression – Gist vs. Verbatim of Non-SONA Sample

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Flu						

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Flu Verbatim	1.187	2.285	0.270	1	0.604	3.277
Age	-0.029	1.235	0.001	1	0.981	0.971
Flu Knowledge	0.260	1.021	0.065	1	0.799	1.297
Sex	-18.375	15785.339	0.000	1	0.999	0.000
Constant	21.554	15785.339	0.000	1	0.999	2294154471.519
Vax Plan Flu						
Flu Verbatim	-0.456	0.493	0.855	1	0.355	0.634
Age	0.553	0.598	0.856	1	0.355	1.738
Flu Knowledge	0.392	0.627	0.391	1	0.532	1.480
Sex	-0.777	1.311	0.351	1	0.553	0.460
Constant	1.795	1.221	2.160	1	0.142	6.019
Vax Ever Flu						
Flu Gist	1.937	2.924	0.439	1	0.508	6.935
Age	0.189	1.265	0.022	1	0.881	1.208
Flu Knowledge	-0.618	1.973	0.098	1	0.754	0.539
Sex	-18.266	15086.339	0.000	1	0.999	0.000
Constant	21.861	15086.339	0.000	1	0.999	3118208646.815
Vax Plan Flu						
Flu Gist	1.889	1.324	2.038	1	0.153	6.615
Age	0.991	0.763	1.684	1	0.194	2.693
Flu Knowledge	-0.365	0.851	0.184	1	0.668	0.694
Sex	-0.221	1.369	0.026	1	0.872	0.802
Constant	1.818	1.262	2.076	1	0.150	6.158

Table 12. Results of Binary Logistic Regression – Gist vs. Verbatim of Non-SONA Sample (continued)

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Pneumo						
Pneumo Verbatim	1.771*	1.065	2.763	1	0.096	5.875
Age	0.292	0.615	0.225	1	0.635	1.339
Sex	0.351	1.209	0.084	1	0.771	1.421
Pneumo Knowledge	1.178	0.685	2.955	1	0.086	3.249
Constant	0.504	1.096	0.211	1	0.646	1.655
Vax Plan Pneumo						
Pneumo Verbatim	0.823	0.898	0.840	1	0.359	2.278
Age	0.649	0.762	0.725	1	0.395	1.913
Sex	-0.321	1.326	0.059	1	0.809	0.725
Pneumo Knowledge	0.564	0.640	0.775	1	0.379	1.757
Constant	1.924	1.200	2.573	1	0.109	6.850
Vax Ever Pneumo						
Pneumo Gist	1.902*	1.047	3.300	1	0.069	6.702
Age	-0.283	0.723	0.153	1	0.695	0.754
Sex	0.286	1.350	0.045	1	0.832	1.332
Pneumo Knowledge	1.401	1.005	1.943	1	0.163	4.059
Constant	0.686	1.307	0.276	1	0.600	1.986
Vax Plan Pneumo						
Pneumo Gist	0.521	0.674	0.597	1	0.440	1.684
Age	0.451	0.749	0.362	1	0.547	1.570
Sex	-0.469	1.317	0.127	1	0.722	0.626
Pneumo Knowledge	0.550	0.661	0.694	1	0.405	1.734
Constant	1.934	1.223	2.500	1	0.114	6.917

Table 12. Results of Binary Logistic Regression – Gist vs. Verbatim of Non-SONA Sample (continued)

Variables (Dependent, Independent, & Control)	β	S.E.	Wald	df	Sig.	Exp(B)
Vax Ever Men						
Men Verbatim	0.579	0.796	0.529	1	0.467	1.784
Age	-1.306	0.671	3.794	1	0.051	0.271
Sex	-1.485	1.439	1.064	1	0.302	0.227
Men Knowledge	1.328	0.688	3.727	1	0.054	3.773
Constant	1.925	1.405	1.877	1	0.171	6.852
Vax Plan Men						
Men Verbatim	0.607	0.772	0.618	1	0.432	1.835
Age	-0.347	0.602	0.333	1	0.564	0.706
Sex	-1.996	1.578	1.600	1	0.206	0.136
Men Knowledge	1.377	0.699	3.878	1	0.049	3.962
Constant	2.705	1.529	3.129	1	0.077	14.957
Vax Ever Men						
Men Gist	0.847	0.669	1.603	1	0.205	2.333
Age	-1.411	0.703	4.032	1	0.045	0.244
Sex	-1.654	1.536	1.159	1	0.282	0.191
Men Knowledge	1.136	0.696	2.665	1	0.103	3.114
Constant	2.063	1.433	2.072	1	0.150	7.868
Vax Plan Men						
Men Gist	0.558	0.654	0.728	1	0.394	1.747
Age	-0.351	0.580	0.366	1	0.545	0.704
Sex	-1.940	1.608	1.455	1	0.228	0.144
Men Knowledge	1.277	0.708	3.256	1	0.071	3.587
Constant	2.656	1.550	2.936	1	0.087	14.242

* $p < .10$, ** $p < .05$, *** $p < .01$