An Educational Experience: Impact of Proper Hand Washing Education on College Aged Adults

By
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A Senior Comprehensive Project in Partial Fulfillment of the Requirements for a Bachelor of Science Degree from Allegheny College

I hereby recognize and pledge to fulfill my responsibilities as defined in the Honor Code and to maintain the integrity of both myself and the College community as a whole.

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Pledge

Approval by the Senior Thesis Committee:

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Dr. Rebecca Dawson

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Abstract

It has been long understood that hand washing decreases the amount of illness transferred to oneself and to others; however, hand washing is most commonly taught in early childhood and never spoken of again. This Senior Comprehensive Project highlights the importance of proper hand washing technique as a college aged adult, and observes the difference between those who use proper methods and those who do not. Forty nine volunteers were randomly sorted into either the receiving hand washing methods education group, or control group, who received no hand washing education. The volunteers who received hand washing education, were educated on the importance of proper methods and the potential risks of not using those proper methods, while the control received no education whatsoever. Both groups were emailed a survey once a week to indicate the symptoms they experienced, along with any official diagnosis they received. Data was analyzed using chi-square and t-tests. P-values were use3d to determine if there were statistically significant difference between the education group and the control group and their symptoms and diagnoses. Ultimately no statistically significant results were found between the education group and the control group; however, this may have been due to the influx of illness during the 2014-2015 school year, and the emails from the colleges Nurse Practitioner, who reminded all students to be hypervigilant of washing their hands.

Introduction

Since early childhood years, it has been taught to wash your hands in order to decrease the spread of germs and illness. You were taught to wash your hands before each meal, after using the bathroom, and any other time you may have come into contact with the outside world. The cardinal rule of hand washing has remained constant over several years. That is wash with hot water and soap and then dry with a clean towel (Todd et. al. 2010). Although it seems that the cardinal rule is clear and concise, hand washing is one of the most neglected practices in the modern world today (Daniels et. al. 1999). The purpose of this Senior Comprehensive Project is to observe whether or not students who receive hand washing education have fewer symptoms overall and are diagnosed less often than students who receive no education.

The purpose of hand washing is to reduce in germ transmission from person to person. An individual's hands are seen as the single most effective tool for shuttling illness to themselves and others, especially those who reside in close contact to one another like dormitory buildings (White et. al. 2003). Because most individuals only learn proper hand washing skills when they are young, it is important to reintroduce methods on how to properly wash ones hands in adulthood as well (Wilson et. al. 2011). Education and training is essential in order to make sure that individuals are properly and effectively washing their hands in order to avoid the spread of disease (Gould et. al. 2007). In addition, the compliance and understanding of bacterial transmission is imperative for ones understanding of why proper hand washing techniques are important

(Pittet et. al. 2006). This supports the idea that it is crucial to reintroduce hand washing methods to adults because adults are better able to understand the implications of proper hand washing methods than children.

In continuance, individuals are constantly coming into contact with germs and bacteria, with or without their knowledge or consent. Bacteria are able to survive in the most extreme conditions, including but not limited to the unbearable cold and intense heat (Mesbah et. al, 2012). The bacteria that survive in these conditions are referred to as extremophiles, meaning, they thrive in extreme temperature conditions. These organisms can thrive in ranges from the very hot (>80 °C) to the very cold (<1 2001). Bacteria are incredible for the sheer fact that they can be found anywhere and everywhere on planet earth. These microorganisms are thriving in regions of the world that are otherwise too harsh to support any kind of human, animal, or insect life (Mesbah et. al. 2012). Because we see bacteria in these harsh conditions, it is not hard to believe that bacteria are thriving in the same conditions that humans are. Furthermore, our households are rich with bacteria, thus making them a common focus for bacterial transmission research. Our kitchens are host to several billion microorganisms, and are typically dense with bacterial populations (Flores et. al, 2013). Many of the bacteria found in our kitchens are harmless bacteria, which do not cause devastation when you come into contact. However, there are also strains of bacteria found in your home that may compromise the health of individuals if those bacteria are contracted or ingested (Rusin et. al, 1998).

The areas in our kitchen that are found to be the most densely populated with harmful bacteria are the places that are continuously moist or wet. Dish towels, kitchen

sinks and sponges are incredible breeding grounds for harmful bacteria (Beumer et. al. 2003). Furthermore, it has been noted that humans (in comparison to household pets) are a major contributor to the introduction of bacteria and foodborne illnesses into their households and living spaces (Flores et. al. 2013). The spread of foodborne disease and bacteria is becoming a growing concern in America. Each and every year there are thousands of hospitalizations and deaths due to bacterial contamination (Edmonds et. al. 2012). The Centers for Disease Control recognizes that on average 48 million people become ill with foodborne illness each year, 128,000 people are hospitalized and 3,000 die (CDC 2015). The most common and effective way of spreading these bacteria is through improper hand washing (Edmonds et. Al. 2012). One of the most effective ways of removing these germs is through the use of soap and water (Savolainen-Kopra et. al. 2012).

Furthermore, humans in comparison to pets, are some of the largest contributors to introducing bacteria and viral infections into homes and within hospitals. The use of improper hand washing methods and the lack of hand washing all together has contributed to the spread of dangerous illness amongst vulnerable hospital patients (Vincent et. al. 2003). Individuals must be educated continuously throughout workplaces, such as hospitals, in order to establish knowledge as to what hand washing methods are deemed as appropriate and inappropriate. This kind of education in important to the decrease and spread of potentially dangerous diseases amongst vulnerable populations (Luria 2006). In addition, individuals are more likely to wash their hands using the instructed proper methods if they feel that noncompliance will potentially pose as a risk

to them. That is, people are more likely to wash their hands if they're afraid of becoming ill from contamination (Whitby et. al. 2006).

College campuses are an ideal area to conduct research on contamination and transmission of illness and disease because the students are typically living in close quarters with one another (Moe et. al, 2001). There are also communal bathrooms and kitchens and close quartered academic settings, along with common areas. If students are improperly washing their hands, these areas are perfect breeding grounds to grow harmful bacteria and to incubate viruses, which can potentially cause illness if contracted. In addition to constant close contact and interaction with one another, when an outbreak of illness occurs on campus it does not take long for large number of students and staff to become infected. This can lead to absence from classes on both the professor and students part, which ultimately affects academic performance (Moe et. al. 2001). In addition to the spread of illness from college student to college student, students also pose a risk to infecting their community as well. Many students maintain outside contact with their community through their jobs at highly social places, such as restaurants, which poses as a risk to contaminate non-college community members (Drankiewicz et. al. 2003).

Finally, the proper method on how to wash ones hands effectively has been partially stated by Doctors of Medicine Christopher Aspock and Walter Koller (Aspöck et. al. 1999) These methods state to first turn faucet on so the water is not splashing in excess over himself and the sink. Then, dampen hands and apply a liberal amount of soap and begin lathering hands in a palm to palm fashion. From there, you must interlace fingers and scrub both palms, then interlace fingers and scrub the right hand, and then

interlace your fingers and scrub the left hand. Your hands should be sufficiently lathered with soap and moistened any time that an area becomes too dry. Another vital step when properly washing ones hands is the rinsing and drying process. Hands that are not dried after washing are more likely to have residual germs and bacteria on them (Patrick, 1997).

All in all, learning how to wash your hands while one is a child is important, yet, reeducation during adulthood may help to decrease illness during the adulthood years. The way in which an individual washes their hands can be socially affected which can lead to improper use of hand washing methods, or the lack of any kind of hand washing. Individuals need to be made aware of the dangers that they may face and that others around them may face if they do not properly wash their hands. In continuation, individuals need to be reeducated on how to properly wash their hands and need to be made aware of the accepted proper methods in order to avoid unwanted and unintentional spread amongst co workers, peers, and patients. This way, the amount of dangerous viral and bacterial infections can be lessened, and overall illness can also successfully be decreased.

I have hypothesized that college students who received hand washing education will have fewer symptoms overall and will be diagnosed with common illness less often than students who received no education.

Materials and Methods

Volunteers were voluntarily asked to participate through in class advertising. Meaning I, the researcher, explained to a class what the study was about and asked if

anyone was interested in participating. Those who were interested signed their names on a sheet, which allowed me to enter their names into a random number generator via the website random.org under list randomizer. In continuation, each participant was assigned a number via a random number generator, and was then randomly sorted into the group who received hand washing education, the odd numbers, or the group who did not receive any hand washing education, the even numbers. The education group received hand washing education by watching two video's indicating the importance of hand washing and the proper hand washing methods. The education group then completed an online questionnaire which asked them questions about the video that they watched. The video questionnaire was to ensure that the participants in the education group had actually viewed the video. After viewing the videos and completing the questionnaire, I emailed the correct answers to the education group to ensure that they knew of the proper methods that I wanted them to practice.

Furthermore, an email was sent to both the education group and the non education group (in addition to the education groups video email) which included a survey that was to be completed on a weekly basis for 5 weeks (Figure 1). The email asked students to fill out the questionnaire, which asked for them to indicate if during the past week they had experienced any of the listed illnesses. Throughout the 5 weeks of data collection, I kept an individual file of each participant and the illnesses and symptoms that they experienced on a weekly basis. All of the participants information was kept strictly confidential on my computer which was kept locked under a password that only I had knowledge of. After the 5 weeks of data collection, participants from the education group and the non education group were sent a questionnaire that asked for individual

demographics of the participant (Figure 2). This project was reviewed and approved by the Allegheny College Institutional Review Board (IRB) during January 2015.

When 5 weeks worth of data was successfully collected, I then used statistics to draw conclusions from my data via socscistatistics.com. The data was statistically analyzed using chi-square test comparing the education group and the non education group for each for the 5 weeks of data collection. Data was analyzed for statistically significant chi-square and P values at p =<0.05 for each sym pt diagnosed illness from the survey.

Alas, at the completion of my study, participants from both groups of the study were invited to view my defense. Participants were also emailed a copy of my findings and results, the rationale for my study and a copy of the proper hand washing methods.

Figure 1. Survey that was sent every Monday starting on February 2, 2015 and finishing on March 2, 2015. This survey asked for participants to indicate which illness they were diagnosed with my a professional praticioner, and which symptoms they were experiencing.

Week 1

Please carefully read the instructions before filling out the Survey:

In the past week, have you experienced any of the following symptoms? Mark in the "no" box if the symptom is a normally occurring symptom for you (Such as an allergy). If this is a brand new or recurring symptom (such as a symptom from an on going cold or illness), please mark in the "yes" box.

In the past week have you experienced a fever?*

- ○ Yes
- ○ No

In the past week, have you experienced chills?*

- ○ Yes
- ○ No

In the past week, have you experienced a runny nose?*

- ○ Yes
- ○ No

In the past week, have you experienced muscle pains?*

- ○ Yes
- ○ No

In the past week, have you experienced coughing?*

- ○ Yes
- ○ No

In the past week, have you experienced sneezing?*

- ○ Yes
- ○ No

In the past week, have you experienced vomiting?*

- ○ Yes
- ○ No

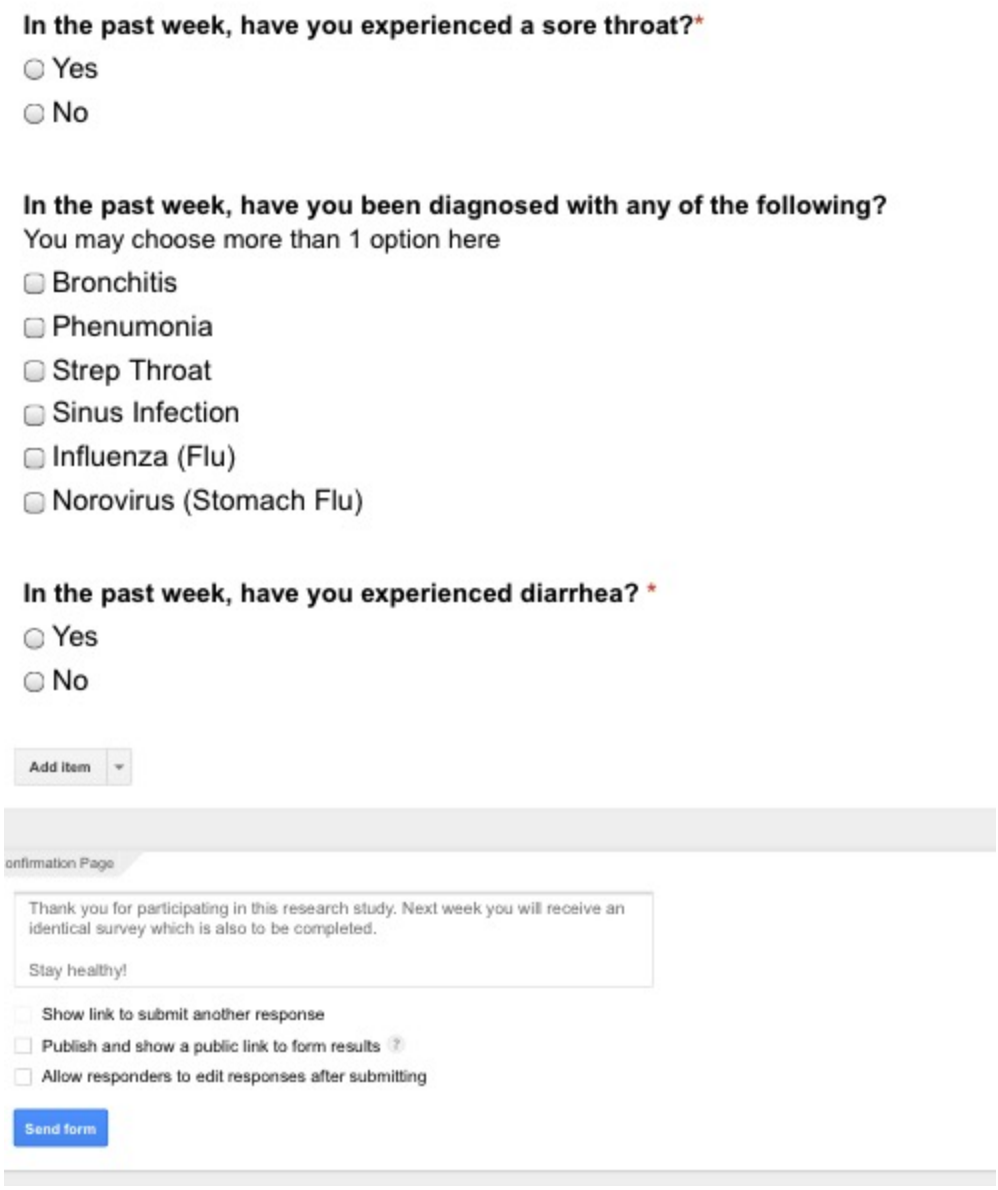


Figure 2. Demographics survey that both the education group and the non education group were sent via email after the 5 week surveying period. This survey was to ensure that both the educational and non education group were represenative of one another in age, sex, academic year, and

Final Survey

Form Description

Where do you reside for the 2014-2015 school year?*

- ○ Baldwin
- ○ Ravine
- ○ Shultz
- ○ Caflisch
- ○ North Village 1
- ○ North Village 2
- ○ Allegheny Commons
- ○ College Court
- ○ Brooks Hall
- ○ Walker
- ○ Ravine
- ○ Edwards
- ○ Crawford
- ○ Allegheny Hall
- ○ Special Interest Housing
- ○ Greek Housing
- ○ Off Campus
- ○ Other:

What gender do you identify as?*

- ○ Male
- ○ Female
- ○ Other:

What is your academic standing for the 2014-2015 school year?*

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior
- ○ Other:



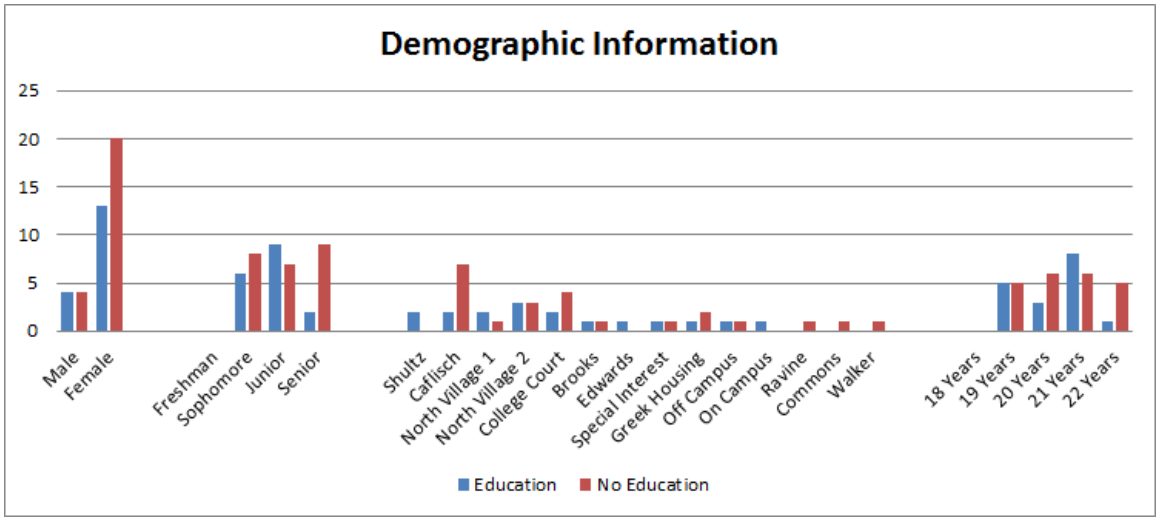
Results

On average, a total of 41 volunteers participated in my survey. The group who received education, had an average of 17 participants, while the group who did not receive education,, had an average of 24 participants for the 5 weeks. Due to participant drop outs, there was an unequal amount of participants between the group receiving education and the group who did not receive education. Participants who did not respond to more than 3 surveys were taken out of the research all together.

Table 1: Demographic information of the participants from the group who received hand washing education and the group who did not receive hand washing education. This survey was sent to all participants on March 22, 2015 and was closed on March 24, 2015. Chi-square and p-values calculated at p = 0.05 indicated whether or not the information was statistically significant.

	Education	No Education	p-value
Year (Freshman, Sophomore,	Freshman: 0 Sophomore: 6	Freshman:0 Sophomore: 8	0.14

Junior, Senior)	Junior: 9 Senior: 2	Junior: 7 Senior: 9	
Living Arrangements	Shultz: 2 Caflisch: 2 North Village 1: 2 North Village 2: 3 College Court: 2 Brooks: 1 Edwards: 1 Special Interest: 1 Greek Housing: 1 Off Campus: 1 Campus House: 1	Ravine:1 Caflisch: 7 North Village 1: 1 North Village 2: 3 Commons:1 College Court: 4 Brooks: 1 Walker: 1 Special Interest: 1 Greek Housing: 2 Off Campus: 1	0.81
Gender Male, Female	Male: 4 Female: 13	Male: 4 Female: 20	0.58
Mean Age 18-22	20.2 years	19.6 years	0.34



For gender, the Chi-square statistic is 0.2984 and the P value is 0.584871. This result is *not* significant at $p < 0.05$. Living arrangements were further simplified when calculating Chi-square statistics and P value to "Traditional dorm communal

bathroom, Campus apartment/house bathroom, Off campus apartment/house bathroom." For living arrangements, the chi-square statistic is 0.4134, the P-Value is 0.813268. The result is *not* significant at $p < 0.05$. For age, the chi-square statistic is 3.3667 and the P-Value is 0.338468. The result is *not* significant at $p < 0.05$.

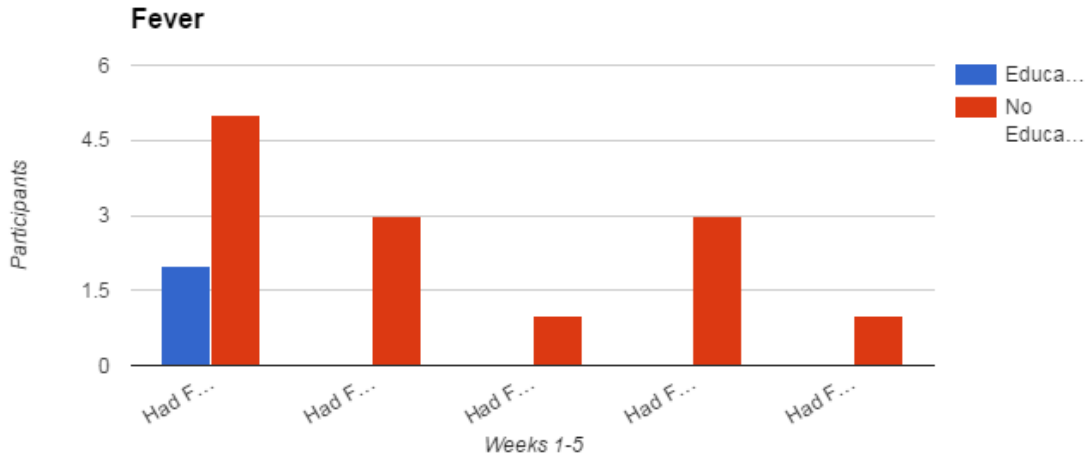
For academic year, the chi-square statistic is 3.9091 and the P-Value is 0.141629. The result is *not* significant at $p < 0.05$

Table 2: Questionnaire that followed the videos that indicated proper hand washing methods and the importance of the methods. This is the education that education group received and the non education group did not. An asterix * indicates the correct answer to the question. After questionnaire was completed the correct answers were sent via email.

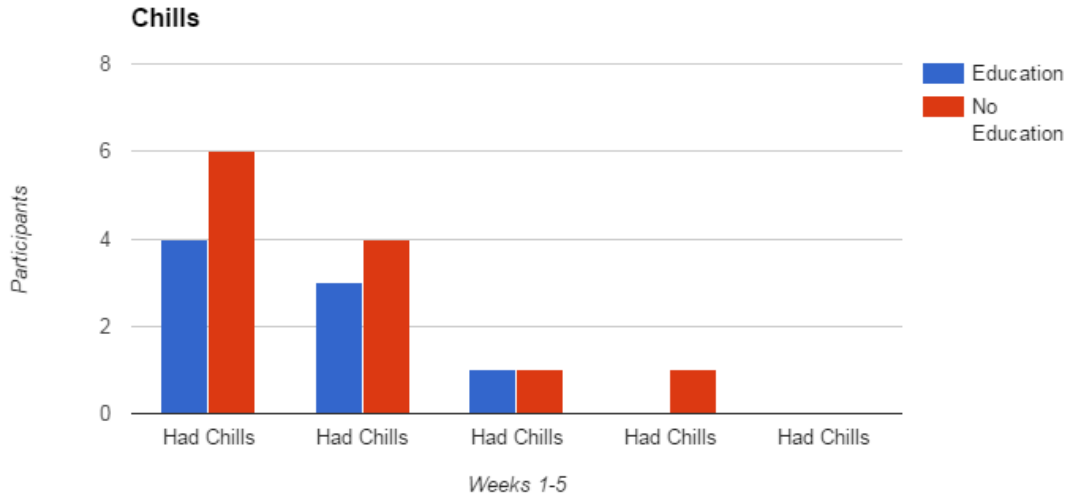
Question 1: What is the best way to contain a sneeze? 1) Elbow* 2) Hands 3) No Coverage	100% correct
Question 2: You should always turn the faucet off with… 1) Your hand 2) A dry paper towel* 3) A wet paper towel 4) Elbow	57.1% correct
Question 3: You should wash your hands for about.. 1) 10 seconds 2) 20-30 seconds* 3) 1 minute 4) 2 minutes	90.5% correct
Question 4: When washing your hands, you should always… 1) Wet your hands before soaping them*	90.5% correct

2) Use scalding hot water 3) Use freezing cold water 4) Soap your hands, and then wet them	

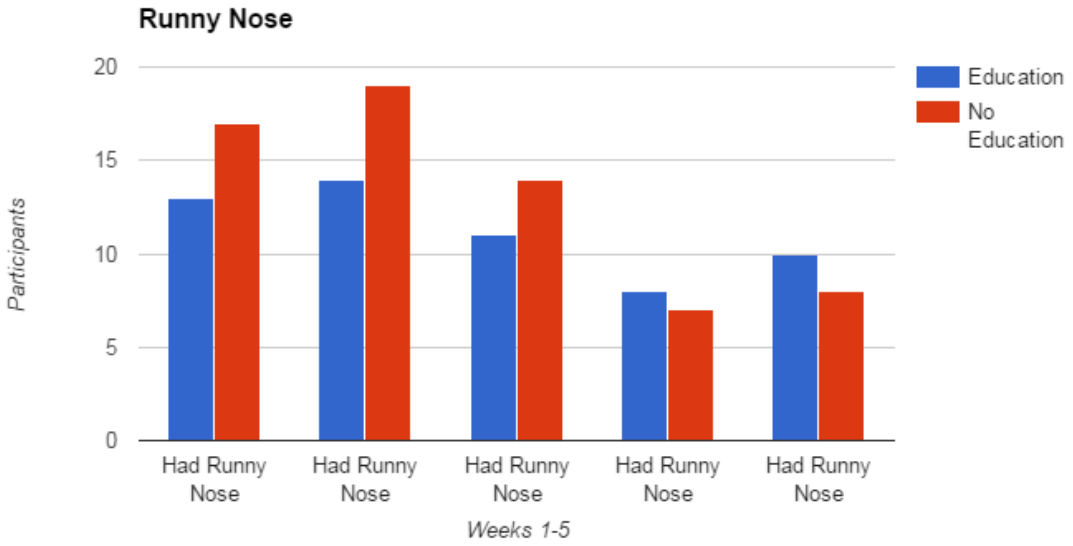
Table 3: chi-square values and p-values of at p= <0.05 for each symptom and each diagnosed illness from the survey in Figure 1, sent each Monday for 5 weeks.



For week 1, the Chi-square statistic is 0.746 and the P value is 0.387562. This result is *not* significant at $p < 0.05$.Week 2 for fever, the Chi-square statistic is 2.7187 and the P value is 0.09918. This result is not statistically significant at $p < 0.05$. For week 3 for fever, the Chi-square statistic is 0.8182 and the P value is 0.365712. This result is not statistically significant at $p < 0.05$. For week 4 for fever, the Chi-square statistic is 2.636 and the P value is 0.104418. This result is not statistically significant at $p < 0.05$. For week 5 for fever, the Chi-square statistic is 0.8736 and the P value is 0.349958. This result is not statistically significant at $p < 0.05$.

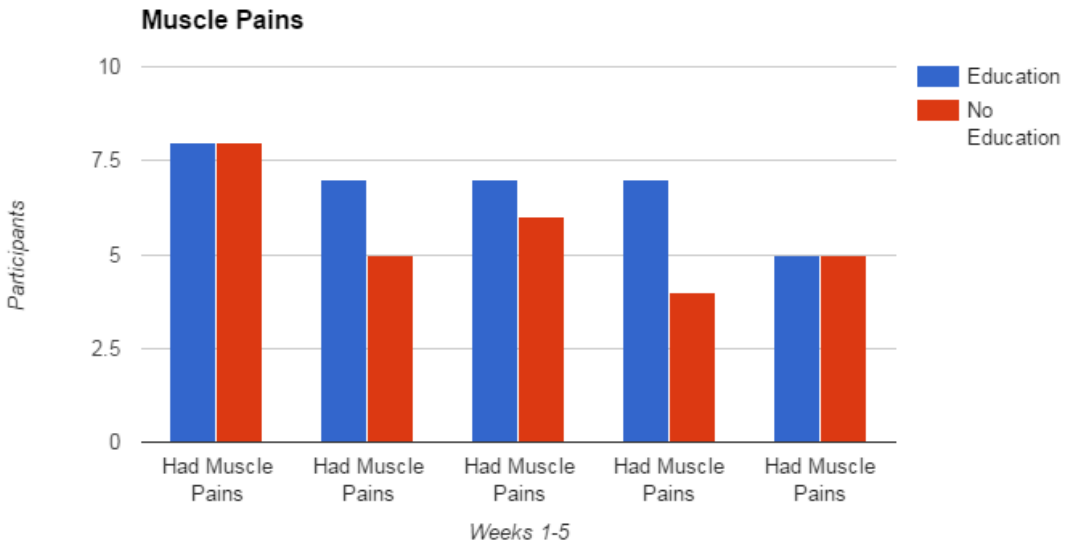


Week 1 for chills, the Chi-square statistic is 0.0324 and the P value is 0.857225. This result is not significant at $p < 0.05$. For week 2 for chills, the Chi-square statistic is 0.0262 and the P value is 0.871503. This result is not significant at $p < 0.05$. Week 3 for chills, the Chi-square statistic is 0.8314 and the P value is 0.361867. This result is not significant at $p < 0.05$. For week 4, the Chi-square statistic is 0.8314. The P value is 0.361867. This result is *not* significant at $p < 0.05$. For week 5 no participants experienced chills.

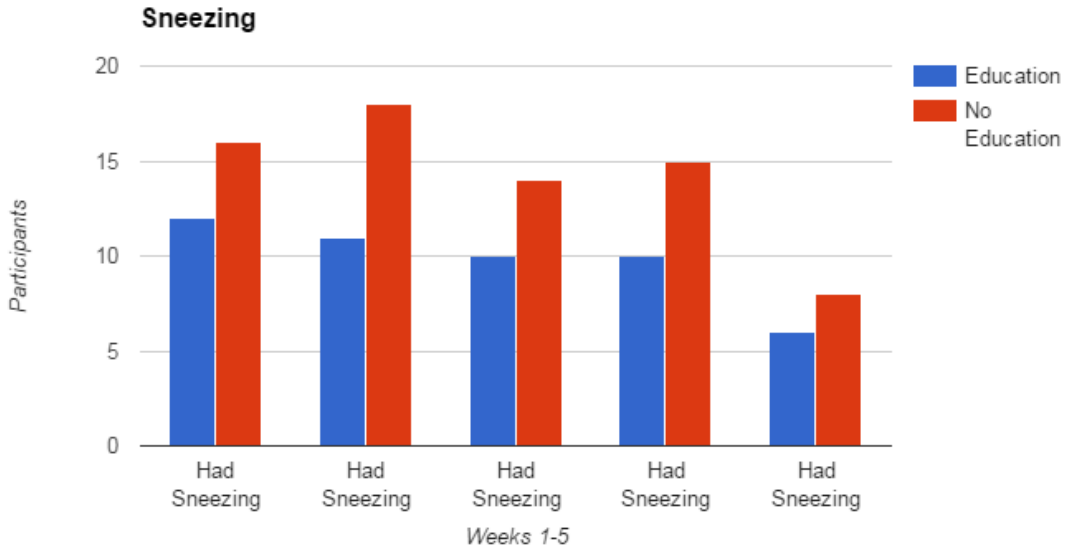


For week 1, the Chi-square statistic is 0.0206. The P value is 0.885737. This result is *not* significant at $p < 0.05$. Week 2 for Runny Nose, the Chi-square statistic is 0.4996 and the P value is 0.479677. This result is not significant at $p < 0.05$. For Week 3

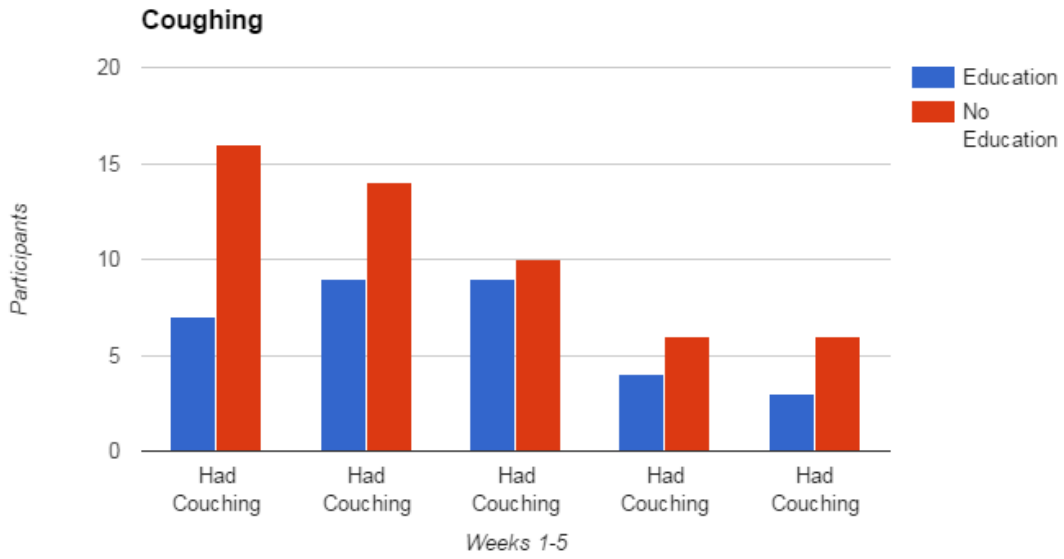
for Runny nose, the Chi-square statistic is 0.0045 and the P value is 0.946516. This result is not significant at $p < 0.05$. For week 4 for runny nose, the Chi-square statistic is 0.7408 and the P value is 0.389412. This result is not significant at $p < 0.05$. For week 5 for runny nose, the Chi-square statistic is 1.3033. The P value is 0.253605. This result is not significant at $p < 0.05$.



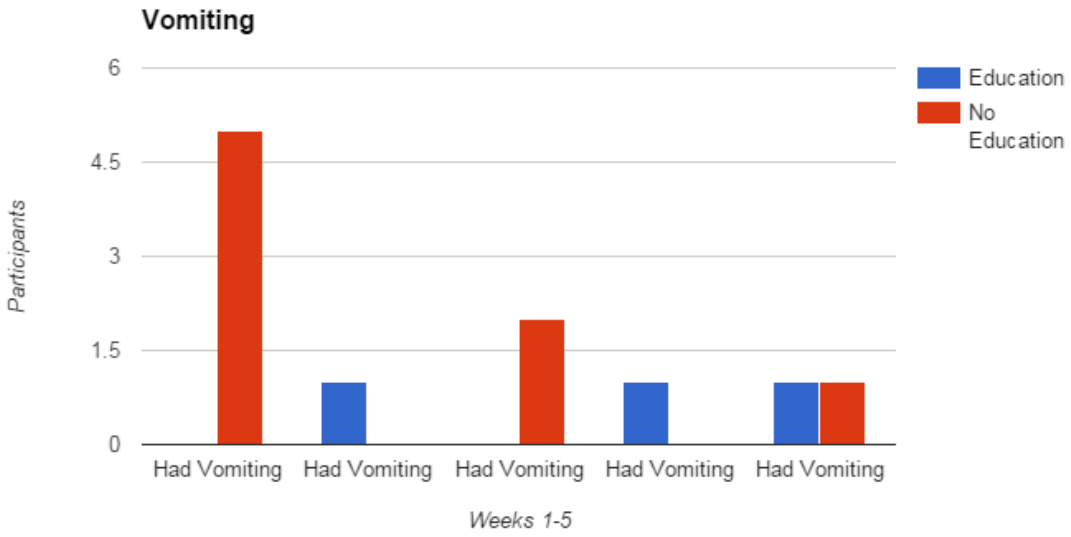
For week 1, the Chi-square statistic is 0.5503. The P value is 0.458196. This result is *not* significant at $p < 0.05$.For week 2 for Muscle Pains, the Chi-square statistic is 0.9669 and the P value is 0.325457. This result is not significant at $p < 0.05$. For week 3 for muscle pains, the Chi-square statistic is 0.6544 and the P value is 0.418527. This result is not significant at $p < 0.05$. For week 4 for muscle pains, the Chi-square statistic is 2.2367 and the P value is 0.134766. This result is not significant at $p < 0.05$. For week 5 for muscle pains, the Chi-square statistic is 0.0907 and the P value is 0.763307. This result is not significant at $p < 0.05$.



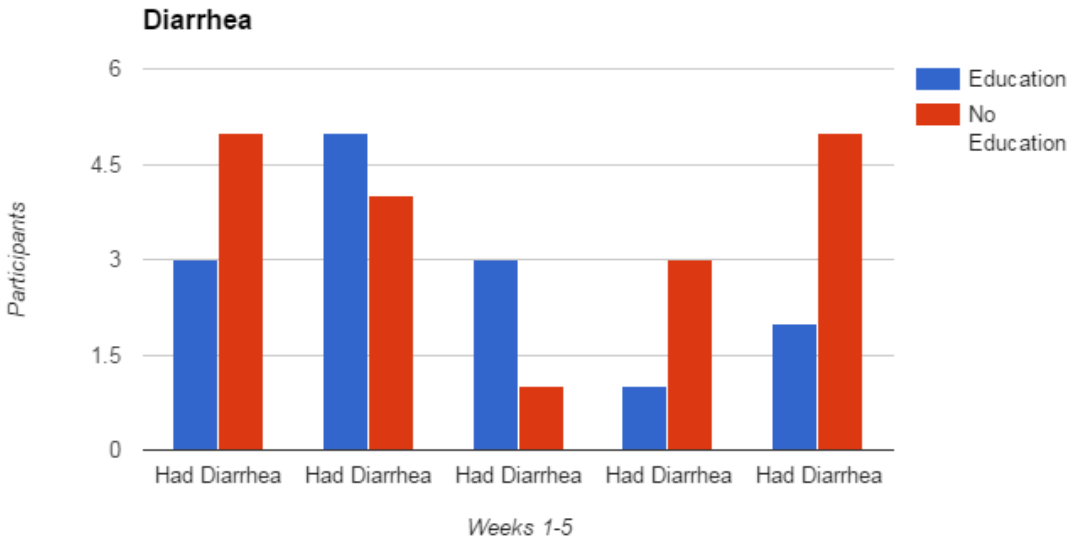
For week 1, The Chi-square statistic is 0.0026 and the P value is 0.959196. This result is *not* significant at $p < 0.05$.For week 2 for Sneezing, the Chi-square statistic is 1.8098 and the P value is 0.178531. This result is not significant at $p < 0.05$. For week 3 for sneezing, the Chi-square statistic is 0.1607 and the P value is 0.6885. This result is not significant at $p < 0.05$. For week 4 for sneezing, the Chi-square statistic is 0.6632 and the P value is 0.415426. This result is not significant at $p < 0.05$. For week 5 for Sneezing, the Chi-square statistic is 0.0865 and the P value is 0.768651. This result is not significant at $p < 0.05$.



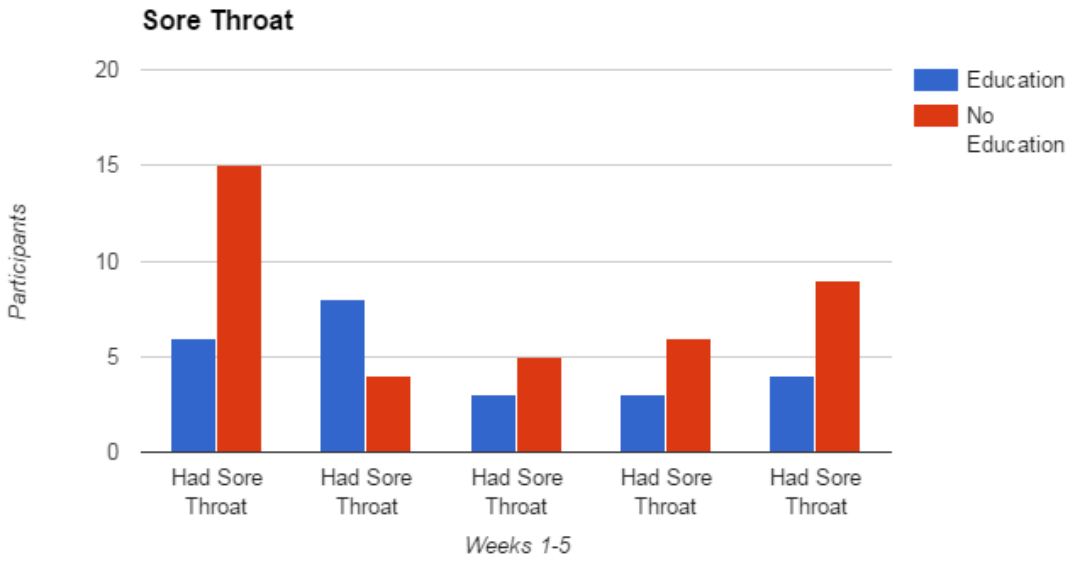
The Chi-square statistic is 2.7059. The P value is 0.099979. This result is *not* significant at $p < 0.05$.For week 2 for Coughing, The Chi-square statistic is 0.8092 and the P value is 0.368365. This result is not significant at $p < 0.05$. For week 3 for coughing, the Chi-square statistic is 0.1139 and the P value is 0.735785. This result is not significant at $p < 0.05$. Week 4 for coughing, the Chi-square statistic is 0.1232 and the P value is 0.725622. This result is not significant at $p < 0.05$. For week 5 for coughing, the Chi-square statistic is 0.7618 and the P value is 0.382777. This result is not significant at $p < 0.05$.



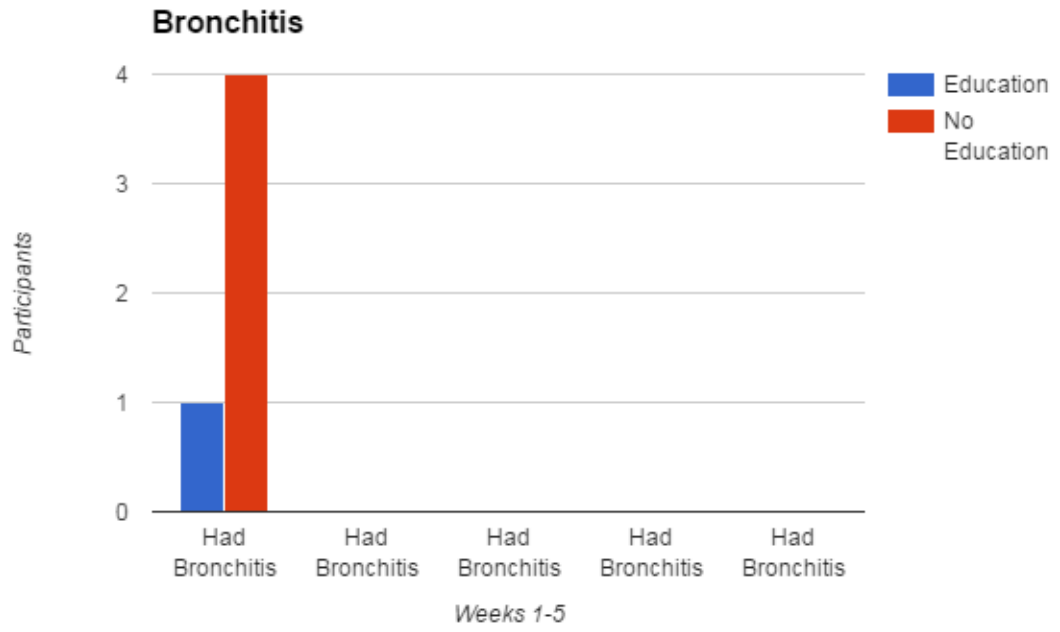
For week 1, the Chi-square statistic is 4.1446 and the P value is 0.041767. This result is significant at $p < 0.05$.For week 2 for vomiting, the Chi-square statistic is 1.1979 and the P value is 0.273748. This result is not significant at $p < 0.05$. For week 3 for vomiting, the Chi-square statistic is 1.6744 and the P value is 0.195668. This result is not significant at $p < 0.05$. For week 4 for vomiting, the Chi-square statistic is 1.2687 and the P value is 0.260014. This result is not significant at $p < 0.05$. For week 5 for vomiting, the Chi-square statistic is 0.014 and the P value is 0.905841. This result is not significant at $p < 0.05$.



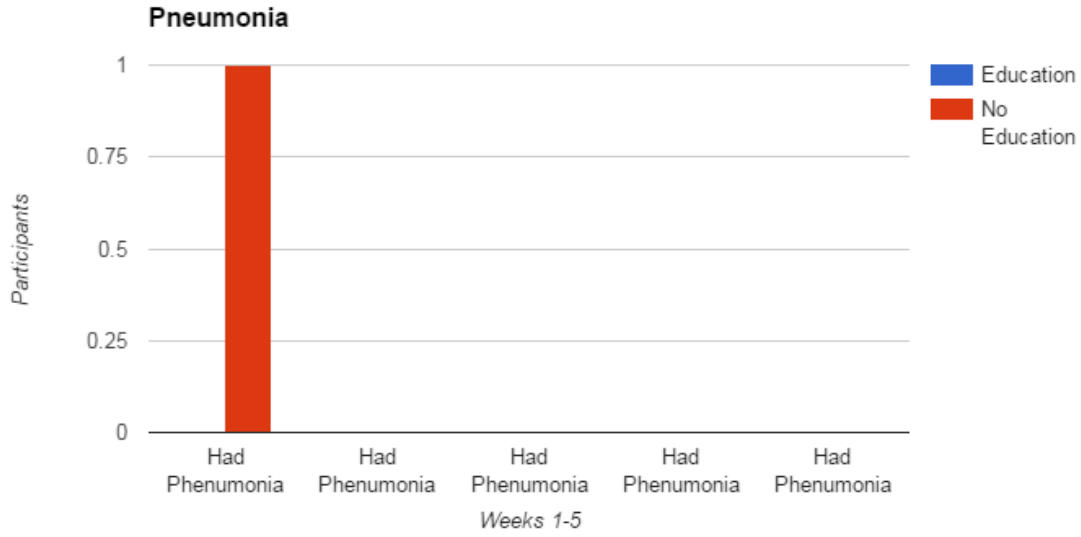
For week 1, the Chi-square statistic is 3.0358, and the P value is 0.081448. This result is *not* significant at $p < 0.05$.For week 2 for Diarrhea, the Chi-square statistic is 0.4034 and the P value is 0.525313. This result is not significant at $p < 0.05$. For week 3 for diarrhea, the Chi-square statistic is 1.6601 and the P value is 0.197595. This result is not significant at $p < 0.05$. For week 4 for Diarrhea, the Chi-square statistic is 0.7044 and the P value is 0.401309. This result is not significant at $p < 0.05$. For week 5 for diarrhea, the Chi-square statistic is 1.0494 and the P value is 0.305652. This result is not significant at $p < 0.05$.



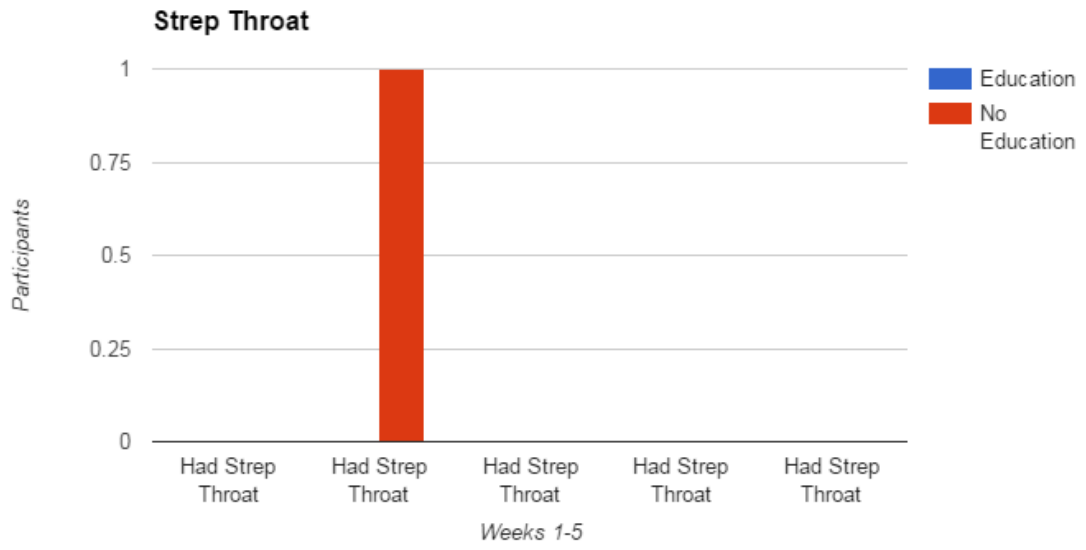
For week 1 Sore Throat, the Chi-square statistic is 3.0358 and the P value is 0.081448. This result is not statistically significant at $p < 0.05$; however, P value indicates some evidence of a difference between the two groups. The education group had less overall incidence of sore throats than the non education group. For week 2 Sore Throat, the Chi-square statistic is 1.8039 and the P value is 0.179239. This result is not statistically significant at $p < 0.05$. For week 3 Sore Throat, the Chi-square statistic is 0.19 and the P value is 0.662889. This result is not statistically significant at $p < 0.05$. Week 4 Sore Throat, the Chi-square statistic is 0.6203 and the P value is 0.430935. This result is not statistically significant at $p < 0.05$. Finally, week 5 Sore throat, the Chi-square statistic is 1.8587 and the P value is 0.172773. This result is not statistically significant at $p < 0.05$.



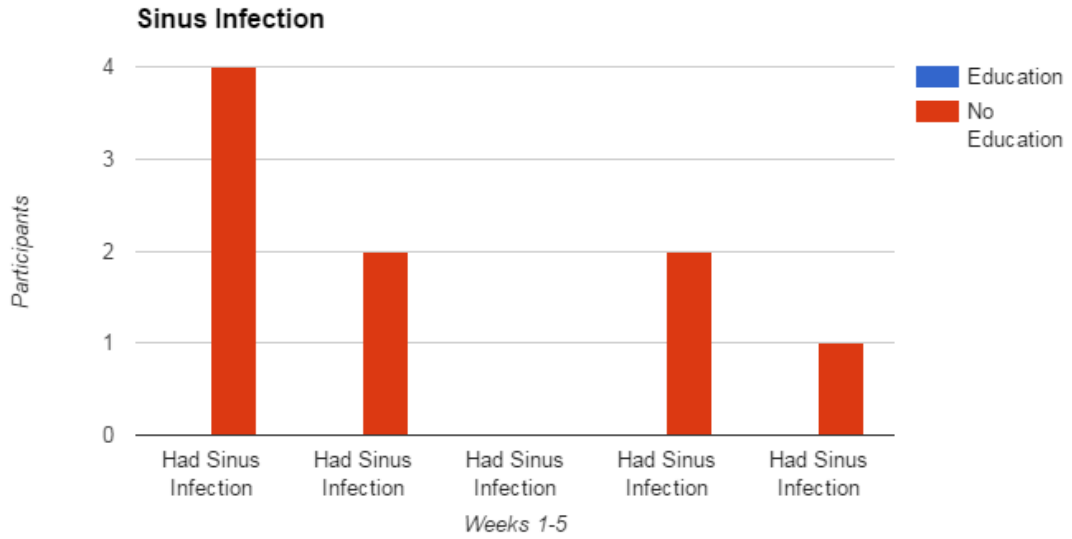
Bronchitis, The Chi-square statistic is 1.1642. The P value is 0.280591. This result is not significant at $p < 0.05$. Weeks 2-5, 0 participants experienced bronchitis.



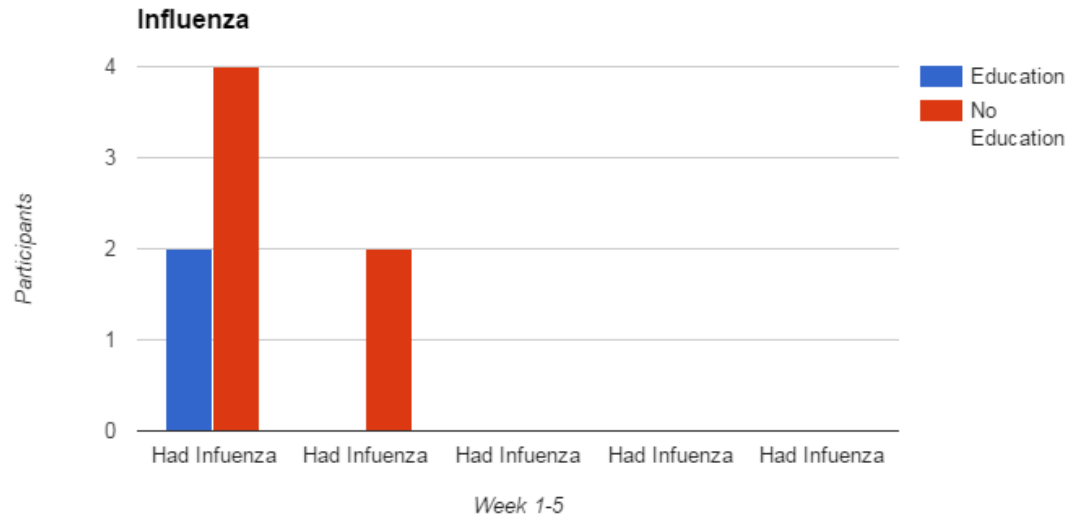
Pneumonia The Chi-square statistic is 0.7568. The P value is 0.384318. This result is not significant at $p < 0.05$. Weeks 2-5, 0 participants experienced Pneumonia.



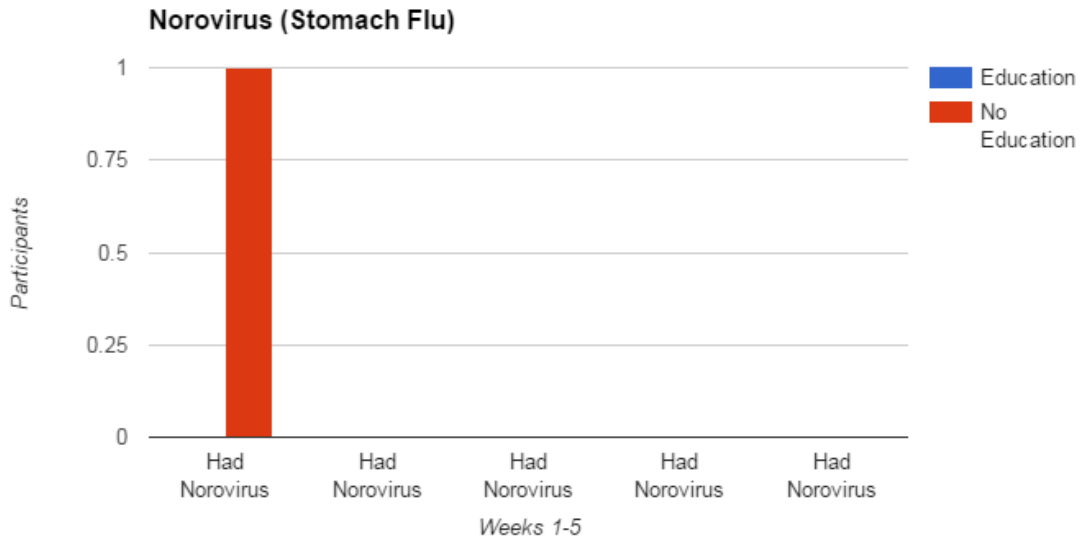
For week 1, 0 participants experienced strep throat. For week 2 for Strep Throat, the Chi-square statistic is 0.8692 and the P value is 0.351167. This result is not significant at $p < 0.05$. Weeks 3-5, 0 participants experienced strep throat.



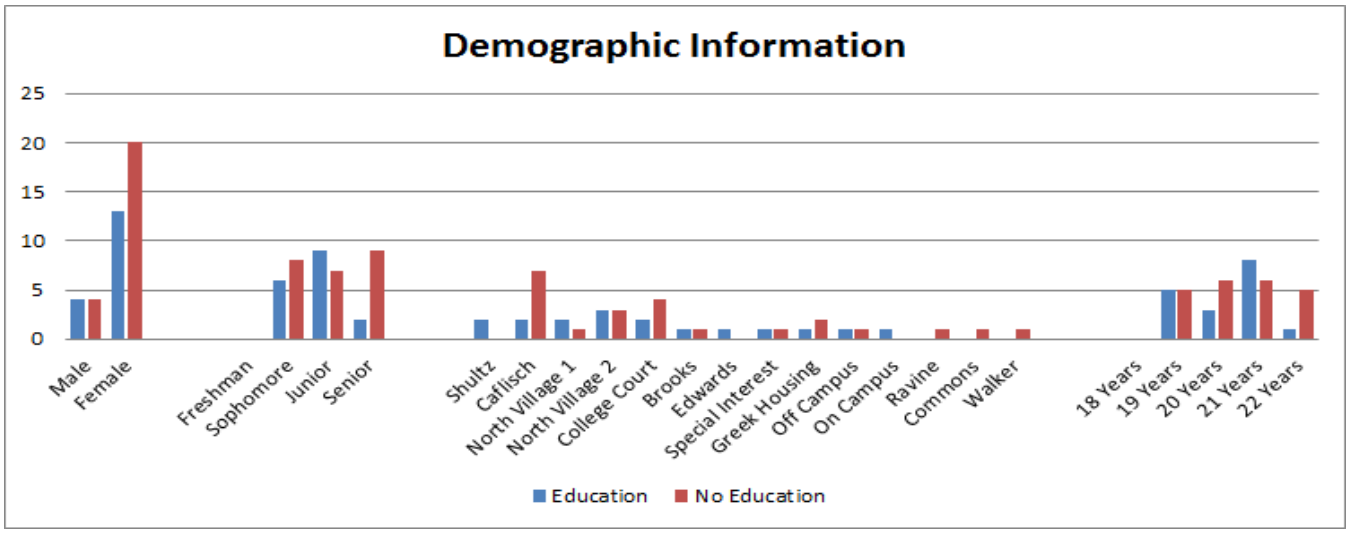
Sinus Infection week 1, the Chi-square statistic is 2.8003. The P value is 0.094248. This result is not significant at $p < 0.05$. Week 2 for sinus infection, The Chi-square statistic is 1.7747. The P value is 0.182803. This result is not significant at $p < 0.05$. For week 3 no participants experienced a sinus infection. Week 4 for sinus infection, The Chi-square statistic is 1.709. The P value is 0.191116. This result is not significant at $p < 0.05$. Week 5 for sinus infection, The Chi-square statistic is 0.8736. The P value is 0.349958. This result is not significant at $p < 0.05$.



Influenza week 1, the Chi-square statistic is 0.0987 and the P value is 0.753384. This result is not significant at $p < 0.05$. For week 2 for influenza, the Chi-square statistic is 1.7747 and the P value is 0.182803. This result is not significant at $p < 0.05$. Weeks 3, 4, and 5 had 0 participants who experienced Influenza.



Norovirus (stomach flu), The Chi-square statistic is 0.7568. The P value is 0.384318. This result is not significant at $p < 0.05$. For weeks 2-5, 0 participants experienced the stomach flu.



For gender, the Chi-square statistic is 0.2984 and the P value is 0.584871. This result is *not* significant at $p < 0.05$. Living arrangements were further simplified when calculating Chi-square statistics and P value to "Traditional dorm communal bathroom, Campus apartment/house bathroom, Off campus apartment/house bathroom." For living arrangements, the chi-square statistic is 0.4134, the P-Value is 0.813268. The result is *not* significant at $p < 0.05$. For age, the chi-square statistic is 3.3667 and the P-Value is 0.338468. The result is *not* significant at $p < 0.05$. For academic year, the chi-square statistic is 3.9091 and the P-Value is 0.141629. The result is *not* significant at $p < 0.05$.

Discussion

The goal of this research was to identify whether or not educating college aged students on how to properly wash their hands would decrease the amount of illness and symptoms experienced over a 5 week period. Individuals voluntarily participated in a 5 week survey, where they were randomly assigned to a group that received education or one that did not. Participants who were assigned to the educational group received two

videos via email and were then asked a series of questions afterwards to ensure that proper attention was paid. After the five week surveying period, all participants were asked a series of demographic questions to ensure that both groups were equal in age, gender, year and living arrangements.

Results for table 1, demographics, indicates that between the group who received education and the group who did not receive education, there were no statistically significant results for age, gender, living arrangements, or academic year. Results were statistically analyzed using chi-square and p-values at p=0.05. These results indicate that there were no significant differences between the group who received education and the group who did not. All demographic variants were representative of one another, meaning that the overall population of the education group and the non education group were reflective of one another.

In addition, table 2 results indicate that the students who received education viewed the video's sent to them via email and were able to efficiently answer the video questionnaire. For the first question, 100% of the participants from the education group answered correctly as to where the proper method was when sneezing. 57.1% of the participants answered correctly when asked how they should turn off the faucet when finishing hand washing. When asked about what the proper length of time was when washing hands, 90.5% of participants answered correctly with 20-30 seconds, and finally, 90.5% of the participants answered correctly when asked how they should soap their hands prior to washing.

Furthermore, my research for Table 3 indicated that although one group successfully received proper education, my results for my 5 week survey were statistically insignificant. There were no statistically significant results for each of the experienced symptoms for each of the five weeks. In addition, there also were not any significant results for the rate of diagnosis and they type of diagnosis during the 5 week study. These results were analyzed using chi-square statistics at $p=0.05$.

Overall, my data cummulatively did not show any statistically significant results. These insignificant results may have been due to the influx of emails via Sue Plunket (The colleges Nurse Practitioner) during my surveying period. During the winter months of the 2014-2015 school year, Allegheny College was inundated with illness, there were several cases of Influenza and a suspected case of the Mumps. During this time, Sue Plunket, sent a series of emails to the students reminding them to wash their hands and practice safe hygiene. This may have caused the group who did not receive education, to ultimately receive some variant of hand washing education. These influx of emails essentially caused both the education group and the non education group to potentially become more aware of their hand washing behavior. My results may have also been skewed due to an overall lack of interest in the participants during the 5 week surveying period. Ten students dropped out of the study after 1 or 2 weeks, which greatly decreased my overall participant count.

Potential ways in which this study could be strengthened is by surveying earlier in the year before peek illness rates become a factor. By surveying earlier in the year, students would receive hand washing education before the peak months of illness, thus

possibly eliminating confounding emails from the health center. In addition, rather than emailing participants educational videos as their education source, it may be worthwhile to meet with the participants in person to give a live demonstration of proper technique.

By properly and effectively educating college aged adults on the correct hand washing methods, overall illness rates may potentially be decreased, thus decreasing the amount of absence from class and the overall spread of illness among students and faculty. This may help save College's precious expenses and overall help to avoid epidemic like illness amongst the community population.

Appendix

Emails that participants in the educational group received:

Comp Survey
February 2, 2015 at 9:39 PM

Please fill this survey out first:

https://docs.google.com/a/allegheny.edu/forms/d/1NFLMEuWwc6cqxLc13rn58EKRuX6Oli18AKOOSKZSq30/viewform?usp=send_form

After finishing the video survey, please fill out the health journal. This will be sent every Monday for 5 weeks*:

https://docs.google.com/a/allegheny.edu/forms/d/1zo0FNA3YKLF9e_ZT3kG8WfH10WHahd23_GQUvoQxFqo/viewform?usp=send_form

Thank you all. Let me know if you have any questions/comments/concerns

Stay healthy!

Jordan Borst

Comp Survey week 2
February 9, 2015 at 8:35 PM

Hi All,

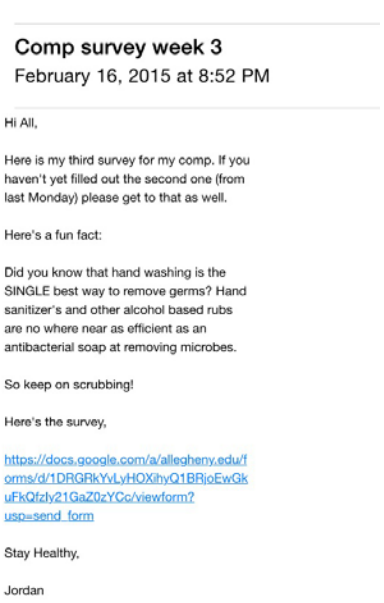
Here is my second survey for my comp. If you haven't yet filled out the first one (from last Monday), please get to that as well.

Just a reminder, the only way for bacteria/viruses to enter your body is through openings! Be cautious not to touch your ears, eyes, nose, and mouths. And remember to wash your hands diligently with soap and water for roughly 30 seconds. When you turn the faucet off, do so with a dry paper towel to keep germs from getting back onto your hands.

I'll be posting fun germ facts each week to keep you all motivated to practice proper hand hygiene.

Best,

Jordan Borst



Comp survey week 3
February 16, 2015 at 8:52 PM

Hi All,

Here is my third survey for my comp. If you haven't yet filled out the second one (from last Monday) please get to that as well.

Here's a fun fact:

Did you know that hand washing is the SINGLE best way to remove germs? Hand sanitizer's and other alcohol based rubs are no where near as efficient as an antibacterial soap at removing microbes.

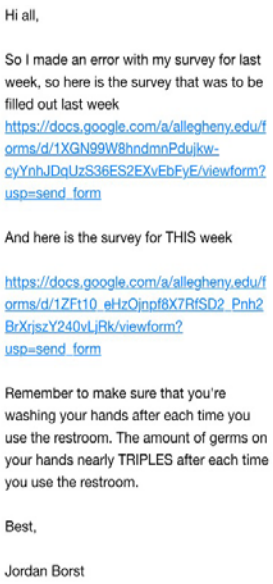
So keep on scrubbing!

Here's the survey,

https://docs.google.com/a/allegheny.edu/forms/d/1DRGRkYvLyHOXihyQ1BRjoEwGkuFkQfzly21GaZ0zYCc/viewform?usp=send_form

Stay Healthy,

Jordan



Hi all,

So I made an error with my survey for last week, so here is the survey that was to be filled out last week
https://docs.google.com/a/allegheny.edu/forms/d/1XGN99W8hndmnPdujkw-cyYnhJDqUzS36ES2EXvEbFyE/viewform?usp=send_form

And here is the survey for THIS week

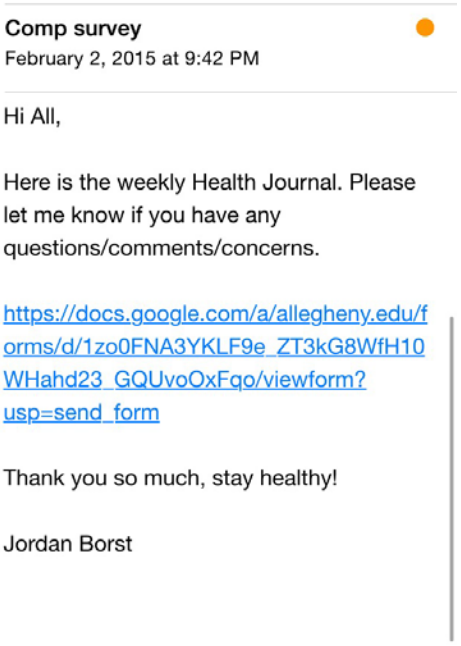
https://docs.google.com/a/allegheny.edu/forms/d/1ZFt10_eHzOjnpf8X7RfSD2_Pnh2BrXrjszY240vLjRk/viewform?usp=send_form

Remember to make sure that you're washing your hands after each time you use the restroom. The amount of germs on your hands nearly TRIPLES after each time you use the restroom.

Best,

Jordan Borst

Emails that non educational group received:



Comp survey
February 2, 2015 at 9:42 PM

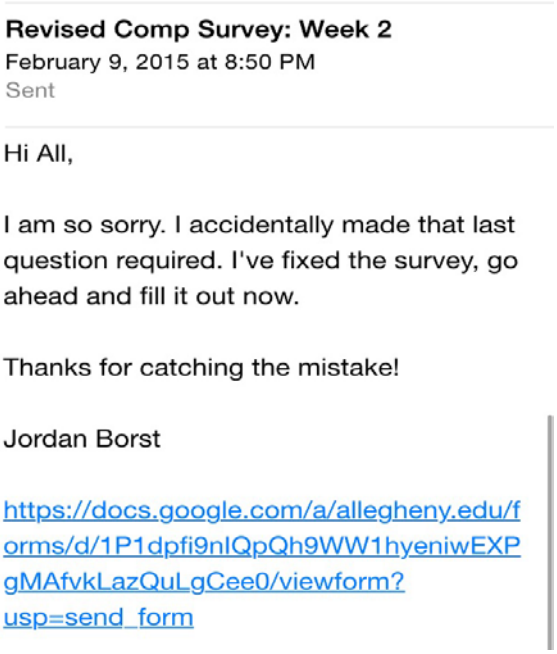
Hi All,

Here is the weekly Health Journal. Please let me know if you have any questions/comments/concerns.

https://docs.google.com/a/allegheny.edu/forms/d/1zo0FNA3YKLF9e_ZT3kG8WfH10WHahd23_GQUvoOxFqo/viewform?usp=send_form

Thank you so much, stay healthy!

Jordan Borst



Revised Comp Survey: Week 2
February 9, 2015 at 8:50 PM
Sent

Hi All,

I am so sorry. I accidentally made that last question required. I've fixed the survey, go ahead and fill it out now.

Thanks for catching the mistake!

Jordan Borst

https://docs.google.com/a/allegheny.edu/forms/d/1P1dpfi9nIQpQh9WW1hyeniwEXPgMAfvkLazQuLgCee0/viewform?usp=send_form

Comp survey week 3
February 16, 2015 at 8:55 PM

Hi All,

Here is my third survey for my comp. If you have not already filled out hte survey from last Monday, please do so.

https://docs.google.com/a/allegheny.edu/forms/d/1DRGRkYvLyHOXihyQ1BRjoEwGkuFkQfzly21GaZ0zYCc/viewform?usp=send_form

Stay healthy,

Jordan Borst

comp survey week 4&5
March 2, 2015 at 9:25 PM

Hi all,

So I made an error with my survey for last week, so here is the survey that was to be filled out last week
https://docs.google.com/a/allegheny.edu/forms/d/1XGN99W8hndmnPdujkw-cyYnhJDqUzS36ES2EXvEbFyE/viewform?usp=send_form

And here is the survey for THIS week

https://docs.google.com/a/allegheny.edu/forms/d/1ZFt10_eHzOjnpf8X7RfSD2_Pnh2BrXrjszY240vLjRk/viewform?usp=send_form

This email was the final email sent to both the educational group and the non educational group:

Last Survey
March 22, 2015 at 7:19 PM

Hi all,

I hope that everyone had a wonderful spring break. Now that we're back, I must ask if you can fill out my last survey which asks demographic questions. If you need any help or have any questions please feel free to text/email me.

Thank you so much for your participation,

Jordan Borst
(724)-689-4931

https://docs.google.com/a/allegheny.edu/forms/d/1fM_wlf60XlNpdSraF5bAU7ZvPUwtek5Eaku8ala-fRI/viewform?usp=send_form

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Dr. Humphreys: Thank you for always being so quick to respond to my emails and questions. Your comments were always so helpful and constructive. Thank you for laughing with me and helping me along the way. You are the best!