

COLLEGE STUDENTS PERCEPTIONS OF QUARANTINE AND SOCIAL
DISTANCING METHODS IN THE EVENT OF AN INFLUENZA PANDEMIC

Kylene Joy Baker

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John Parrish-Sprowl, Ph.D., Chair

Ronald Sandwina, Ph.D.

Master's Thesis
Committee

Elizabeth Goering, Ph.D.

Dedication

This thesis is dedicated to various entities: The first is God embodied in the Father, the Son Jesus Christ, and the Holy Spirit, whom without, this thesis would not have been possible nor could it have been completed. The second is my parents and my sister and brother-in-law, Kyle and Carrie Baker and Kristin and Jeff Paul, without their love and support throughout my life and educational endeavors I would never have been as successful as I have been or made it this far. The third is my fiancé, Bradley Wesner, whose love, faith, kindness, support, encouragement, and sense of humor always calmed me down when I was furious, pushed me when I was apathetic, and made the writing of this thesis tolerable. The fourth is Suzy Younger, who without our “walk and talk” breaks at work the stress of the past year would have been unbearable. And last but not least my best friends, Dr. April Toelle and Dr. Erin Gilles, for being my sounding board, sources of encouragement, and providing me with necessary distractions in order to keep me sane.

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Abstract

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In the event of another pandemic influenza, it will be important to understand the public's perception of quarantine and social distancing methods, as these methods will be the first line of defense in attempting to contain or lessen the severity of the outbreak until a vaccine and medications can be developed and produced in mass quantities. College students perceptions are particularly important to look at as their living situations can vary drastically from the general public, i.e. living far away from home and with roommates. This study looks at college students perceptions of quarantine and social distancing measures that could be implemented in the event of an outbreak of pandemic influenza. The data revealed that undergraduate college students in this study favored the use of government implemented quarantine and social distancing methods, except for requiring that religious services be temporarily canceled. They are also worried about the potential problems that may occur as a result of the implementation of quarantine and social distancing methods, and the only information source that the majority of them trust to give them useful and accurate information regarding an influenza pandemic in their community was their physician or other health care professional. Of most significance to the college student population, as opposed to the general public, is the place of quarantine for the other people that live in the same residence. Fifty-three percent of the respondents in this study favored quarantining the other people living in their residence in a separate

quarantine facility compared to 29% in the Blendon (2006) study that surveyed the general adult population in the United States.

John Parrish-Sprowl, Ph.D., Chair

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Introduction

The potential for the emergence of an influenza virus that could cause a pandemic is real. Throughout the 20th century there have been three influenza pandemics that caused significant infection and death in the United States and worldwide. The first occurred in 1918-1919 and resulted in at least 675,000 deaths in the U.S. and up to 50 million worldwide. The second and third pandemics were less severe and occurred in 1957 and 1968, and resulted in at least 70,000 and about 34,000 deaths in the U.S. and 1-2 million and 700,000 deaths worldwide, respectively (U.S. Department of Health and Human Services, 2006a). The world has not seen an influenza pandemic in almost 40 years and the emergence of human infections caused by avian influenza H5N1, a virus endemic to poultry populations in Asia, has caused serious concern that it may continue to mutate and become easily transmissible between humans. The first cases of human infection from avian influenza H5N1 occurred in 1997 in Hong Kong where 18 people were infected and resulted in six deaths (U.S. Department of Health and Human Services, 2006b). Since then human infections have occurred in Azerbaijan, Cambodia, China, Djibouti, Egypt, Indonesia, Iraq, Lao People's Democratic Republic, Nigeria, Thailand, Turkey, and Vietnam. Since 2003, the total number of human cases reported to the World Health Organization has reached 291 cases and has killed approximately 60% of those that were infected (172 deaths) (World Health Organization, 2007 April 11).

Overview of the problem

Because a vaccine for pandemic influenza cannot be developed until the strain of the virus emerges that will cause human-to-human transmission and there is not enough anti-viral medication to give as a prophylaxis to the entire world, non-pharmaceutical

interventions, such as quarantine, isolation, and social distancing methods will have to be implemented at the beginning of an influenza pandemic (U.S. Department of Health and Human Services, 2006c; WHO Writing Group, 2006a). The most recent use of these methods of disease containment was during the SARS outbreak in 2003. The SARS outbreak in 2003 gave the world an opportunity to implement these methods, analyze their effectiveness, and offer suggestions for the future (Blendon, 2006; Cava, Fay, Beanlands, McCay, & Wignall, 2005; CDC, 2003, 2003b, 2003c; Lo et al., 2005; National Advisory Committee on SARS and Public Health, 2003; Ooi, Lim, & Chew, 2005; Toronto Public Health, 2003; Wu et al., 2004). However, in contrast to SARS, influenza is more virulent and can be transmitted before symptoms occur, which suggests that it may be harder to contain using quarantine, isolation, and social distancing methods (CDC, 2004b; WHO, 2006b).

Rationale

This study is necessary because in the event of an infectious disease outbreak, such as pandemic influenza, it will be important to know how people perceive quarantine and social distancing methods. This knowledge can be used in preparedness planning to inform communication strategies and their implementation as well as the logistics to promote successful quarantine and social distancing results, such as grocery delivery and lost income protection. College students, specifically, are a section of the population that have unique characteristics that significantly differ from the general population. These characteristics could have a major impact on the success of controlling an infectious disease outbreak when using quarantine and social distancing methods, such as living in residence halls or apartments by themselves or with roommates away from their family.

This could impact their ability to get necessary supplies and medical treatment as well as getting necessary emotional support and could create an environment that could promote breaking quarantine and social distancing protocols. Additionally, colleges are specifically listed in the US government's pandemic influenza plan as a collective entity that needs to make specific preparations in the event that there is a pandemic (U.S. Department of Health and Human Services, 2006d). In addition there have recently been a number of articles that report on the increased risk of upper respiratory infections and meningococcal disease in college students, which are both spread via respiratory and throat secretions (Barker, Stevens, & Bloomfield, 2001; Bruce et al., 2001; Froeschle, 1999; Harrison et al., 1999; Pons, Canter, & Dolin, 1980; Rosenstein et al., 1999; Tsuang, Bailar, & Englund, 2004).

Specific Aims

This paper will explore previous literature on quarantine and social distancing methods used in outbreaks of SARS and pandemic influenza, specifically successful and unsuccessful containment, perception, compliance, and problems and support for those quarantined, as well as disease transmission in colleges and universities, looking specifically at upper respiratory infections and meningococcal disease as they are spread in the same manner as pandemic influenza, via respiratory and throat secretions. It will then report college students' perceptions of quarantine and social distancing methods in the event of a pandemic influenza outbreak and offer suggestions on how to effectively implement successful quarantine and social distancing methods in a college environment.

Literature Review

Quarantine and Social Distancing

In the event of an infectious disease outbreak, there are a variety of non-pharmaceutical methods of containment that may be used to slow down or stop the spread of the disease at the beginning of an outbreak, such as a) isolation of patients and quarantine of contacts, b) social distancing methods, such as closing schools and businesses and canceling public events, and c) increasing personal protection and hygiene (WHO, 2006). Quarantine and social distancing methods may have to be used in place of pharmaceutical interventions during an infectious disease outbreak due to various circumstances, such as a new disease that has previously not been identified, as SARS was in 2003; or an infectious agent that has mutated and a pharmaceutical has not been developed that is specific enough to prevent or treat infection, which many scientists are fearing could happen with the H5N1 avian influenza virus; or there are not any pharmaceuticals that can combat the particular infectious agent, such as Ebola or SARS (CDC, 2002, 2004; WHO 2005).

Quarantine has been defined as “the separation and restriction of movement of persons who, while not yet ill, have been exposed to an infectious agent and therefore may become infectious” (CDC, 2004a, p. 1). Isolation has been defined as “the separation of persons who have a specific infectious illness from those who are healthy and the restriction of their movement to stop the spread of that illness” (CDC, 2004). Social distancing is a relatively new term, that has yet to be defined in the literature. Examples of social distancing are found in the literature such as, closing of schools and daycares, telecommuting at work, canceling of public events, temporary closures of businesses that

promote public gatherings such as coffee houses, movie theaters, night clubs, and restaurants; and suspending religious services (Glass, Glass, Beyeler, & Min, 2006; World Health Organization Writing Group, 2006). The goal of these methods is to prevent the transmission of disease by limiting close contact with people. For the purposes of this study, social distancing will be defined as: the increase of physical distance between people in public places to prevent the transmission and infection of individuals by contagious disease. The most recent use of quarantine was during the SARS pandemic in 2003 (Blendon, 2006; Cava, Fay, Beanlands, McCay, & Wignall, 2005; CDC, 2003, 2003b, 2003c; Lo et al., 2005; National Advisory Committee on SARS and Public Health, 2003; Ooi, Lim, & Chew, 2005; Toronto Public Health, 2003; Wu et al., 2004). During that pandemic between 23,000-30,000 people were quarantined at home in the greater Toronto area (National Advisory Committee on SARS and Public Health, 2003); 131,000 people were quarantined in their home or “quarantine facilities” in Taiwan (CDC, 2003); and about 30,000 people were quarantined in Beijing (CDC, 2003b).

Successful/Unsuccessful Use of Quarantine, Isolation, and Social Distancing Methods

There are conflicting reports on whether quarantine, isolation, and social distancing methods during influenza outbreaks have been successful in the past (Ooi et al., 2005; WHO, 2006; Whitelaw, 1919; Patterson, 1983). Quarantine and isolation in SARS was successful, however it is feared that these methods may or may not be successful during an outbreak of a novel strain of influenza. It is generally thought that SARS is only contagious when an individual is symptomatic and is most contagious during the second week of illness. This varies drastically from the virulent and contagious

nature of influenza. In the general adult population, influenza can be transmitted in the 24-48 hours before a person becomes symptomatic and infectivity is at its peak for 24-72 hours upon onset of the symptoms. Once infected individuals are usually only contagious for up to 5 days from the start of the illness. Children and immuno-compromised individuals who have been infected may be even more contagious to others around them prior to symptom onset, in the first three days of illness, and for a longer period of time than the average adult population (CDC, 2004b; WHO, 2006b).

Due to the different levels of infectivity it appears that influenza will be harder to contain using quarantine, isolation, and social distancing methods as people could become infected and infect other people before symptoms even develop. However, it is noted that there was a reduced incidence of influenza in rural areas (Markel et al., 2006; WHO, 1959; Jordan, 1927) and that avoiding overcrowding could make the impact of the disease less intense by reducing the peak incidence of an epidemic and spreading it over many weeks, instead of a few. Markel et al. (2006) did a historical analysis of communities in the United States that successfully implemented nonpharmaceutical interventions during the second, and most deadly, wave of the influenza pandemic of 1918-1919. Two of the small communities they reviewed, San Francisco Naval Training Station, Yerba Buena Island and Gunnison, Colorado had zero infections and zero deaths. This was achieved by protective sequestration, or cutting off contact with the outside world. Jordan (1927) also reported that some towns in Colorado and Alaska, who were also successful in preventing infections in their town, required all travelers entering their town to comply with a five-day quarantine. This appears to have had a significant impact on these towns escaping the tragedy other US communities experienced. Of special

mention, with regards to this study, was the successful implementation of nonpharmaceutical interventions at Princeton University and Bryn Mawr College, PA. Both universities, although the student population was small, did have some infections; however, neither of them reported any deaths from the deadly pandemic influenza of 1918-1919 (Merk et al., 2006). Merk et al. (2006) determined through their analysis, that protective sequestration, if enacted early enough, could provide protection to communities, however, they also note that no other nonpharmaceutical interventions appear to have been effective in preventing the spread of the disease. They also note, as other studies have, that most American communities did not see a dramatic decrease in disease transmission and infection rate due to the implementation of nonpharmaceutical methods (Patterson, 1983; Whitelaw, 1919; McGinnis, 1977; Jordan, 1927).

In preparing for a future pandemic researchers have recently begun using computer simulated models to determine if quarantine and social distancing measures as well as targeted prophylactics could be successful in containing a highly infectious disease outbreak, such as pandemic influenza. Ferguson et al. (2005) simulated an influenza pandemic in Thailand and determined that in conjunction with prophylaxis, quarantine and social distancing measures could be successful if implemented at the outbreaks earliest stages. Another study, conducted by Glass et al. (2006), that modeled a small U.S. town determined that using only targeted social distancing methods could effectively mitigate the progression of the disease in the small town without using pharmaceutical interventions, such as vaccines and anti-viral medications.

Another measure that was commonly used in many countries during both the influenza pandemic of 1918-1919 and SARS pandemic of 2003 was the wearing of

masks in public and at home. Although this is considered a method of personal protection and hygiene, it has been and in the future could be used in conjunction with social distancing methods and quarantine/isolation to prevent disease transmission if people must be in contact. If social contact cannot be avoided, such as mandatory work, or going to the store for necessities, this protects the individual and the public from potential infection. There have not been any controlled studies that looked at the efficacy of wearing a mask in preventing influenza infection, however, there was a case-control study conducted in Beijing and Hong Kong that reported that wearing masks in public was independently associated with protection from SARS in a multivariate analysis (Wu et al., 2004).

Perception

When preparing for a pandemic outbreak it is important to determine the public's perception of quarantine, isolation, and social distancing methods. In order for these measures to have a chance of being successful the public's perception must be determined in order that public health officials and local, state, and federal governments know what messages to construct and who should deliver the messages. A recent study, that assessed public perception of quarantine in the US and three Asian countries, determined that 76% of US respondents favored quarantining people suspected of having been exposed to the disease, and 53% favored requiring everyone to wear a mask in public (Blendon et al., 2006). However, when asked if they would still be in favor of these measures if people could be arrested for refusing to comply the support for these two measures dropped to 42% and 27% respectively. When asked about being quarantined in a designated health care facility, the US respondents reported that they

were most worried about being exposed to someone with the disease (56%) and being unable to communicate with family members (56%) (Blendon et al., 2006). A previous study conducted by Blendon et al. (2004) that also looked at perceptions of quarantine, but in relation to SARS, found that the majority of the people were in favor of the use of quarantine for those that had been exposed to the disease. They reported that during the SARS outbreak a survey conducted by Harvard School of Public Health (2003) found that 84% of those surveyed said that those who are exposed to SARS need to be quarantined. Ninety-five percent said they would agree to be isolated for 2-3 weeks if they had SARS and 93% reported they would agree to quarantine if they had been exposed to SARS.

Blendon et al. (2006) also asked respondents about their preferences for monitoring if they were quarantined. There were two methods of monitoring that the majority of the general U.S. population favored: daily visits to check the health of those who are quarantined (84%) and periodic telephone calls (75%). They were also asked about their preferences of where they would want to be quarantined. Seventy percent reported that if they had to be quarantined they would want to be quarantined at home and 71% reported that if their family member had to be quarantined that they would also want them to be quarantined at home as well.

Blendon et al. (2006) also asked respondents how much they trusted a variety of sources of information for useful and accurate information. There was only one source that a majority (78%) reported that they trusted “a lot” as a source of useful and accurate information, and that was “your doctor or other health care professional.” Fifty-two

percent indicated that they trusted a family member or friend, 40% government public health authorities, 30% their employer, and 27% newspapers, magazines, TV, or radio.

Compliance

Blendon et al. (2006), suggested that the public should be asked to voluntarily cooperate in the event of an outbreak that requires the use of quarantine, however, during the SARS outbreak in Canada, the government used the term “voluntary quarantine” because they initially believed that the use of this term would cause less “panic” and more people would comply, but they noted that using the word “voluntary” was confusing because there were repercussions if quarantine was broke (DiGiovanni et al., 2004). If we are to follow the suggestion of Blendon et al. (2006) then penalties for not complying could not be issued or enforced. During the SARS outbreak in Canada, compliance with the quarantine order not to leave the house was reported to be high for those individuals who had been exposed to individuals with SARS and was justified by the respondents in the study most commonly on ethical grounds. Many participants reported that they complied with the quarantine order to be “good citizens” and because of “civic duty.” Many also reported complying because of social pressures and legal reasons (\$5,000 fine for leaving their house) (Cava et al., 2005b). Compliance with the quarantine protocols within households, however varied, with some individuals ignoring or questioning their effectiveness. This behavior was seen most in people who perceived they were at a lower risk of contracting the disease (Cava et al., 2005b).

Conversely, physicians and nurses in the greater Toronto area who cared directly for SARS patients complied with the recommended quarantine protocols without encouragement. They also implemented stricter protocols on themselves with some

restricting their contact with others more strictly and for a longer period of time than was required. They also sent their families away or lived alone in their basements instead of wearing masks, and stayed in quarantine for 14 days or longer, instead of the required 10 (DiGiovanni et al., 2004). Of the 195 quarantined healthcare workers that were surveyed 94% reported that reducing the risk of transmission to others was the primary reason for complying, which was also the primary reason given by non-health care workers as well, which was also seen in the study by Cava et al. (2005b). Twenty-four of 30 respondents who had been quarantined and were aware of the penalties said that their knowledge of these penalties did not affect their decision to comply (DiGiovanni et al., 2004).

There was an exception to this trend. In an adolescent focus group some of the high school students reported they were concerned that their parents would be punished if they did not comply with quarantine measures. They also questioned the effectiveness of quarantine to control the disease. Another interesting aspect of adolescents that was not seen in adults was that the media reported that adolescents were breaking quarantine and going to shopping malls. The adolescent focus group, however, said that these reports were exaggerated and that their friends as well as themselves obeyed quarantine protocols. They reported that as long as they could communicate with their peers via phone and email, had electronic entertainment, and had their lessons and homework assignments posted on-line, so that they would not fall behind in their coursework, complying with quarantine was not an issue (DiGiovanni et al., 2004).

A major factor of non-compliance for individuals who were told they should follow the quarantine protocol, but did not comply, was the fear of loss of income. This fear was not unwarranted. Although some employers at the beginning of the outbreak had

told their employers that they would still receive pay if they were required to be quarantined, other employers did not. For people whose income came from self-employment, part-time work, or casual work this was even more concerning (DiGiovanni et al., 2004).

Problems

Understanding problems individuals in quarantine may be faced with is important in designing messages that will promote compliance. A study conducted by the Harvard School of Public Health and Health Canada (2003, as cited by Blendon et al., 2004) reported that 22% of Toronto residents were quarantined themselves or had a family member or friend who had been quarantined. Of those that responded that they had been effected by quarantine 75% reported that being quarantined was a problem, however, only 24% reported it being a major problem. The major problems that were reported by the respondents were a) the inability to get regular medical care and prescriptions, food and water, b) inability to communicate with family members who were not there, c) not getting paid because of missed work and d) emotional difficulties of being confined. Getting paid and emotional difficulties were the problems most reported by respondents. DiGiovanni et al. (2004) also noted that during the SARS outbreak in Toronto the fear of losing income was of particular concern for those respondents that were surveyed and in focus groups, especially for people who were not convinced that quarantine was necessary.

Emotional distress, such as feelings of isolation, depression, uncertainty, and post-traumatic stress disorder was also reported by a number of studies (Blendon et al, 2004; Cava et al., 2005a; DiGiovanni et al., 2004; Gammon, 1998; Grazier, 1988; Hwaryluck et

al., 2004). Blendon et al. (2006) asked the U.S. general public how worried they would be about these potential problems if they had to be quarantined. The authors reported that 45% were very worried they might not be able to get the health care or the prescriptions they would need; 40% said they were very worried they might not get paid for the time when they were not at work and that they might lose their job or business; 33% said they were very worried that they may be treated unfairly after the quarantine period was over because people would think they were contagious; and 32% reported being very worried that they might be treated unfairly because of their economic or social status.

Support For Those in Quarantine

Social and economical support for those quarantined will be a very important component in gaining compliance with quarantine, isolation, and social distancing methods. In the study conducted by DiGiovanni et al. (2004) 76% of nurses, 60% of doctors, and 70% of other healthcare workers said that they would want “fairly detailed information about when, how, and how much compensation” they would receive as encouragement to comply with “voluntary” quarantine. Participants in the focus group that represented the general public were also asked how much detail they would require about a compensation package and they reported that significant detail would be required, specifically about compensation, benefits, and amount of time before compensation would be received.

Additional support will also be needed for those dealing with emotional distress. During the SARS quarantine in Toronto, participants who were in quarantine or isolation reported that in order to cope they needed trustworthy information, institutional and

personal supports to assist with obtaining food and other necessities, such as medication, and income reimbursement and emotional support both during and after the quarantine (Blendon et al., 2004; Cava et al., 2005a, DiGiovanni et al., 2004). If quarantined in a healthcare facility, health care workers could assist those in isolation with coping with emotional distress by increasing social support, autonomy, and access to information (Gammon, 1998; Grazier, 1988).

Of particular interest, specifically to this study, is the difficulty of getting food, medication, and other necessities while in quarantine. This is not an issue that is commonly discussed when the implementation of quarantine is being considered. Getting food, medication, and other necessities could be especially difficult for college students if they are living away from home and are quarantined in their residence halls on campus or their apartments off-campus. Because they could be living a significant distance away from their family, they may not have anyone that would be willing to pick up and deliver the necessities they may need for daily living. This was confirmed by the interviews and focus groups that were conducted by DiGiovanni et al. (2004) in which they found that students and single people had greater difficulty in relying on or obtaining help from others.

DiGiovanni et al. (2004) noted that during the SARS outbreak in Toronto the government was unable to meet these needs due to the lack of prior planning for such large-scale deliveries and difficulties in coordination between local health departments and volunteer and service organizations. However, some of those in quarantine with access to computers and Internet at home took advantage of Internet grocery delivery services. Among those with access these were widely used and well rated. This could be a feasible

option for college students. For healthcare workers who were on “work quarantine” some medical facilities established small grocery stores in their cafeterias, however, 83% of the quarantined healthcare workers in the survey said they relied on friends, relatives, or neighbors for groceries and supplies, and four percent said they broke quarantine to get them for themselves.

Another issue in which support is needed for those in quarantine is the transportation of the quarantined individuals’ dependents. DiGiovanni et al. (2004) reported that 83% of the 47 quarantined healthcare workers who normally provide transportation for dependents, such as children, disabled individuals, or the elderly, relied on family members or friends to take over these responsibilities while they were quarantined. Thirteen percent had to leave quarantine in order to provide these services.

Logistical support of those in quarantine was mostly handled privately, not through the government. The focus group that contained members of the general public that had been quarantined were very complementary of the public health authorities for delivering kits of medical supplies at the beginning of their quarantine periods (DiGiovanni et al., 2004). These kits contained thermometers (for twice-daily monitoring of body temperature), surgical masks, wipes, and similar items; healthcare workers obtained these supplies on their own or through their employers. This would be very important to college students as well.

Another method of support for those who must be quarantined away from home is establishing systems and methods that will enable them to keep in contact with family and friends and get trustworthy information about the outbreak (Blendon et al., 2006). Not being able to communicate with their family and friends would be a great source of

emotional distress for college students and could be a catalyst to breaking quarantine. Even though SARS has a relatively low level of spread among the population, it had a significant psychological and economic impact in Toronto and Ontario and to a lesser extent the other Canadian provinces and the United States (Blendon et al., 2004). This is important to remember in planning for future outbreaks, especially pandemic influenza which will have a high level of spread and could have an even more significant psychological and economic impact than SARS.

Disease Transmission in Universities and Colleges

Despite the fact that there is not any data on the effectiveness of closing schools during an infectious disease outbreak or pandemic on stopping the spread of the illness, there are studies that have indicated that schools play a role in disease transmission (Heymann et al., 2004; Neuzil, Hohlbein, & Zhu, 2002; WHO, 1959). Although most of these studies focus on primary and secondary schools, there have been a few which have focused on disease transmission on college campuses, specifically meningitis and respiratory illnesses (Barker, Stevens, & Bloomfield, 2001; Bruce et al., 2001; Froeschle, 1999; Harrison et al., 1999; Pons, Canter, & Dolin, 1980; Rosenstein et al., 1999; Tsuang, Bailar, & Englund, 2004). A recent study using computer modeling showed that during an influenza pandemic that resembles the 1957-1958 Asian flu (approximately 50% infection rate), closing schools and keeping children and teenagers at home reduced the rate of attack by more than 90% (Glass et al., 2006).

Studies that have been conducted on college campuses have found that the incidence of influenza, meningitis, and viral respiratory illnesses is reportedly higher in students that live in dormitories than students that do not live in dormitories (Bruce et al.,

2001; Froeschle, 1999; Harrison et al., 1999; Moe, Christmas, Echols, & Miller, 2001; Pons, Canter, & Dolin, 1980; Rosenstein et al., 1999). Tsuang et al. (2004) found that students with more than 50% carpeting in their room were at a significantly lower risk for influenza-like symptoms (ILS), as well as respondents who lived in double occupancy dorm rooms and whose roommate slept in a different room. They also observed that the number of times the dining hall was attended or how often laundry was washed had no significant effect on the frequency of influenza-like symptoms. There did not appear to be an increased risk for ILS that was dependant on the type of washrooms used – private washrooms (four or fewer students per washroom) versus communal washrooms, or between coed versus single-gender washrooms (Tsuang et al., 2004). It has also been suggested that an increased knowledge about influenza transmission within college dormitories may aid in developing methods of preventing infection (Tsuang et al., 2004). Upper respiratory infections (URI's), such as the common cold and flu, also are seen at an increased incidence in young adults and are very common among college students (Barker et al., 2001). The incidence among college students who live in group environments, such as resident halls, may even be higher (Moe et al., 2001).

Another example of an infectious disease, that is transmitted via respiratory secretions similar to that of influenza and has seen an increased incidence rate in young adults on college campuses, is meningococcal meningitis. The highest incidence rate of this disease is usually seen in children under the age of one year, however in 2001 55% of cases occurred in people 18 years and older, and 523 cases occurred in those between the ages of 15 and 24 years (CDC, 2003c). The incidence of meningococcal meningitis in college students is higher than in many populations, however, it is unclear if college

students are more likely than their peers of the same age range to be more susceptible to the disease or not (Harrison et al., 2001; Jackson, Schuchat, Reeves, & Wenger, 1995; Jackson & Wenger, 1993; Paneth et al., 2000; Roberts et al., 1996). One specific group of college students, first-year students living in dormitories or residence halls, are considered among those to be at the highest risk of becoming infected with this disease (Bruce et al., 2001; Froeschle, 1999; Harrison et al., 1999; Neal et al., 1999, 2000; Pons, Canter, & Dolin, 1980; Rosenstein et al., 1999). Neal et al. (2000) also noted that carriage rates for meningococci increased rapidly in the 1st week of school, with further increases as time progressed, which may suggest that the rapid rate of acquisition may explain the increased risk of disease.

Meningococcal disease is transmitted by respiratory and throat secretions, much in the same way as influenza is transmitted (CDC, 2006; Coordinating Center for Infectious Diseases/Division of Bacterial and Mycotic Diseases (CDC), 2005). This is one reason why adolescents and young adults have an increased risk of becoming infected with meningococcal disease as well as URI's. Studies have reported that certain behaviors, such as binge drinking, going to bars, active and passive cigarette smoking, cigarette sharing, kissing, coughing, communal living, and sharing utensils, beverages, and lip balm are important risk factors for meningococcal infection during outbreaks. While it is not clear how these factors are related in an increased incidence rate in the disease for adolescents and young adults, these are typical behaviors of many in the adolescent and young adult population (Stuart et al., 1989; Stanwell-Smith et al., 1994; Imrey et al., 1995, 1996; Fischer et al., 1997; NMA, 2005; Neal et al., 2000).

Research Question

The purpose of this study is to determine the perceptions of college students regarding quarantine and social distancing methods in the event of an influenza pandemic. Based on the proceeding discussion of the literature, the following research questions were asked:

RQ 1a: What are students' perceptions of government implemented quarantine and social distancing methods to control the spread of disease during a major outbreak?

RQ 1b: Does employment type, ethnicity, class standing, gender, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students' perceptions of government implemented quarantine and social distancing methods to control the spread of disease during a major outbreak?

RQ 2a: What are students' perceptions of self-implementation of social distancing methods to control the spread of disease during a major outbreak?

RQ 2b: Does employment type, ethnicity, class standing, gender, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students' perceptions of self-implementation of social distancing methods to control the spread of disease during a major outbreak?

RQ 3a: What are students' perceptions of potential problems while in quarantine or during the use of social distancing methods to control the spread of disease during a major outbreak?

RQ 3b: Does gender, ethnicity, class standing, employment type, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students' perceptions of potential problems while in quarantine or during the implementation of social distancing methods to control the spread of disease during a major outbreak?

RQ 3c: Is there a significant difference between being quarantined and being affected by social distancing methods on students' perceptions of potential problems they might experience during a major outbreak?

RQ 4a: What are students' perceptions of various methods of monitoring those that are in quarantine?

RQ 4b: Does employment type, ethnicity, class standing, gender, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students' perceptions of various methods of monitoring those that are in quarantine?

RQ 5a: What are students' quarantine preferences?

RQ 5b: Does age, gender, ethnicity, class standing, employment type, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students' quarantine preferences?

RQ 6a: What are students' perceptions of being quarantined at a designated health care facility?

RQ 6b: Does gender, class standing, ethnicity, age, employment type, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students' quarantine preferences?

RQ 7: What information sources do students' trust to give them useful and accurate information in the event of a major outbreak?

Methodology

Research Tool

The research tool used in this study is a modified version of the survey that was used in the Blendon et al. (2006) study on attitudes toward quarantine in four countries. The original survey instrument was created as a telephone survey and was intended to gather attitudes of the general population toward quarantine in four different countries. The survey for this study was adapted to be administered as a paper survey, geared toward college students, and to obtain perceptions of social distancing methods in addition to quarantine. It was composed of four point and five point interval scale questions and nominal scale questions. Surveys were chosen as the research tool because: a) a previous survey had already been developed and tested that asked questions that were directly related to this study, b) qualitative research regarding quarantine had already been conducted during the SARS outbreak in Canada, and c) the goal of the study was to be able to generalize the results to the general student population, which necessitated a survey being administered to a larger sample population than could have been collected if interviews or other methods of qualitative research had been done.

Sampling

The survey was administered using convenience sampling to undergraduate students at a large urban mid-western university. Ten undergraduate courses were sampled, totaling 180 respondents. The courses were chosen based on the breadth of various majors that would be represented in the classes, which should provide a representative sample of the university population. The survey population represents six sections of Introduction to Public Speaking, two sections of Interpersonal

Communication, one section of Introduction to Communication Studies, and one section of Political Communication.

Procedure

The survey was distributed during one class period at the beginning or end of the class by the researcher or the instructor/professor of the class. The surveys were then collected by the researcher or the instructor/professor and then given to the researcher. The surveys were then assigned a number in preparation of analysis.

Analysis

The survey data was coded and entered into SPSS and was analyzed using descriptive statistics and inferential statistics. An initial set of descriptive statistics were run to determine if demographic categories needed to be combined. Categories needed to be combined for two variables: age and ethnicity. Age initially started out having five categories for age (18, 19, 20, 21, and 22 and over), and were then grouped together to make three categories to create more meaningful categories (18-19, 20-21, and 22 and over). This was also done with ethnicity, with the original categories being Caucasian, African-American, Asian, and Other, however, because the number of respondents in the categories Asian and Other were low, they were combined and placed in the category Other, leaving three total ethnic groups instead of four. The descriptive statistics were run again and were used to report demographic data, as well as perceptions of all items on the survey.

Cronbach's alpha was calculated for each section of questions with interval scale data (five of the seven sections) to determine if the questions were consistent with each other and represented only one area of interest. Cronbach's alpha for the first section (17

items), “Perceptions of Government Implemented Quarantine and Social Distancing Methods to Control the Spread of Disease,” was .928. For the second section, “Willingness to Self-Implement Social Distancing Methods,” Cronbach’s alpha was .738 (7 items). For the third section, “Perceptions of Potential Problems While in Quarantine or During the Use of Social Distancing Methods,” Cronbach’s alpha was .870 (10 items). Cronbach’s alpha for the fourth section, “Perceptions of Quarantine Monitoring Methods,” was .754 (5 items). For the fifth section “Perceptions of Being Quarantined at a Designated Health Care Facility,” Cronbach’s alpha was .611 (3 items). The low level of reliability for this section is likely due to the low number of items in this section.

One-way ANOVAs were calculated, comparing each of the interval scale measures to each of the nominal scale demographic measures included in the survey. There were several ANOVAs that were run that produced statistically significant results and these are reported in the results section. When the independent variable had more than two groups, a post-hoc analysis was run using LSD to determine the nature of the differences between the groups.

Paired samples *t* tests were calculated for each of the three sets of paired questions, which compared the mean of how worried they would be that X would happen while in *quarantine* to the mean of how worried they would be that X would happen if they were affected by *social distancing methods*. This test was used in order to determine whether the situation of quarantine or social distancing affected their responses to how worried that they would be about potential problems that could result from those situations.

Chi-square tests were calculated for the section of questions that asked, “If there were an outbreak of a contagious disease, such as avian influenza, also known as bird flu, in your community how much would you trust the following sources to give you useful and accurate information about the outbreak?” This test was used to determine whether the respondents’ answers deviated from the expected frequencies based on the equal probability hypothesis for the three categories of trust that were given, “a lot, a little, not at all.”

Results

Participants

All 180 undergraduate students who were given the opportunity to fill out the survey, turned a survey back in. However, five were excluded because the survey was not completely filled out. Fifty-six percent of the respondents were female and 44% were male. Forty-five percent of the participants were 18-19 years, 24% were 20-21 years old and 31% were 22 or older. Fifty percent were freshmen, 18% were sophomores, 19% were juniors, and 13% were seniors. Twenty-six percent were seeking degrees with health or medical related majors and 74% were seeking degrees in non-health or medical related majors. Seventy-six percent were Caucasian, 16% were African-American, and 8% were Other. Ninety-seven percent were U.S. citizens. Fifty-seven percent indicated that they worked a full-time job, 24% a part-time job, and 19% were not currently working. Forty-five percent indicated that they themselves or a family member worked in the health care field. Eighty-eight percent of the students lived off campus. Forty-nine percent currently live at home with their parents and/or siblings, 28% with roommates, 15% with their spouse and/or children, and eight percent live alone. Sixty-three percent reported that they do not sleep in the same room with another person on a regular basis.

Perceptions of Government Implemented Quarantine and Social Distancing Methods to Control the Spread of Disease

RQ 1a asks, “What are students’ perceptions of government implemented quarantine and social distancing methods to control the spread of disease during a major outbreak?” To answer this question respondents were asked, “If there were a major outbreak of a serious contagious disease, such as avian influenza, what is your opinion of

the following actions the government could take to control the spread of the disease,” the only measure that a majority (68%) of the respondents agreed or strongly agreed with was “People suspected of having been exposed to the disease should be quarantined.” When asked if people should be fined or arrested if they refused to be quarantined the percentage of those that agreed or strongly agreed dropped to 41% and 33%, respectively (Table 1).

Fifty-one percent of the respondents disagreed or strongly disagreed with the statement “Everyone should be required to wear a mask in public.” When asked if people should be fined or arrested if they refused to wear a mask in public the percentage of those that disagreed or strongly disagreed rose to 56% and 62%, respectively (Table 1).

Fifty-seven percent disagreed or strongly disagreed with the statement “Everyone should be required to have their temperature taken to screen for illness before entering public places.” When asked if people should be fined or arrested if they refused to have their temperature taken before entering public places the percentage of those that disagreed or strongly disagreed rose to 63% and 71%, respectively (Table 1).

There was not a majority either way when asked how much they agreed with restricting travel outside designated boundaries. Forty-five percent agreed or strongly agreed, 35% disagreed or strongly disagreed and 20% were neutral with regards to the aforementioned statement. However, when penalties for breaking the boundaries were given as an option, the percentages were favored more towards disagree and strongly disagree, with 42% disagreeing or strongly disagreeing with fining people for traveling outside the designated boundaries and 53% for having people arrested (Table 1).

Seventy-eight percent of the respondents reported that they agreed or strongly agreed with requiring people to temporarily stay at home from work and 74% agreed or strongly agreed with temporarily closing schools and/or childcare centers. Sixty percent agreed or strongly agreed that large public events should be canceled and 50% agreed or strongly agreed that businesses that promote social gatherings, such as shopping centers, bars, and restaurants, should be temporarily closed. The only response that did not have a majority of respondents agree or disagree was “Should religious services be temporarily canceled?” Thirty-eight percent agreed or strongly agreed and 37% disagreed or strongly disagreed (Table 1).

Table 1**Perceptions of government imposed measures to control the spread of disease (%)**

Disease Control Measures	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
People suspected of having been exposed to the disease should be quarantined (n = 174; m = 3.84; sd = 1.019)	29	39	20	10	2
Individuals should be arrested if they refuse to be quarantined (n = 173; m = 2.98; sd = 1.131)	10	23	32	25	10
Individuals should be fined if they refuse to be quarantined (n = 174; m = 3.16; sd = 1.125)	12	29	30	21	8
Everyone should be required to wear a mask in public (n = 173; m = 2.66; sd = 1.300)	10	20	19	28	23
Individuals should be arrested if they refuse to wear a mask in public (n = 172; m = 2.28; sd = 1.142)	5	11	22	32	30
Individuals should be fined if they refuse to wear a mask in public (n = 173; m = 2.44; sd = 1.193)	4	19	21	29	27
Everyone should be required to have their temperature taken to screen for illness before entering public places (n = 173; m = 2.52; sd = 1.232)	6	22	16	32	24
Individuals should be arrested if they refuse to have their temperature taken to screen for illness before entering public places (n = 169; m = 2.09; sd = 1.057)	3	8	18	37	34
Individuals should be fined if they refuse to have their temperature taken to screen for illness before entering public places (n = 171; m = 2.29; sd = 1.145)	3	16	19	32	30
Restricting travel outside designated boundaries (n = 173; m = 3.10; sd = 1.244)	12	33	20	22	13
Individuals should be arrested if they travel outside designated boundaries (n = 173; m = 2.55; sd = 1.107)	5	17	25	35	18
Individuals should be fined if they travel outside designated boundaries (n = 172; m = 2.80; sd = 1.174)	6	27	25	26	16
People should be required to temporarily stay at home from work (n = 174; m = 3.95; sd = .973)	29	49	13	5	4
Schools and/or child care centers should be temporarily closed (n = 175; m = 3.89; sd = 1.011)	29	45	14	9	3
Large public events should be canceled (n = 174; m = 3.59; sd = 1.123)	23	37	21	15	4
Businesses that promote social gatherings should be temporarily closed (n = 175; m = 3.38; sd = 1.143)	18	32	26	18	6
Religious Services should be temporarily canceled (n = 174; m = 2.98; sd = 1.321)	15	23	25	19	18

RQ 1b asks, “Does employment type, ethnicity, class standing, gender, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students’ perceptions of government implemented quarantine and social distancing methods to control the spread of disease during a major outbreak?” A one-way ANOVA was calculated comparing each of the interval scale measures to each of the nominal scale demographic measures. Statistically significant differences were seen for employment type, ethnicity, and class standing and are as follows.

An employment type difference was found for seven items. In response to the item “Everyone should be required to wear a mask in public” a significant difference was found ($F(1,170) = 9.496, p < .01$). Respondents who were not health care workers or did not have family members or friends that were health care workers were more opposed with the statement regarding the mandate to wear a mask in public ($m = 2.38, sd = 1.242$) than respondents who were health care workers or had family or friends that were health care workers ($m = 2.97, sd = 1.301$).

The second employment type difference was found for the item “Everyone should be arrested if they refuse to wear a mask in public” ($F(1,169) = 8.603, p < .01$). Respondents who were not health care workers or did not have family members or friends that were health care workers were more opposed to people being arrested for refusing to wear a mask in public ($m = 2.04, sd = 1.058$) than respondents who were health care workers or had family or friends that were health care workers ($m = 2.54, sd = 1.174$).

In response to “Everyone should be fined if they refuse to wear a mask in public,” the third employment type difference that was found ($F(1,170) = 6.847, p < .05$). Respondents who were not health care workers or did not have family members or friends that were health care workers were more opposed to people being fined for refusing to wear a mask in public ($m = 2.22, sd = 1.112$) than respondents who were health care workers or had family or friends that were health care workers ($m = 2.68, sd = 1.236$).

The fourth employment type difference that was found was for the item “Everyone should be should be required to have their temperature taken to screen for illness before entering public places,” ($F(1,170) = 4.987, p < .05$). Respondents who were not health care workers or did not have family members or friends that were health care workers were more opposed to being required to have their temperature taken in public ($m = 2.34, sd = 1.169$) than respondents who were health care workers or had family or friends that were health care workers ($m = 2.76, sd = 1.271$).

The fifth employment type difference that was found, was in response to asking the respondents if “Individuals should be arrested if they refuse to have their temperature taken to screen for illness before entering public places,” ($F(1,166) = 6.148, p < .05$). Respondents who were not health care workers or did not have family members or friends that were health care workers were more opposed to individuals being arrested who refused to have their temperature taken in public ($m = 1.91, sd = .939$) than respondents who were health care workers or had family or friends that were health care workers ($m = 2.31, sd = 1.150$).

In response to “Individuals should be should be fined if they refuse to have their temperature taken to screen for illness before entering public places,” the sixth employment type difference was found ($F(1,168) = 7.562, p < .01$). Respondents who were not health care workers or did not have family members or friends that were health care workers were more opposed to individuals being fined who refused to have their temperature taken in public ($m = 2.08, sd = 1.051$) than respondents who were health care workers or had family or friends that were health care workers ($m = 2.55, sd = 1.202$).

The seventh employment type difference that was found was for the item “Should people be required to temporarily stay at home from work,” ($F(1,171) = 3.515, p < .05$). Respondents who were health care workers or had family members or friends that were health care workers agreed more with the statement that people should be required to temporarily stay at home from work ($m = 4.13, sd = .925$) than respondents who were not health care workers or did not have family or friends that were health care workers ($m = 3.84, sd = .954$).

An ethnicity difference was found for three items. In response to the item “Individuals should be arrested if they refuse to wear a mask in public,” a significant difference was found ($F(2,167) = 3.326, p < .05$). The LSD post-hoc analysis revealed that Caucasians were more likely to disagree with this method of enforcement with regards to wearing a mask in public ($m = 2.18, sd = 1.100$) than the ethnic group Other ($m = 3.00, sd, 1.354$). African-Americans ($m = 2.39, sd = 1.133$) were not statistically different from either of the other two groups.

The second ethnicity difference that was found was for the item “Individuals should be arrested if they travel outside designated boundaries,”

($F(2,168) = 3.188, p < .05$). The LSD post-hoc analysis revealed that Caucasians were more likely to disagree with this method of enforcement with regards to traveling outside of designated boundaries ($m = 2.45, sd = 1.093$) than the ethnic group Other ($m = 3.23, sd = 1.301$). African-Americans ($m = 2.68, sd = 1.020$) were not statistically different from either of the two groups.

The third ethnicity difference that was found was in response to asking the respondents “Should people be required to temporarily stay at home from work,” ($F(2,169) = 5.044, p < .01$). The LSD post-hoc analysis revealed that African-Americans more strongly agreed with this statement ($m = 4.46, sd = .576$) than Caucasians ($m = 3.85, sd = .978$). The ethnic group Other ($m = 4.08, sd = 1.038$) was not statistically different from either of the two groups.

A class standing difference was found for one item. In response to, “Should religious services be temporarily canceled,” a significant difference was found ($F(3,165) = 2.902, p < .05$). The LSD post-hoc analysis revealed that juniors disagreed more with this statement ($m = 2.56, sd = 1.39$) than sophomores ($m = 3.40, sd = 1.221$) and seniors ($m = 3.35, sd = 1.335$). There was not a significant difference between juniors and freshmen or between freshmen, sophomores, and seniors.

Willingness to Self-Implement Social Distancing Methods

RQ 2a asks, “What are students’ perceptions of self-implementation of social distancing methods to control the spread of disease during a major outbreak?” To answer this question respondents were asked, “If there were a major outbreak of a serious contagious disease, such as avian influenza, in your community would you be willing to help control the spread of the disease without the government requiring the action?”

Ninety percent said they would stay at home from work with pay, with six percent reporting that they were unsure. When asked if they would stay at home without pay 20% said they would, 56% said they would not, and 24% were unsure. Eighty-eight percent would keep kids home from school and/or childcare centers and 74% would limit their trips to buy supplies. Seventy-nine percent indicated that they would limit their participation at large public events and 76% said they would limit their participating in social gatherings. Fifty-two percent said that they would limit their attendance, with 38% reporting they would not limit attending religious services, and 10% were unsure.

RQ 2b asks, “Does employment type, ethnicity, class standing, gender, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students’ perceptions of self-implementation of social distancing methods to control the spread of disease during a major outbreak?” A one-way ANOVA was calculated comparing each of the interval scale measures to each of the nominal scale demographic measures. There was not a significant difference seen for any of the nominal demographic scale measures.

Perceptions of Potential Problems While in Quarantine or During the Use of Social Distancing Methods

RQ 3a asks, “What are students’ perceptions of potential problems while in quarantine or during the use of social distancing methods to control the spread of disease during a major outbreak?” To answer this question respondents were asked, “If you were quarantined or affected by the implementation of social distancing methods for at least a week, how worried would you be that each of the following would happen to you?” At least 70% reported being somewhat or very worried for four out of the five questions in

this section that asked, “How worried would you be that you would experience X while being quarantined?” The one question that was asked where this was not seen was, “You might be treated unfairly because of your economic or social status,” and still over half of the respondents (57%) reported that they were somewhat or very worried that they might experience this while in quarantine. Seventy-eight percent were somewhat or very worried (49%) that they might not be able to get the health care or prescription drugs they needed, 79% were somewhat or very worried (38%) that they may be treated unfairly after the quarantine period was over because people might think they were still contagious, 72% were somewhat or very worried (48%) that they might not get paid for their time off of work, and 70% were somewhat or very worried (51%) that they may lose their job as a result of being quarantined (Table 2).

When asked about a list of problems that they might experience if they were affected by the implementation of social distancing methods for at least a week, 70% or more of the respondents reported being somewhat or very worried for all five measures in this section. Seventy-seven percent were worried that they might be unable to get the health care or prescription drugs that they needed and 74% were worried that they might not be able to use the health care system. Seventy-six percent were worried that they might not be paid for the time off work and 70% were worried that they might lose their job because of temporary closures. Eighty-two percent were worried that they might not be able to get food, water, and other supplies that they need (Table 2).

Table 2

Perceptions of Potential Problems While in Quarantine or During the Use of Social Distancing Methods (%)

Potential Problems	Very Worried	Somewhat Worried	Not too Worried	Not Worried at all
While in Quarantine				
You might be unable to get the health care or prescription drugs you need (n = 175; m = 1.78; sd = .896)	48	29	18	5
You might be treated unfairly because of your economic or social status (n = 175; m = 2.22; sd = 1.033)	33	24	32	11
You might be treated unfairly after the quarantine period was over because people thought you might be contagious (n = 175; m = 1.88; sd = .853)	38	42	15	5
You might not get paid for the time when you are not at work (n = 174; m = 1.89; sd = 1.011)	48	25	18	9
You might lose your job as a result of being quarantined (n = 174; m = 1.93; sd = 1.105)	50	20	16	14
While Social Distancing Methods are Implemented				
You might be unable to get the health care or prescription drugs you need (n = 174; m = 1.89; sd = .892)	40	37	17	6
You might be unable to get food, water, or other supplies you need (n = 173; m = 1.79; sd = .860)	44	38	13	5
You might not get paid for the time you are off work (n = 173; m = 1.90; sd = .919)	40	36	17	7
You might lose your job as a result of temporary closures (n = 174; m = 1.99; sd = 1.062)	44	26	18	12
You might not be able to use the health care system (n = 174; m = 1.87; sd = .893)	43	31	22	4

RQ 3b asks, “Does gender, ethnicity, class standing, employment type, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students’ perceptions of potential problems while in quarantine or during the implementation of social distancing methods to control the spread of disease during a major outbreak?” A one-way ANOVA was calculated comparing each of the interval scale measures to each of the nominal scale demographic measures. Statistically significant differences were seen for gender, ethnicity, and class standing and are as follows.

A gender difference was found for four items. In response to the item “You might be unable to get the health care or prescription drugs you need” while in quarantine significant difference was found ($F(1,170) = 5.420, p < .05$). Women reported being more worried about this ($m = 1.75, sd = .871$) than men ($m = 2.07, sd = .899$).

The second gender difference that was found was for the item “You might be unable to get the health care or prescription drugs you need” during the use of social distancing methods ($F(1,171) = 6.070, p < .05$). Women were more worried about this ($m = 1.64, sd = .868$) than men ($m = 1.97, sd = .909$).

The third gender difference that was found was for the item “You might not be able to use the health care system” during the use of social distancing methods, ($F(1,170) = 5.684, p < .05$). Women were more worried about this aspect ($m = 1.73, sd = .852$) than men ($m = 2.05, sd = .922$).

The fourth gender difference that was found was for the item “You might be treated unfairly after the quarantine period was over because people thought you might be

contagious,” ($F(1,171) = 5.737, p < .05$). Women were more worried about being treated unfairly ($m = 1.74, sd = .807$) than men ($m = 2.05, sd = .893$).

An ethnicity difference was found for three items. In response to the item “You might be treated unfairly because of your economic or social status” while in quarantine, a significant difference was found ($F(2,170) = 7.541, p < .01$). The LSD post-hoc analysis revealed that Caucasians were less worried about being treated unfairly ($m = 2.37, sd = 1.003$) than African Americans ($m = 1.68, sd = 1.020$) and the ethnic group Other ($m = 1.71, sd = .825$). There was not a significant difference between African-Americans and the ethnic group Other.

The second ethnicity difference that was found was for the item “You might lose your job as a result of being quarantined,” ($F(2,169) = 3.410, p < .05$). The LSD post-hoc analysis revealed that the ethnic group Other were more worried about losing their job ($m = 1.29, sd = .611$) than Caucasians ($m = 2.05, sd = 1.113$). African-Americans ($m = 1.79, sd = 1.166$) were not statistically different from either of the two groups.

The third ethnicity difference that was found was for the item “You might lose your job as a result of temporary closures” during the use of social distancing methods ($F(2,169) = 3.814, p < .05$). The LSD post-hoc analysis revealed that the ethnic group Other ($n=14$) were more worried about losing their job ($m = 1.43, sd = .756$) than Caucasians ($n=131$) ($m = 2.12, sd = 1.067$). African-Americans ($n=27$) ($m = 1.74, sd = 1.059$) were not statistically different from either of the other two groups.

A class standing difference was found for one item. In response to the item “You might be unable to get the health care or prescription drugs you need” while in quarantine, a significant difference was found ($F(3,166) = 2.655, p = .05$). The LSD post

hoc analysis revealed that sophomores were more worried ($m = 1.47$, $sd = .900$) than juniors ($m = 2.09$, $sd = .963$). There was not a significant difference between sophomores and freshmen and seniors or between juniors and freshmen and seniors.

RQ 3c asks, “Is there a significant difference between being quarantined and being affected by social distancing methods on students’ perceptions of potential problems they might experience during a major outbreak?” Paired samples t tests were calculated for each of the three sets of paired questions, which compared the mean of how worried the respondents would be that X would happen while in *quarantine* to the mean of how worried they would be that X would happen if they were affected by *social distancing methods*. The first pair compared how worried they would be about not being able to get the health care or prescription drugs that they needed while quarantine/social distancing methods were being used. The mean while in quarantine was 1.79 ($sd = .897$), and the mean while social distancing methods was being used was 1.89 ($sd = .892$). No significant difference was found ($t(173) = -1.736$, $p > .05$).

The second pair compared how worried they would be that they might not get paid for time when they were off work while quarantine/social distancing methods were being used. The mean while in quarantine was 1.90 ($sd = 1.012$), and the mean while social distancing methods was being used was 1.90 ($sd = .919$). No significant difference was found ($t(172) = -.101$, $p > .05$).

The third pair compared how worried they would be that they might lose their job as a result of quarantine/social distancing methods being used. The mean for quarantine was 1.94 ($sd = 1.106$), and the mean while social distancing methods was being used was 1.99 ($sd = 1.062$). No significant difference was found ($t(172) = -.965$, $p > .05$).

Perceptions of Quarantine Monitoring Methods

RQ 4a asks, “What are students’ perceptions of various methods of monitoring those that are in quarantine?” To answer this question respondents were asked, “If there were a major outbreak of a serious contagious disease, such as avian influenza, what is your opinion of the following ways that people in quarantine might be monitored?” The most preferred monitoring method was “daily visits to check the health of those who are quarantined,” with 77% agreeing or strongly agreeing with this method. The only other method that received favorable responses from over half of the respondents was periodic telephone calls, with 55% agreeing or strongly agreeing with this method. The least preferred monitoring method was periodic video monitoring, with 56% reporting that they disagreed or strongly disagreed with this method of monitoring. Fifty-three percent also disagreed or strongly disagreed with the having guards station outside the quarantine location and the use of electronic bracelets as methods of monitoring those in quarantine.

RQ 4b asks, “Does employment type, ethnicity, class standing, gender, age, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students’ perceptions of various methods of monitoring those that are in quarantine?” A one-way ANOVA was calculated comparing each of the interval scale measures to each of the nominal scale demographic measures. There was not a significant difference seen for any of the nominal demographic scale measures.

Quarantine Preference

RQ 5a asks, “What are students’ quarantine preferences?” To answer this question respondents were asked, “If there were a major outbreak of a serious contagious disease,

such as avian influenza, what is your opinion of the following quarantine situations?"

Fifty-three percent of the respondents reported that if a person that they lived with had to be quarantined they would prefer that they be quarantined at a quarantine facility instead of at their current residence; however, when asked, "If you had to be quarantined because you may have been exposed to a contagious disease, such as bird flu, where would you prefer to be quarantine?" 64% reported they would prefer to be quarantined at their current residence. Ninety-four percent reported being somewhat or very worried that if quarantined at their current residence they might infect other healthy people currently living at their residence. Sixty-seven percent reported that even if they were required to wear a mask to prevent spreading the contagious disease they would still want to be quarantined at their current residence. Only 34% reported that they would be frightened of being confined for at least a week if they had to be quarantined, however 19% reported that they were unsure.

RQ 5b asks, "Does age, gender, ethnicity, class standing, employment type, employment status, residence location, number of household members, type of household members, and sleeping in the same room significantly affect students' quarantine preferences?" A one-way ANOVA was calculated comparing each of the interval scale measures to each of the nominal scale demographic measures. Statistically significant differences were seen for age and gender and are as follows.

An age difference was found for one item. In response to the item "If you were quarantined at your current residence, how worried would you be that you might infect other healthy people currently living at your residence," a significant difference was found ($F(2,155) = 4.258, p < .05$). The LSD post-hoc analysis revealed that students who

were 18-19 were less worried about infecting others ($m = 1.70$, $sd = .772$) than students who were 20-21 ($m = 1.39$, $sd = .495$) and students who were 22 and older ($m = 1.41$, $sd = .498$). There was not a significant difference seen between students who were 20-21 and students who were 22 and older.

A gender difference was found for one item. In response to the item “If you were quarantined at your current residence, how worried would you be that you might infect other healthy people currently living at your residence,” a significant difference was found ($F(1,156) = 14.443$, $p < .01$). Women were more worried about potentially infecting others ($m = 1.38$, $sd = .593$) than men ($m = 1.76$, $sd = .669$).

Perceptions of Being Quarantined at a Designated Health Care Facility

RQ 6a asks, “What are students’ perceptions of being quarantined at a designated health care facility?” To answer this question respondents were asked, “If you were quarantined in a special designated health care facility, because you may have been exposed to a contagious disease, how worried would you be about the following?” Ninety percent of respondents were somewhat or very worried, with 55% being very worried, that they would be exposed to someone who was infected with the contagious disease while they were there. Eighty-eight percent said they would be somewhat worried or very worried, with 51% being very worried, that the place where they were quarantined would be overcrowded. Ninety-one percent of the respondents reported that they were somewhat or very worried, with 69% being very worried, that they would be unable to communicate with family members while they were in quarantine.

RQ 6b asks, “Does gender, class standing, ethnicity, age, employment type, employment status, residence location, number of household members, type of household

members, and sleeping in the same room significantly affect students' quarantine preferences?" A one-way ANOVA was calculated comparing each of the interval scale measures to each of the nominal scale demographic measures. Statistically significant differences were seen for gender and class standing and are as follows.

A gender difference was found for two items. In response to the item "Being exposed to someone who has the contagious disease while you were in quarantine," a significant difference was found ($F(1,171) = 10.519, p < .01$). Women reported being more worried about this ($m = 1.41, sd = .608$) than men ($m = 1.76, sd = .814$).

The second gender difference that was found was for "That you would be unable to communicate with family members" ($F(1,171) = 12.566, p < .01$). Women were more worried they would be unable to communicate with their family ($m = 1.27, sd = .587$) than men ($m = 1.66, sd = .857$).

A class standing difference was found for one item. In response to the item "Being exposed to someone who has the contagious disease while you were in quarantine," a significant difference was found ($F(3,166) = 2.691, p < .05$). The LSD post-hoc analysis revealed that sophomores were more worried about this ($m = 1.23, sd = .504$) than freshmen ($m = 1.65, sd = .782$), juniors ($m = 1.63, sd = .707$), and seniors ($m = 1.65, sd = .714$). There was not a significant difference between freshmen, juniors, and seniors.

Information Source and Trust

RQ 7a asks, "What information sources do students' trust to give them useful and accurate information in the event of a major outbreak?" To answer this question respondents were asked, "If there were an outbreak of a contagious disease, such as avian

influenza, also known as bird flu, in your community how much would you trust the following sources to give you useful and accurate information about the outbreak?" The only source that a majority (80%) said they would trust "a lot" to give them useful and accurate information was their doctor or other health care professional. Additionally 19% reported that they would trust their doctor or other healthcare professional "a little", which brought it to a total of 99% of the respondents reporting that would trust their doctor or other health care professional to give them useful and accurate information. Forty-five percent reported that they would trust government public health authorities "a lot" and forty-eight percent reported they would trust this source "a little". Twenty-eight percent of the respondents reported that they would trust newspapers, magazines, tv, or radio that they currently read, watch, or listen to "a lot" and sixty-two percent reported that they would trust this source "a little." Thirty-seven percent said that they would trust a family or a friend to give them useful and accurate information "a lot" and 54% said they trust this source "a little." Only 9% of the respondents said they would trust their employer "a lot" for accurate and useful information. Sixty-nine percent said they would trust this source "a little," but 22% reported they would not trust this source at all for accurate and useful information. Twenty-two percent reported that they would trust their professor or instructor "a lot" and 65% reported that they would trust this source "a little" to give them accurate and useful information. The source that the respondents most reported trusting "not at all," 41%, was websites and blogs that they usually read. Forty-nine percent reported that they would trust this source "a little" and 10% said they would trust this source "a lot." Twenty-four percent reported that they would trust the university

website “a lot” to give them useful and accurate information and 60% said they would trust this source “a little” (Table 3).

Chi-square was calculated to test the hypothesis of how much students trust a particular information source to give them useful and accurate information regarding a major outbreak in their community. It was hypothesized that for each category “a lot, a little, not all” would be equally represented. For all eight information sources a statistically significant difference was found (see Table 3 for descriptive statistics for each item). For the information source “doctor or other health care professional,” a significant deviation from the hypothesized values was found ($X^2 (2) = 176.197, p. < .01$). For the information source “government public health authorities” a significant deviation from the hypothesized values was found ($X^2 (2) = 54.462, p. < .01$). For the information source “newspapers, magazines, tv, or radio that you usually watch, read, or listen to,” a significant deviation from the hypothesized values was found ($X^2 (2) = 73.483, p. < .01$). For the information source “a family member or friend,” a significant deviation from the hypothesized values was found ($X^2 (2) = 53.379, p. < .01$). For the information source “your employer,” a significant deviation from the hypothesized values was found ($X^2 (2) = 92.268, p. < .01$). For the information source “your professor or instructor,” a significant deviation from the hypothesized values was found ($X^2 (2) = 81.861, p. < .01$). For the information source “website and blogs that you usually read,” a significant deviation from the hypothesized values was found ($X^2 (2) = 44.717, p. < .01$). For the information source “university website,” a significant deviation from the hypothesized values were found ($X^2 (2) = 57.792, p. < .01$).

Table 3**Perceptions of Trustworthiness of Information Sources (%)**

Information Source	A lot	A little	Not at All
Government Public Health Authorities (n = 173; m = 1.62; sd = .614)	45	48	7
Newspapers, magazines, tv, or radio (n = 174; m = 1.82; sd = .589)	28	62	10
A family member or friend (n = 173; m = 1.72; sd = .621)	37	54	9
Your doctor of other health care professional (n = 173; m = 1.21; sd = .439)	80	19	1
Your employer (n = 157; m = 2.12; sd = .547)	10	69	21
Your professor or instructor (n = 173; m = 1.91; sd = .583)	22	65	13
Websites and blogs (n = 173; m = 2.31; sd = .643)	10	49	41
University Website (n = 173; m = 1.91; sd = .627)	24	60	16

Discussion

This study explored the perceptions of undergraduate college students with regard to quarantine and social distancing methods in the event of an influenza pandemic. The results indicated that the undergraduate college students in this study favored the use of government implemented quarantine and social distancing methods, except for requiring that religious services be temporarily canceled. They are also worried about the potential problems that may occur as a result of the implementation of quarantine and social distancing methods, and the only information source that the majority of them trust to give them useful and accurate information regarding an influenza pandemic in their community was their physician or other health care professional. Several gender, ethnicity, and employment type differences were found. Interestingly, few age and class standing differences were found.

This study was based on a study conducted by Blendon et al. (2006) that looked at the publics' perceptions of quarantine and a few social distancing methods in the U.S. and three Asian countries: Hong Kong, Singapore, and Taiwan. They surveyed approximately 500 adults age eighteen and older in each country by phone. This study converted the phone survey used in the Blendon et al. (2006) study to a paper format survey and then added additional questions related to social distancing methods were added. Questions were also modified or added to relate to the lifestyle of college students.

Perceptions of Government Implemented Quarantine and Social Distancing Methods to Control the Spread of Disease

Three scenarios were given in both studies: requiring people who have been exposed to the disease to be quarantined, requiring everyone to wear a mask in public,

and requiring everyone to have their temperature taken in public. A fourth measure was added to this study: restricting travel outside designated boundaries. Of the three measures that both studies looked at only one was similar in both studies, “requiring people suspected of having been exposed to the disease to be quarantined,” with 76% favoring this measure in the Blendon et al. (2006) study and 68% favoring it in this study. For all three measures the respondents in this study favored each of these measures less than respondents in the Blendon et al. (2006) study. The fourth measure, that was examined in this study only “restricting travel outside designated boundaries,” was viewed favorably by more respondents than opposed it, 46% and 35% respectively (Table 1).

Both studies also looked at the perceptions of respondents when a penalty, being arrested, for not complying with the requested behavior would be enforced. The percentage of those that were in favor of those measures being used dropped in both studies when being arrested was given as an option for those who did not comply. This study also looked at perceptions of another penalty being enforced for those who did not comply, fines. In all four measures what support was given for the measures declined, however being arrested for not complying had the strongest opposition in all four scenarios (Table 4).

Table 4
Comparison of Disease Containment Strategy Between Two Studies
(% favor)

Disease Containment Strategy	Baker	Blendon et al. (2006)
Requiring people suspected of having been exposed to the disease to be quarantined	68	76
Individuals should be fined if they refuse to be quarantined	41	N/A
Individuals should be arrested if they refuse to be quarantined	33	42
Everyone should be required to wear a mask in public	30	53
Individuals should be fined if they refuse to wear a mask in public	23	N/A
Individuals should be arrested if they refuse to wear a mask in public	16	27
Everyone should be required to have their temperature taken to screen for illness before entering public places	27	44
Individuals should be fined if they refuse to have their temperature taken to screen for illness before entering public places	19	N/A
Individuals should be arrested if they refuse to have their temperature taken to screen for illness before entering public places	11	23
Restricting travel outside designated boundaries	46	N/A
Individuals should be fined if they travel outside designated boundaries	33	N/A
Individuals should be arrested if they travel outside designated boundaries	21	N/A

It is interesting to note that employment type (being a health care worker or having a family member or friend that is a health care worker) and ethnicity had a significant effect on the level of opposition to the four scenarios that were given. Respondents that reported that they themselves were health care workers or one of their family members or friends were health care workers were less opposed to all measures requiring people to wear a mask in public and being fined or arrested if they refused and

all measures requiring people to have their temperature taken before entering public places and being fined or arrested if they refused. This may be because they understand how infectious diseases are spread more than the rest of the population due to their work in the health care industry or because they have heard about it from family or friends that work in health care. Having an increased knowledge of how infectious diseases are spread may be why this subpopulation were more favorable towards these methods than the general population, even if individuals could be arrested or fined.

Caucasians were more opposed to people being arrested if they refused to wear a mask in public and for traveling outside of designated boundaries than the ethnic group Other, which included Asians. This could be because the ethnic group Other, which included Asians, may be from foreign countries or have family still in foreign countries where these measures have been enforced during an outbreak of infectious disease. As reported in Blendon et al. (2006), the use of quarantine and wearing masks during the SARS outbreak in Asian countries was common and was highly favored as a method to control the spread of disease in the Asian countries that were surveyed. Previous personal or familial experience could be the reason that such a difference was seen. Another possible explanation that is similar to the previous one is cultural difference. U.S. culture is individualistic with an emphasis on individual rights, whereas Asian cultures are a collective society where individuality is not promoted and individual rights are not guaranteed. Because of the emphasis on individual rights in U.S. culture, requiring actions that limit their personal freedoms and rights is may be viewed negatively. These cultural differences could account for the difference seen in the results.

It appears from both of these studies that Americans, including college students, are in favor of the use of quarantine methods for people who have been exposed to the disease. However, they are not favorable to imposing penalties for those who do not comply for quarantine or any of the measures where not complying resulted in penalties. Yet, just because the public and college students do not have a favorable opinion about imposing penalties on those who do not comply does not mean that imposing penalties does not help ensure compliance. For instance, Cava et al. (2005b) reported that during the SARS outbreak in Toronto that quarantine compliance was high. Many participants in the study reported that they complied with the quarantine order to be “good citizens” and because of “civic duty,” but many also reported complying because of social pressures and legal reasons, such as a \$5,000 fine that was imposed if they were found having left their house. It could be that these measures would help ensure compliance but were perceived unfavorably because the respondents would not these measures taken against them if they did not comply.

This study also looked specifically at a variety of social distancing methods that may be used to control the spread of disease, such as requiring people to temporarily stay at home from work, temporarily closing schools and/or child care centers, canceling public events, temporarily closing businesses that promote social gatherings, and temporarily canceling religious services. Fifty percent or more agreed with the use of all of these measures except for one, temporarily canceling religious services. Thirty eight percent agreed that religious services should be temporarily canceled, 37% disagreed, and 25% reported being neutral on this subject. This is an interesting finding, although it is unclear as to why the respondents felt this way. It may be that regardless, of the small

distance between people, the large numbers of people attending weekly services, and the increased risk of disease transmission that would be possible, the one place they feel they would need to be during a devastating outbreak is their place of worship. It could also be that because of the religious freedoms in the U.S., any mandatory government restriction on them is strictly opposed. If each individual place of worship decided on their own to stop holding services for a short time or as an individual they decide that will not attend religious services to protect themselves and others, their perceptions may be different.

Another interesting result is that African-Americans more strongly favored requiring people to temporarily stay at home from work than Caucasians. However, it is unclear as to why this difference is seen.

According to this study, college students favor and would implement the social distancing methods listed above. These are promising results, and further research should be done to determine the general public's perception of social distancing methods, as this was not looked at in the study conducted by Blendon et al. (2006).

Willingness to Self-Implement Social Distancing Methods

The respondents were also asked what they would be willing to do regarding social distancing methods, without the government requiring them to do so. The majority were willing to stay at home with pay, keep kids home from school and/or child care centers, limit their trips to buy supplies, limit their participation in large public events and social gatherings, and limit attending religious services. This is interesting because only 38% agreed that religious services should be temporarily canceled, but 52% reported that they would limit their attendance at religious services. It appears that they are more willing to self impose restrictions on attending religious services in order to help control

the spread of disease as long as it is not a required action by the government. These perceptions of college students regarding social distancing methods are very positive. Since the study conducted by Blendon et al. (2006) did not look into the general public's perceptions of social distancing methods further investigation into the general public's perceptions of social distancing methods needs to be conducted.

Perceptions of Problems While in Quarantine or During the Use of Social Distancing

Methods

Blendon et al. (2004) reported that during the SARS outbreak in Toronto, of the 22% that were quarantined, 75% reported that being quarantined was a problem and 24% reported that being quarantined was a major problem. The major problems that were reported were not being able to get regular medical care and prescriptions, food and water, inability to communicate with family members who were not there, not getting paid because of missed work and emotional difficulties of being confined. This study, as well as Blendon et al. (2006), asked the respondents how worried they would be for all of the major problems reported in the Blendon et al. (2004) study except for emotional difficulties, and both studies added additional measures that addressed social stigma. Seventy percent or more of the respondents in this study reported being somewhat or very worried about all of the possible problems listed regarding quarantine, except for one, "You might be treated unfairly because of your economic or social status," which 57% of the respondents reported being somewhat or very worried about this potential problem. This could be due to the fact that the majority (76%) of the respondents in this study were Caucasian and do not feel that they would be discriminated against.

When comparing the results of this study to the Blendon et al. (2006) study, similar responses for “very worried” were reported. However, the percentages in this study for those being very worried were 5-11% higher for all questions, except for “You might be treated unfairly because of your economic status.” The results in both studies, regarding economic status, were approximately the same with Blendon et al. (2006) reporting 32% and this study reporting 33% of the respondents were very worried about being treated unfairly because of economic status.

Additionally, this study also asked similar questions about potential problems with regard to the implementation of social distancing methods. This is the first study, that has looked at public perception of the implementation of social distancing methods in the event of an influenza pandemic. For all measures, 70% or more reported being somewhat or very worried about the potential problems that could occur. An additional measure was added to this section that asked “How worried would you be about being able to get food and supplies while social distancing methods have been implemented?” Eighty-two percent of the respondents reported being worried or very worried about this. DiGiovanni et al. (2004) reported that this was a major issue for those affected by quarantine during the SARS outbreak in Toronto and that students and single people had greater difficulty in relying on or obtaining help from others.

The results indicate that with regard to both quarantine and the use of social distancing methods 70% or more of the respondents were somewhat or very worried about all of the potential problems that could occur during quarantine or the use of social distancing methods except one question related to quarantine, which was reported earlier.

It is also interesting to note that several gender, ethnic group, and class standing differences were found. Women were more worried than men about not being able to get health care or prescriptions while in quarantine and about being treated unfairly after the quarantine period was over because people might think they are still contagious. Women were also more worried about not being able to use the health care system, get health care, or prescriptions while social distancing methods were being used. The differences seen in responses due to the use of quarantine and social distancing methods with regard to not being able to access the health care system, get health care, or prescriptions may be due to the role that women play in overseeing the healthcare of herself as well as her family. Regarding their perception that they would be treated unfairly because people might think they are still contagious, this may be due to women being more conscious and concerned than men about other peoples' thoughts and opinions.

Caucasians were less worried than African Americans and the ethnic group Other about being treated unfairly because of economic or social status. This could be because African Americans and other ethnic groups may perceive themselves as minorities and that by being a minority they would not be treated fairly. The same would hold true of those that made less money. The perceptions of African Americans and those in the ethnic group Other is may be that being Caucasian and having a more affluent economic status would entitle them to better health care and access to drugs and other necessities in the event that a pandemic did occur. The ethnic group Other was more worried than Caucasians about potentially losing their job after being quarantined or because of temporary closures due to the use of social distancing methods. This again is probably due to the perception of being a minority and that by being a minority they would be

more likely to be let go from their jobs than Caucasians. It could also have to do with the type of employment that they are currently working in. If they are working part-time jobs or their job is lower in the hierarchy of positions within their company they may perceive that their jobs would be disposable due to the economic hardship that may result from a pandemic.

Another interesting result was that the respondents in this study were equally worried, regardless of whether quarantine or social distancing methods were being used, about not being able to get health care or prescription drugs, not getting paid for time when they were off work, or losing their job as a result of being quarantined or affected by the use of social distancing methods. So regardless of the type of disease control method implemented these fears would be prevalent and need to be addressed prior to a pandemic actually occurring.

DiGiovanni et al. (2004) reported that a major factor of non-compliance for individuals who were told they should follow the quarantine protocol, but did not comply, was the fear of loss of income. The results of this study indicate that non-compliance for fear of loss of income could be an issue for the college students in this study. Eighty-one percent of the respondents in this study work either full-time or part-time jobs. Seventy-two percent reported being worried that they might not be paid for their time off work and 70% were worried that they may lose their job because of being in quarantine. Seventy-six reported being worried that they might not be paid for their time off work and 70% were worried that they may lose their job due to temporary closures while social distance methods were being used. This matter should be

investigated further and policies should be developed to address these issues should there be a need for people to stay at home for work during an influenza pandemic.

Perceptions of Quarantine Monitoring Methods

When respondents were asked about their perceptions of monitoring methods while in quarantine the results were very similar to the Blendon et al. (2006) study. They both reported that there were only two methods that the majority of the respondents favored, daily visits to check the health of those quarantined and periodic telephone calls. The more invasive or socially stigmatizing methods of monitoring, periodic video monitoring, electronic bracelets (such as those used for house arrest), and having guards stationed outside the place of quarantine, which could be their home, were opposed by the majority of the respondents in both studies. The strongest support was reported for daily visits to check the health of those who are quarantined, with 77% of the respondents in this study and 84% of the respondents in the Blendon et al. (2006) study favoring this method. These results are important as people would have to be monitored to determine if they were following quarantine orders and knowing which methods are favored could help policy makers decide which methods should be implemented to monitor those in quarantine.

Quarantine Preference

There was an interesting difference between this study and Blendon et al. (2006) regarding where respondents preferred the people that they lived with to be quarantined. Although the majority of respondents in both studies preferred that they themselves be quarantined at that their current residence, 64% in this study and 70% in the Blendon et al., 47% of respondents in this study reported that if a person they lived with had to be

quarantined they would prefer them to quarantined at their current residence and the majority 53% would prefer that they be quarantined at another facility. This is a large difference from the Blendon et al. (2006) study, which reported that the majority (71%) would prefer that someone that they lived with to be quarantined at their current residence. One explanation is that 28% of the respondents in this study are college students and live with roommates and not family members, while the Blendon et al. (2006) surveyed the general public who are more likely to live with their families or alone. These results are astounding as the university that was surveyed in this study is a large urban university where a large majority of the students live off campus (88%) and with family (64%), either their parents and/or siblings or their spouse and/or children. The results could be even higher for “preferring that they be quarantined at another facility” and would have a more substantial impact on more traditional campuses where a majority live on campus and/or with roommates. This issue could be incredibly should be investigated further on a variety of campuses.

Perceptions of Being Quarantined at a Designated Health Care Facility

This study, as well as Blendon et al. (2006), also looked at how worried respondents would be about certain aspects if they were required to be quarantined at a designated health care facility. Both studies reported that a majority of the respondents were worried about being unable to communicate with family members while quarantined in a designated health care facility. Blendon et al. (2006) reported that 56% would be very worried about this, while the results from this study show that 69% would be very worried about not being able to communicate with their family members or friends. Both studies similarly reported that over half of the respondents were very

worried about being exposed to someone with the disease if they were quarantined in a designated health care facility, with this study reporting that 55% would be very worried and 56% in Blendon et al. (2006). These issues need to be addressed in order to increase compliance and make the quarantine experience less fear provoking and as pleasant as possible. With the technology that we have today communicating with family members or friends should not be an issue. Portable and mobile communication devices, such as mobile phones, BlackBerries, laptops, etc., if not already owned by the individuals that are in quarantine should be provided so that they can keep in contact with their family and friends and can at least relieve some of their anxiety about being quarantined away from their home and significant others.

Information Source and Trust

In order to cope with quarantine, one of the coping methods that was reported was the need for trustworthy information both during and after quarantine (Blendon et al., 2004; Cava et al., 2005a; DiGiovanni et al., 2004) this would probably hold true for social distancing methods as well. Trust related to information source was also explored in this study, as well as Blendon et al. (2006). The results of these measures also proved to be interesting, as some results were similar but others differed. Both studies reported that the only source that was trusted “a lot” by a majority of the respondents was “your doctor or other health care professional,” with 80% of the respondents in this study and 78% in Blendon et al. (2006). They were also similar in their trust of government public health authorities (45% this study and 40% in Blendon et al. (2006)) and newspapers, magazines, TV, or radio (28% this study and 27% in Blendon et al. (2006)). These results are very interesting as communication strategies generally tend use government public

health authorities and media to deliver messages and influence behavior. These results indicate that doctors and other health care professionals must be brought into the communication strategies that are being developed so that they can deliver messages and influence public behavior. This may be done in a number of ways: discussing it with patients during their appointments, sending out information via mail and email, and using automated telephone messages.

They differed however in trust of their employer and a family member or friend. The results of this study indicated that only 9% of the respondents would trust their employer, compared to 30% in Blendon et al. (2006). This is interesting as people might assume that this is the case because most college students hold part-time jobs instead of full-time jobs as the general public would hold, however 57% of the students in this study indicated that they worked a full-time job. Only 37% in this study reported that they would trust a family member or friend where 52% reported that they would trust a family member or friend in Blendon et al. (2006). This is also interesting as 64% of the respondents in this study live with their family members.

Because this study surveyed college students they were also asked how much they would trust their professor or instructor, the university website, and websites and blogs, which would be common sources of information for college students. The least trustworthy source of these three sources was websites and blogs that they regularly visit, with only 10% of the respondents reporting that they trusted this source “a lot” for useful and accurate information. This is very interesting as college students use this information medium heavily. A possible explanation for this could be the qualification “that they regularly visit.” It is unlikely that college students regularly visit websites and blogs that

would contain useful and accurate information such as the Center for Disease Control website or the Department for Health and Human Services website. Both of these entities websites also contain websites within them that pertain specifically to pandemic influenza (<http://www.cdc.gov/flu/avian/> and www.pandemicflu.gov, respectively). It is more likely that college students spend the majority of their time on websites and blogs, such as Facebook, MySpace, iTunes, etc. However, these websites could potentially be used to disseminate information to this specific part of the population and methods of doing so should be investigated further.

With regard to the other two information sources that are particularly college student specific, their professors or instructors and the university website, results were similar between the two with 22% and 24% of respondents, respectively, indicating that they trusted these sources “a lot” for useful and accurate information during a major outbreak in their community. These are interesting results and one wonders why the percentage would be so low. One possible explanation is that they are not considering how a pandemic would affect their schoolwork. However, in today’s world technology is prevalent in the classroom and studies could continue fairly uninterrupted with the use of technologies already in place such as OnCourse and Blackboard, which are online teaching and learning environments. These technologies enable professors and instructors to conduct class without actually being there or enhance their lecture class by posting or emailing lectures and notes. This type of platform also enable students could turn in homework, papers, and exams and have “conversations” amongst the class via discussion threads. Another possible explanation is that college students do not perceive their professors or instructors or the university website as being knowledgeable about

pandemics and about what they should be doing while one is occurring in their community.

Limitations

Limitations of this study include sampling method and survey construction. Convenience sampling was used to obtain the survey population and while the classes that were chosen for this study represented a wide variety of majors ranging from liberal arts to engineering, and including health professions, it was not a random sample of the undergraduate population. A random sample of college students may produce different results.

An additional limitation was the survey construction. The original study that this was based on Blendon et al. (2006) was originally written as a telephone survey, not a paper survey, and in retrospect the survey questions should have been more effectively adapted to a paper survey style. Also more questions that particularly pertained to college students, such as how quarantine and social distancing methods may affect their classes and other university related activities would also be applicable. It would have also been interesting to include measures on how likely they would comply with quarantine and social distancing methods if various penalties or no penalties at all were imposed for not following quarantine and social distancing orders. It also should have been pre-tested for length and clarity before being administered to the survey population.

Conclusion

The results of this study have proved to be very interesting and warrant further investigation on other types of college campuses so that perceptions of all types of college students can be ascertained, generalizations can be made, and policies and

communication strategies can be developed to help ensure compliance with quarantine and social distancing methods should they be implemented in the event of an influenza pandemic.

Blendon et al. (2006), suggested that the public should be asked to voluntarily cooperate in the event of an outbreak that requires the use of quarantine. However, this may or may not be justified. Just because the public is not in favor of penalties being applied if they do not comply with the requested behavior does not mean that they would not comply if those same penalties were enacted. In fact, it may be that they do not favor penalties being applied because they do not intend to comply with the measures and do not want to be fined or arrested for not complying with the requested behavior.

Also, due to the level of worry indicated about the potential problems that one could face during quarantine or the use of social distancing methods policies and communication strategies should be developed to alleviate these concerns as much as possible, specifically those concerns about the potential loss of wages and jobs as a result of quarantine and social distancing methods being implemented.

Further research also needs to be conducted to determine how living with roommates would affect quarantine situations and how this should be handled on college campuses. The results of this study, with only 12% of the respondents living on campus and 28% living with roommate(s) other than family, had an effect on whether they would want other people living with them to be quarantined at their current residence or at a quarantine facility, with 53% reporting that they would want them to be quarantined at a different facility. This is strikingly different from the results reported in Blendon et al. (2006), with only 29% of the general public reporting that they would want the other

people living with them to be quarantined at a quarantine facility. This needs to be investigated on more traditional campuses where a greater number of students live on campus and with roommates other than their family and policies need to be developed within universities to handle this issue should the need arise.

Practical Implications

How do we use this information to help prepare universities and the student population in the event that an influenza pandemic does occur? From the results that this study has produced three suggestions are given:

- 1) Increase the credibility of the university and its website and their professors and instructors in the area of pandemic influenza and infectious disease containment so that students will trust them more as information sources. This can be done by partnering with the student health center on campus, the hospitals on or near campus, local physicians, and public health authorities. The results of this study indicated that doctors and other health care providers and public health authorities were the top two sources of information that respondents trusted. By partnering with these entities and including their websites, checklists, and video clips pertaining to pandemic influenza and disease containment strategies on the university websites, listservs, other communications, and in the classroom the credibility for these sources that was previously low should increase.
- 2) Develop a communication plan that uses modern technology and information mediums that students already use to deliver useful and accurate information. This relates to the first strategy but also builds on it and includes getting the credible information out to entities such as Face Book and My Space, as well as including

audio and video clips on iTunes. iTunes is a very well known and used website and computer application among college students, and they have recently developed a portion of their website for universities, known as iTunes U <http://www.apple.com/education/itunesu/>. iTunes U lets universities upload audio and video files to their own school specific section of the site where students or any iTunes user can listen to or view the files for free. iTunes U, as well as Face Book and My Space, would be excellent ways to get useful and accurate information to students. Video and audio files of physicians, other health care professionals, and public health authorities discussing what pandemic influenza is, how it is spread, how you can protect yourself, and the current disease containment strategies that are being implemented could be posted and viewed or listened to by potentially everyone on campus.

3) Develop quarantine and social distancing plans for students, especially those that live on campus, so that if they have been exposed or someone they live with has been exposed to the disease a plan is already in place to facilitate quarantine and social distancing actions. The results of this study have shown that students support the use of quarantine and social distancing methods and would be willing to self-impose social distancing methods as well. Because they are already in favor of most of the proposed measures implementing social quarantine and social distancing methods should not be a major issue, as long as the information is given by trusted sources and is accurate, clear, concise, and useful.

The major problem that should be addressed is that over half of the respondents prefer that if the other people living with them have been exposed to

the infectious disease that they be quarantined in another facility. This was a not an issue in the general public survey from Blendon et al. (2006) as only 25% preferred to have other household members quarantined at a separate facility. Only 28% of the respondents in this study live with roommates that are not members of their family, this percentage would drastically increase on a more traditional campus where the vast majority live with roommates that are not family members and potentially so would the percentage of people that preferred to have their roommates quarantined at a separate facility. This a major problem that has not been previously looked at and a plan needs to be developed that addresses where people that have been exposed to the disease can be placed: Do they get sent home to their families? If so how would they be transported there, would they drive themselves?

Or is there a facility on campus where all people who are suspected of having been exposed to the disease are put in quarantine? If this is the case communication plans on how information can be sent and received by those in quarantine must be developed, as this was a major concern for the respondents in the study and was also a coping method for those people were placed in quarantine during the SARS outbreak. They also need to address the fear of getting the disease from others that are also in quarantine? Will they all be kept in the same room? Will they all wear masks? Will they be in rooms with special ventilation systems?

Another major concern that needs to be addressed surrounding college students is their parents. How will parents be notified and what information will

they be given? Will they be allowed to communicate with or see their children while they are in quarantine? Will they be given the option of coming to pick them up from the quarantine facility and take them home?

All of these questions need to be answered and a plan needs to be developed so that if a pandemic does occur on campuses nationwide, and worldwide, they will be prepared and will already have a well thought out plan in place that can be implemented when the pandemic does arrive.

Appendix

Please take a few minutes and thoughtfully complete the attached survey.

Your complete confidentiality is guaranteed. Personal identifiable data will not be collected. No person will see the completed questionnaires other than the researchers, and reports will not cite information that may threaten anonymity.

In order to ensure confidentiality, please do not put your name anywhere on the survey.

Your participation is totally voluntary, and you may elect to quit filling out the survey at any point.

Thank you for your participation!

Please **CIRCLE** the best answer from the choices on the right.

1. What is your gender?	Male Female
2. What is your age?	18 19 20 21 22 and over
3. What is your current class standing?	Freshman Sophomore Junior Senior Grad Student
4. What is your major? (Please write in the blank in the next column)	_____
5. What is your ethnicity?	Caucasian African American Asian Hispanic Other
6. Are you a U.S. citizen?	Yes No
7. Do you work?	Full-time Part-time Not Currently Working
8. Are you or is another member of your family or a friend a health care worker?	Yes No
9. What best describes your current living situation?	On-campus Off-campus
10. Who do you currently live with?	Parents and/or siblings Roommates Spouse and/or children Alone
11. How many people, including yourself, currently live in your place of residence?	1 2 3 4 5 or more
12. On a regular basis, do you sleep in the same room with another person?	Yes No

If there were a major outbreak of serious contagious disease, such as avian influenza (also know as bird flu), the government could take a number of temporary steps to control its spread. Please circle the choice that most closely matches your opinion of each.

Please CIRCLE the best answer from the choices on the right.

- SD = Strongly Disagree**
- D = Disagree**
- N = Neutral**
- A = Agree**
- SA = Strongly Agree**
- NA= Question Not Applicable**

QUESTION	
13. People suspected of having been exposed to the disease should be quarantined.	SD D N A SA NA
14. Individuals should be arrested if they refuse to be quarantined.	SD D N A SA NA
15. Individuals should be fined if they refuse to be quarantined.	SD D N A SA NA
16. Everyone should be required to wear a mask in public.	SD D N A SA NA
17. Individuals should be arrested if they refuse to wear a mask in public.	SD D N A SA NA
18. Individuals should be fined if they refuse to wear a mask in public.	SD D N A SA NA
19. Everyone should be required to have their temperature taken to screen for illness before entering public places.	SD D N A SA NA
20. Individuals should be arrested if they refuse to have their temperature taken to screen for illness before entering public places.	SD D N A SA NA
21. Individuals should be fined if they refuse to have their temperature taken to screen for illness before entering public places.	SD D N A SA NA
22. Restricting travel outside designated boundaries.	SD D N A SA NA
23. Individuals should be arrested if they travel outside designated boundaries.	SD D N A SA NA
24. Individuals should be fined if they travel outside designated boundaries.	SD D N A SA NA

Below is a list of ways that people in quarantine might be monitored. Please circle the choice that most closely matches your opinion of each.

25. Periodic telephone calls.	SD D N A SA NA
26. Periodic video monitoring.	SD D N A SA NA
27. Daily visits to check the health of those who are quarantined.	SD D N A SA NA
28. Electronic bracelets.	SD D N A SA NA
29. Guards stationed outside the place where people are quarantined.	SD D N A SA NA

For the following questions please circle the choice that most closely matches your opinion.

30. If you currently live with other people, and one of those people had to be quarantined because they may have been exposed to a contagious disease, such as avian influenza, would you prefer to have them quarantined:	At your current residence In a separate quarantine facility Other: _____ I live alone
31. If YOU had to be quarantined because YOU may have been exposed to a contagious disease, such as bird flu, would you prefer to be quarantined:	At your current residence In a separate quarantine facility Other: _____
32. If you were quarantined at your current residence, how worried would you be that you might infect other healthy people currently living at your residence?	Very Worried Somewhat Worried Not too Worried Not Worried at all I live alone Other residents would leave
33. If you were required to wear a mask at all times to prevent spreading the contagious disease to healthy people currently living at your residence, would you want to be quarantined at:	Your current residence In a separate quarantine facility I live alone Other residents would leave
34. If you had to be quarantined, would you be frightened by being confined for at least a week?	Yes No Unsure

If you were quarantined in a special designated health care facility, because you may have been exposed to a contagious disease, how worried would you be about the following:

35. Being exposed to someone who has the contagious disease while you were in quarantine?	Very Worried	Somewhat worried
	Not too worried	Not worried at all
36. That the place where you are quarantined may be overcrowded?	Very Worried	Somewhat worried
	Not too worried	Not worried at all
37. That you would be unable to communicate with family members?	Very Worried	Somewhat worried
	Not too worried	Not worried at all

Below is a list of problems people might experience while quarantined. If you were quarantined for at least a week, how worried would you be that each of the following would happen to you:

38. You might be unable to get the health care or prescription drugs you need	Very Worried	Somewhat worried
	Not too worried	Not worried at all
39. You might be treated unfairly because of your economic or social status	Very Worried	Somewhat worried
	Not too worried	Not worried at all
40. You might be treated unfairly after the quarantine period was over because people thought you might be contagious	Very Worried	Somewhat worried
	Not too worried	Not worried at all
41. You might not get paid for the time when you are not at work.	Very Worried	Somewhat worried
	Not too worried	Not worried at all
42. You might lose your job as a result of being quarantined	Very Worried	Somewhat worried
	Not too worried	Not worried at all

Public health authorities have also discussed the possible use of social distancing methods if there were an outbreak of a contagious disease, such as avian influenza (also known as bird flu). Social distancing methods include: asking people to stay home from work, keeping kids home from school and daycare, canceling large public gatherings such as sporting events and parades, closing of small businesses that promote social gatherings such as shopping centers, coffee shops, restaurants, and bars, or canceling religious services. In order to keep the disease from spreading, people may be asked to participate in one or more of these social distancing methods.

If there were a major outbreak of a serious contagious disease, such as avian flu, the government could take a number of temporary steps to control its spread. Please circle the choice that most closely matches your opinion of each.

Please CIRCLE the best answer from the choices on the right.

- SD = Strongly Disagree**
- D = Disagree**
- N = Neutral**
- A = Agree**
- SA = Strongly Agree**
- NA= Question Not Applicable**

43. Should people be required to temporarily stay at home from work?	SD	D	N	A	SA	NA
44. Should schools and/or child care centers be temporarily closed?	SD	D	N	A	SA	NA
45. Should large public events be canceled, such as sporting events, concerts, parades, etc.	SD	D	N	A	SA	NA
46. Should businesses that promote social gatherings be temporarily closed, such as shopping centers, coffee shops, bars, restaurants, etc.	SD	D	N	A	SA	NA
47. Should religious services be temporarily canceled?	SD	D	N	A	SA	NA

If there were a major outbreak of a serious contagious disease, such as avian influenza (also known as bird flu), in your community would you be willing to help control the spread of the disease without the government requiring the action for the following items?

48. Stay home from work with pay	Yes	No	Unsure	
49. Stay home from work without pay	Yes	No	Unsure	
50. Keep kids home from school and/or child care centers	Yes	No	Don't have kids	Unsure
51. Limit trips to buy supplies	Yes	No	Unsure	
52. Limit your participation at large public events	Yes	No	Unsure	

53. Limit your participation in social gatherings	Yes	No	Unsure
54. Limit attending religious services	Yes	No	Don't attend religious services Unsure

Below is a list of problems people might experience while social distancing methods had been implemented. If you were affected by the implementation of social distancing methods for at least a week, how worried would you be that each of the following would happen to you?

55. You might be unable to get the health care or prescription drugs you need	Very Worried	Somewhat worried
	Not too worried	Not worried at all
56. You might be unable to get food, water, and other supplies you need	Very Worried	Somewhat worried
	Not too worried	Not worried at all
57. You might not get paid for the time you are off work	Very Worried	Somewhat worried
	Not too worried	Not worried at all
58. You might lose your job as a result of temporary closures?	Very Worried	Somewhat worried
	Not too worried	Not worried at all
59. You might not be able to use the health care system?	Very Worried	Somewhat worried
	Not too worried	Not worried at all

If there were an outbreak of a contagious disease, such as avian influenza (also known as bird flu), in your community how much would you trust the following sources to give you useful and accurate information about the outbreak?

60. Government public health authorities (for example: the director of the CDC)	A lot	A little	Not at all
61. Newspapers, magazines, TV, or radio that you usually watch, read, or listen to	A lot	A little	Not at all
62. A family member or friend	A lot	A little	Not at all
62. Your doctor or other health care professional	A lot	A little	Not at all
63. Your employer	A lot	A little	Not at all
	Not working		
64. Your professor or instructor	A lot	A little	Not at all
65. Website and blogs that you usually read	A lot	A little	Not at all
66. The university website	A lot	A little	Not at all

References

- Apple Inc. (2007). *iTunes: the campus that never sleeps*. Retrieved on June 7, 2007 from <http://www.apple.com/education/itunesu/>
- Blendon, R.J., Benson, J.M., DesRoches, C.M., Raleigh, E., Taylor-Clark, K. (2004). The public's response to severe acute respiratory syndrome in Toronto and the United States. *Clinical Infectious Diseases*, 38(7), 925-931.
- Blendon, R.J., DesRoches, C.M., Cetron, M.S., Benson, J.M., Meinhardt, T., & Pollard, W. (2006). Attitudes toward the use of quarantine in a public health emergency in four countries. *Health Affairs*, 25, pp.w15-w25. Published online 24 January 2006; 10.1377/hlthaff.25.w15.
- Bruce, M., Rosenstein, N., Capparella, J., Shutt, K., Perkins, B., & Collins, M. (2001). Risk factors for meningococcal disease in college students. *Journal of the American Medical Association*, 286(6), 688-693.
- Cava, M.A., Fay, K.E., Beanlands, H.J., McCay, E.A., & Wignall, R. (2005). Risk perception and compliance with quarantine during the SARS outbreak. *Journal of Nursing Scholarship*, 37(4), 343-347.
- Center for Disease Control and Prevention. (2002). *Ebola hemorrhagic fever information packet*. Retrieved on March 23, 2007, from http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/Fact_Sheets/Ebola_Fact_Booklet.pdf
- Center for Disease Control and Prevention. (2003). Use of quarantine to prevent transmission of Severe Acute Respiratory Syndrome—Taiwan 2003. *Morbidity and Mortality Weekly Report*, 52, 680-683. Retrieved on March 11, 2007 from <http://www.cdc.gov/mmwr/PDF/wk/mm5229.pdf>
- Center for Disease Control and Prevention. (2003b). Efficiency of quarantine during an epidemic of Severe Acute Respiratory Syndrome—Beijing, China, 2003. *Morbidity and Mortality Weekly Report*, 52, 1037-1040. Retrieved on March 11, 2007 from <http://www.cdc.gov/mmwr/PDF/wk/mm5243.pdf>
- Center for Disease Control and Prevention (2003c). *Summary of notifiable diseases, morbidity and mortality weekly report recommendations and reports*, 50(53). Retrieved March 16, 2007, from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5053a1.htm>
- Center for Disease Control and Prevention. (2004). *Isolation and Quarantine Fact Sheet, September 2004*. Retrieved on 03/10/07 from www.cdc.gov/ncidod/dq/sars_facts/isolationquarantine.pdf

- Center for Disease Control and Prevention (2004b). *Severe Acute Respiratory Syndrome: Frequently asked questions about SARS*. Retrieved March 23, 2007, from <http://www.cdc.gov/ncidod/sars/sars-faq.pdf>
- Center for Disease Control. (2006). *Key Facts About Influenza and Influenza Vaccine*. Retrieved April 7, 2007, from <http://www.cdc.gov/flu/pdf/keyfacts.pdf>
- Coordinating Center for Infectious Diseases/Division of Bacterial and Mycotic Diseases (CDC). (2005). *Meningococcal Disease: General Information*. Retrieved April 7, 2007, from http://www.cdc.gov/ncidod/dbmd/diseaseinfo/meningococcal_g.htm
- Ferguson, N.M., Cummings, D.A.T., Cauchemez, S., Fraser, C., Riley, S., Meeyai, A., Iamsrithaworn, S., & Burke, D.S. (2005). Strategies for containing an emerging influenza pandemic in Southeast Asia. *Nature*, *August 3*, 1-6.
- Froeschle, J.E. (1999). Meningococcal disease in college students. *Clinical Infectious Disease*, *29*, 215-216.
- Gammon, J. (1999). The psychological consequences of source isolation: A review of the literature. *Journal of Clinical Nursing*, *8*(1), 13-21
- Glass, R.J., Glass, L.M., Beyeler, W.E., & Min, H.J. (2006). Targeted social distancing design for pandemic influenza. *Emerging Infectious Diseases*, *12*(11), 1671-1681. Retrieved March 16, 2007 from <http://www.cdc.gov/ncidod/EID/vol12no11/pdfs/06-0255.pdf>
- Grazier, S. (1988). The loneliness barrier. *Nursing Times*, *84*(11), 44-45.
- Harvard School of Public/Health Canada/GPC Research poll. (2003). Storrs, CT: Roper Center for Public Opinion Research, 2-6 May.
- Harvard School of Public Health/International Communications Research poll. (2003). Storrs, CT: Roper Center for Public Opinion Research. 2-6 May.
- Harrison, L., Dwyer, D., Maples, C., & Billmann, L. (1999). The risk of meningococcal infection in college students. *Journal of the American Medical Association*, *281*, 1906-1910.
- Harrison, L.H., Pass, M.A., Mendelsohn, A.B., et al. (2001). Invasive meningococcal disease in adolescents and young adults. *Journal of the American Medical Association*, *286*, 694-699.
- Hawryluck, L., Gold, W.L., Robinson, S., Pogorski, S., Galea, S., & Styra, R. (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases*, *10*(7), 1206-1212.

- Heymann, A., Chodic, G. Reichman, B., Kokia, E., & Laufer, J. (2004). Influence of school closure on the incidence of viral respiratory diseases among children and on health care utilization. *The Pediatric Infectious Disease Journal*, 23, 675-677.
- Imrey, P., Jackson, L., Ludwinski, P., England, A., Fella, G., Fox, B., et al. (1995). Meningococcal carriage, alcohol consumption, and campus bar patronage in a serogroup C meningococcal disease outbreak. *Journal of Clinical Microbiology*, 33, 3133-3137.
- Jackson, L.A., Schuchat, A., Reeves, M.W., & Wenger, J.D. (1995). Serogroup C Meningococcal Outbreaks in the United States. *Journal of the American Medical Association*, 273, 383-389.
- Jackson, L.A. & Wenger, J.D. (1993). Laboratory-based surveillance for meningococcal disease in selected areas, United States 1989-1991. *Morbidity and Mortality Weekly Report*, 42(SS-2), 21-30. Retrieved April 7, 2007, from <http://www.cdc.gov/mmwr/preview/mmwrhtml/00020882.htm>
- Jordan, E.O. (1927). *Epidemic influenza: a survey*. Chicago: American Medical Association.
- Lo, J.Y.C., Tsang, T.H.F., Leung, Y.H., Yeung, E.Y.H., Wu, T., & Lim, W.W.L. (2005). Respiratory infections during SARS outbreak, Hong Kong, 2003. *Emerging Infectious Diseases*, 11, 1738-1741. Retrieved March 16, 2007 from <http://www.cdc.gov/ncidod/EID/vol11no11/pdfs/05-0729.pdf>
- Luckingham, B. (1984). To mask or not to mask: A note on the 1918 Spanish influenza epidemic in Tucson. *Journal of Arizona History*, 25, 191-204.
- McGinnis, J.P. (1977). The impact of epidemic influenza, Canada, 1918-1919. *Historical Papers The Canadian Historical Association*, 19, 120-141.
- Markel, H., Stern, A.M., Navarro, J.A., Michalsen, J.R., Monto, A.S., & DiGiovanni Jr., C. (2006). Nonpharmaceutical influenza mitigation strategies, US communities, 1918-1920 pandemic. *Emerging Infectious Diseases*, 12(12), 1961-1964. Retrieved March 31, 2007 from <http://www.cdc.gov/ncidod/EID/vol12no12/pdfs/06-0506.pdf>
- Moe, C.L., Christmas, W.A., Echols, L.J., & Miller, S.E. (2001). Outbreaks of acute gastroenteritis associated with Norwalk-like viruses in campus settings. *Journal of American College Health*, 50, 57-66.
- National Advisory Committee on SARS and Public Health. (2003). *Learning from SARS: Renewal of Public Health in Canada*. Ottawa, Ontario: Public Health Agency of Canada. October 2003. Retrieved on March 11, 2007, from <http://www.phac-aspc.gc.ca/publicat/sars-sras/pdf/sars-e.pdf>

- Neal, K.R., Nguyen-Van-Tam, J., Monk, P., O'Brien, S.J., Stuart, J., & Ramsay, M. (1999). Invasive meningococcal disease among university undergraduates: association with universities providing relatively large amounts of catered hall accommodation. *Epidemiology & Infection*, *122*, 351-357.
- Neal, K., Nguyen, V., Jeffrey, N., Slack, R., Madeley, R., AitTahar, K., Job, K. et al. (2000). Changing carriage rate of neisseria meningitidis among university students during the first week of term: Cross sectional study. *Student British Medical Journal*, *8*, 155-159. Retrieved on April 7, 2007, from <http://www.studentbmj.com/search/pdf/00/05/ppr.pdf>
- Neuzil, K.M., Hohlbein, C., & Zhu, Y. (2002). Illness among schoolchildren during influenza season: effect on school absenteeism, parental absenteeism from work, and secondary illness in families. *Archives of Pediatrics & Adolescent Medicine*, *156*, 986-991.
- Ooi, P.L., Lim, S., & Chew, S.K. (2005). Use of quarantine in the control of SARS in Singapore. *American Journal of Infection Control*, *33*(5), 252-257.
- Paneth, N., Kort, E.J., Jurczak, D., et al. (2000). Predictors of vaccination rates during a mass meningococcal vaccination program on a college campus. *Journal of American College Health*, *49*, 7-11.
- Patterson, K.D. (1983). The influenza epidemic of 1918-1919 in the Gold Coast. *Journal of African History*, *24*, 485-502.
- Pons, V.G., Canter, J., & Dolin, R. (1980). Influenza A/USSR/77 (H1N1) on a university campus. *American Journal of Epidemiology*, *111*(1), 23-30.
- Roberts, C.L., Roome, A., Algert, C.S., et al. (1996). A meningococcal vaccination campaign on a university campus: vaccination rates and factors in nonparticipation. *American Journal of Public Health*, *86*, 1155-1158.
- Rosenstein, N.E., Perkins, B.A., Stephens, D.S., Lefkowitz, L., Carter, M., Danila, R., et al. (1999). The changing epidemiology of meningococcal disease in the United States, 1992-1996. *Journal of Infectious Diseases*, *180*, 1984-1901.
- Stanwell-Smith, R., Stuart, J., Hughes, A., Robinson, P., Griffin, M., & Cartwright, K. (1994). Smoking, the environment and meningococcal disease: A case control study. *Epidemiology and Infection*, *112*(2), 315-328.
- Stuart, J., Cartwright, K., Robinson, P., & Noah, N. (1989). Effect of smoking on meningococcal carriage. *Lancet*, *2*, 723-725.

- Toronto Public Health. (2003). *SARS fact sheet*. Retrieved February 13, 2007, from City of Toronto, Toronto Public Health Web Site:
http://www.toronto.ca/health/sars/sars_002.htm
- Tsuang, W.M., Bailer, J.C., & Englund, J.A. (2004). Influenza-like symptoms in the college dormitory environment: a survey taken during the 1999-2000 influenza season. *Journal of Environmental Health*, 66(8), 39-42.
- U.S. Department of Health and Human Services. (2006a). *What is an Influenza Pandemic*. Retrieved on April 12, 2007, from
<http://www.pandemicflu.gov/general/whatis.html>
- U.S. Department of Health and Human Services. (2006b). *Avian Influenza (Bird Flu)*. Retrieved on April 12, 2007, from
<http://www.pandemicflu.gov/general/avian.html>
- U.S. Department of Health and Human Services. (2006c). *General Information*. Retrieved on April 12, 2007, from
<http://www.pandemicflu.gov/general/index.html>
- U.S. Department of Health and Human Services. (2006d). *Colleges and Universities Pandemic Influenza Planning Checklist*. Retrieved on April 12, 2007, from
<http://www.pandemicflu.gov/plan/school/collegeschecklist.html>
- Whitelaw, T.H. (1919). The practical aspects of quarantine for influenza. *Canadian medical Association Journal*, 9, 1070-1074.
- World Health Organization. (1959). Expert committee on respiratory virus disease: First report. *World Health Organization Technical Report Series*, 58, 1-59. Retrieved on March 16, 2007 from http://whqlibdoc.who.int/trs/WHO_TRS_170.pdf
- World Health Organization. (2005). *Avian Influenza: assessing the pandemic threat*. Retrieved on March 23, 2007, from
<http://www.who.int/csr/disease/influenza/H5N1-9reduit.pdf>
- World Health Organization. (2007, April 11). *Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO*. Retrieved April 12, 2007, from
http://www.who.int/csr/disease/avian_influenza/country/cases_table_2007_04_11/en/index.html
- World Health Organization Writing Group. (2006a). Nonpharmaceutical interventions for pandemic influenza, national and community measures. *Emerging Infectious Diseases*, 12(1), 88-94.

World Health Organization Writing Group (2006b). Non-pharmaceutical interventions for pandemic influenza, international measures. *Emerging Infectious Diseases*, *12(1)*, 81-87.

Wu, J., Xu, F., Zhou, W., Feikin, D.R., Lin, C.Y., He, X., et al. (2004). Risk factors for SARS among persons without known contact with SARS patients, Beijing, China. *Emerging Infectious Diseases*, *10*, 210-216