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A healthy herd: addressing the justifications for vaccine denial and applying the health belief model to the current anti-vaccination movement

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A HEALTHY HERD: ADDRESSING THE JUSTIFICATIONS FOR VACCINE DENIAL
AND APPLYING THE HEALTH BELIEF MODEL TO THE CURRENT ANTI-
VACCINATION MOVEMENT

A Thesis Submitted
in Partial Fulfillment
of the Requirements for the Designation
University Honors with Distinction

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This Study by: Sarah L. McHugh

Entitled: A Healthy Herd: Addressing the Justifications for Vaccine Denial and Applying the Health Belief Model to the Current Anti-vaccination Movement

has been approved as meeting the thesis or project requirement for the Designation University Honors with Distinction

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INTRODUCTION

In the wake of recent measles outbreaks, especially the highly-publicized incident at Disneyland in early 2015 and the extensive outbreaks among Ohio Amish in 2014 (CDC, 2015a), the argument surrounding childhood vaccinations has become a serious public health issue. Measles is a highly-contagious virus that begins with mild symptoms such as fever, runny nose, cough, red eyes, and sore throat, followed by a serious body-wide rash. It is spread through the air when people cough and sneeze. Measles is highly-contagious, so if one person has it, nine out of ten people in close contact with that individual will likely become infected if they are not protected (CDC, 2015a). According to the World Health Organization (WHO), measles is still one of the leading causes of death among children worldwide, even though there is a safe vaccine that effectively prevents it (2015). A vaccine is a medication that offers immunity to a specific disease; it creates antibodies to recognize and destroy the disease before it affects the individual (WHO, 2015).

For a number of reasons, which will be explored in this thesis, people are refusing to protect themselves and their children from measles, mumps, and rubella (MMR). With the decline in measles vaccination rates, there is a crack in the herd immunity, which is created naturally by widespread immunization. Herd immunity occurs when the majority of people in a group are protected from a communicable or contagious disease: they create a collective barrier against the disease for the remaining people who are not immune. The protected people block out the disease-causing factor from reaching the vulnerable individuals within the group. A fissure in the barrier occurs when the disease is spread throughout a group and is passed along to the unprotected individuals. Figure 1 illustrates how herd immunity works and how it is threatened by infrequent vaccination.

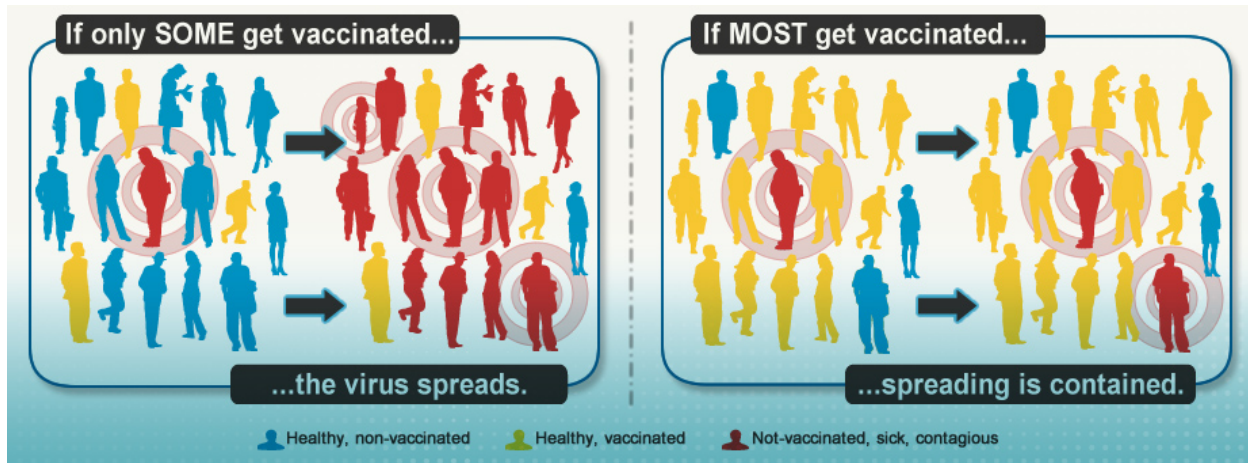


Figure 1. How herd immunity works, according to the CDC (2015e).

The vaccination-rate decline has impacted public health policy at the state and national levels, as well as jeopardized individual and societal health (Poland & Jacobson, 2001). The current anti-vaccine movement has created a critical mass of non-immunized, neutralizing the herd effect, and has put numerous people at risk. According to the Centers for Disease Control and Prevention (CDC), “widespread use of measles vaccine has led to a greater than 99% reduction in measles cases compared with the pre-vaccine era. Since 2000, when measles was declared eliminated from the U.S., the annual number of people reported to have measles ranged from a low of 37 people in 2004 to a high of 668 people in 2014” (2015c, para. 1). In other words, the disease is controllable if people cooperate with the current recommendations. Declining vaccination rates have caused a number of outbreaks of an otherwise controlled disease in 27 states. Figure 2 depicts the number of measles cases in the United States from 1994, before measles was declared eradicated, up to 2014, which had the highest number of cases since elimination, according to the *New England Journal of Medicine* and the CDC (Orenstein & Seib, 2014).

People have various reasons for not receiving the effective vaccine themselves and for denying the protection for their children. The factors involved in a person’s decision can be

separated into the constructs of the Health Belief Model, which is a behavior change model widely utilized among public health professionals. It addresses people’s perceptions about conditions, barriers and benefits of a behavior, and influential factors. Measles is a health concern that is a constant threat to everyone who is not currently protected. By exploring the reasons why people refuse the vaccine, public health efforts may be improved to guide people to trust medical professionals and scientific evidence as well as refute the popular misconceptions.

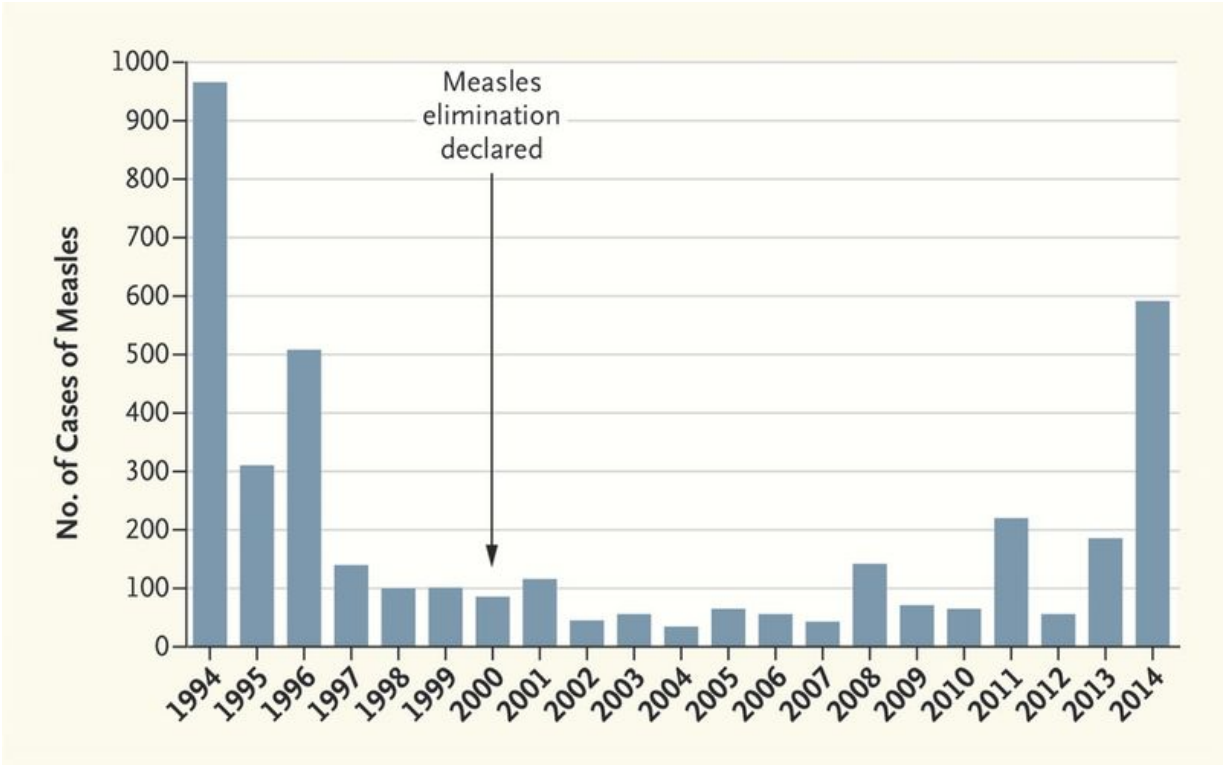


Figure 2. The number of measles cases each year in the United States, according to the New England Journal of Medicine.

PURPOSE

The purpose of this thesis is to explore and analyze the existing literature regarding the refusal to receive vaccinations designed specifically to prevent Measles-Mumps-Rubella

(MMR), which has spurred a serious public health issue that puts every unvaccinated person at risk. It will investigate the reasons people refuse to get vaccinations for themselves or their children. The analysis of the current situation and the application of the Health Belief Model to the related factors will provide potential explanations regarding how the decision-making process may strengthen efforts towards increasing vaccination rates.

CENTRAL THEMES TO BE ADDRESSED

1. The history of anti-vaccination movements, including the current movement concerning the measles vaccine.
2. The main reasons people give for not receiving vaccines or permitting their children to be vaccinated, including personal beliefs concerning vaccine safety and efficacy, religious beliefs, personal health restrictions, and any other arguments that are used.
3. Application of the Health Belief Model to the aspects of measles vaccination.
4. Proposed methods to increase vaccine awareness and vaccination rates.

METHODOLOGY

This thesis is a comprehensive literary analysis regarding the current anti-vaccination movement, the reasons behind people's vaccination decisions, and the categorization of factors into the constructs of the Health Belief Model. It is a summary of current articles and research surrounding the measles vaccine confidence gap and behavior change, as well as the acknowledgement of influence from popular media outlets. In addition, it addresses current public policies and their implications on society. The articles reviewed were from various sources, including database searches, search engine results, and current news releases.

LITERATURE REVIEW

Anti-Vaccination Movements

As far back as the introduction of the first vaccine in the 1800s for smallpox, people have been skeptical about the success of vaccines (Tafari et al., 2014). This first group of people who objected to the new concept of immunity did so because they believed smallpox could be eliminated by early notification and isolation of the sick, as well as with the destruction of contaminated items. Although these simple methods might be helpful in outbreak control, they are not as effective as the specially-created vaccine.

Whereas the first skeptics were limited to voicing their concerns via paper material and word of mouth, doubters today are able to reach virtually everyone with the utilization and accessibility of the Internet. People can be misled by their social interactions and the popular media regarding the anti-vaccination movement. The anti-vaccine movement is a complex issue, and one that public health professionals cannot ignore; therefore, Kata (2010) suggested:

more consideration must be given to the social discourses underlying anti-vaccinationism – reasons for refusing vaccines may involve alternative understandings of health, different perspectives of parental responsibility, or questioning the legitimacy of traditional authorities. These discourses exemplify postmodern tensions in society, making the anti-vaccination issue one of significant complexity (p. 1715).

A movement similar to today's issue with measles occurred when polio was prevalent. In the peak years of polio, outbreaks occurred in both rural and urban areas, and people were frightened by the possibility of being afflicted with this debilitating disease. A nationwide campaign promoting the widespread use of vaccines was launched, significantly reducing polio rates. At the time, scientists believed that these reductions, along with scientific evidence proving

the safety and effectiveness of the vaccine, would together be enough to drive all people towards receiving the vaccine, but some people still resisted (Smith et al., 2011).

The Health Belief Model was introduced in the 1950s to “learn about the barriers to polio vaccination coverage,” and it can now be used to “elucidate the barriers to increasing current vaccination coverage” (Smith et al., 2011, p. 136). The Health Belief Model has been a very influential behavior change model within public health ever since its introduction. It was utilized for this thesis to address the current measles issue “because of its historic importance in vaccination coverage research and because of remarkable parallels in parents’ sentiments during the 1950s, when the model was developed, and today” (Smith et al., 2011, p. 143). It can be used as a means to gain insight about vaccine denial and delay.

In the most recent anti-vaccine movement, focused on the MMR vaccine, the most significant event was the “Wakefield Controversy,” which began when Dr. Andrew Wakefield published an article describing a supposed connection between the vaccine and autism. What the public did not know was that Wakefield’s claims were made with an ulterior motive. In return for these statements, Wakefield received a payout from a group of lawyers planning to sue vaccine production companies (Tafuri et al., 2013). Unfortunately, the discovery of Wakefield’s secret agreement came six years after the article was published, which allowed six years for people to catch on to his ideas, stir up controversy, and launch the anti-vaccine movement. Despite the extensive scientific evidence disclaiming the motives behind anti-vaccinationism, “the anti-vaccine position became a political movement, fueled in equal parts by discredited hypotheses and paranoid ideology, to an extent that it has created ‘true believers’ impervious to revising their ideas” (Camargo & Grant, 2015, p. 233). This group of people combats the efforts of public health advocates.

Justifications Used for Vaccine Denial/Delay

There is currently an anti-vaccination movement, caused and fueled by a group of people who are not getting their children vaccinated against measles and other vaccine-preventable diseases (Tafuri et al., 2014). These skeptics are referred to by some as “anti-vaxxers.” Some parents believe that certain ingredients in these specially-developed immunizations are causing idiopathic diseases, which are, by definition, conditions with no known cause. Thus the dilemma: parents have no credible evidence that these conditions, particularly autism, are brought on by the vaccine. A report from the CDC regarding measles vaccination stated the following: “many well-conducted studies have concluded that thimerosal in vaccines does not contribute to the development of autism. Even after thimerosal was removed from almost all childhood vaccines, autism rates continued to increase” (2015d, para. 8). Parents are frightened because many times, the first signs of autism come about around two years of age, which would be soon after the first dose of the MMR vaccine is administered.

Although the results denying a causal relationship between vaccine ingredients and the onset of autism have been made clear, the fear among parents still exists. As was discovered by Poland & Jacobson (2000), “the controversy and alarm caused by anti-vaccine groups has a demonstrable detrimental effect on population-level coverage rates,” (p. 2444), which leads to outbreaks and illness. Some additional reasons that have been documented for denying or delaying vaccination are: “too many shots as the reason for their refusal; they had concerns about vaccine effectiveness, or vaccine side effects; or they had heard or read unfavorable reports about vaccines in the media” (Smith et al., 2011, p.143). It is natural that parents have a certain level of wariness about their children’s safety and well-being, but in terms of health, it is important that they make positive health decisions for their children.

Certain religious affiliations indirectly discourage believers from getting the MMR

vaccine because of limitations regarding consumption of animal products. Jewish law, particularly Orthodox Judaism, includes restrictions concerning the ingestion of non-kosher items, and the two main measles vaccinations contain infinitesimal quantities of animal products (Wombwell, Fangman, Yoder, & Spero, 2015). This combination leads to low vaccination rates and more measles outbreaks among Orthodox Jewish populations compared to the general population. In addition to Jews, Hindus follow strict guidelines regarding the reverence of animals and plants, and the animal components in the vaccines present a problem. Hindus, as well as Christians, hold all human life in high regard; the rubella aspect of the MMR vaccine includes cells from an aborted fetus, posing an additional issue (Wombell et al., 2015). Islamic beliefs interfere with widespread vaccination because of theological and social issues, including animal ingredients in vaccines and concerns about safety and efficacy.

Although these religious groups pose issues in terms of widespread vaccination, the Amish community is a group of people who traditionally do not receive vaccinations. Serious outbreaks among the Amish population in Ohio in 2014 resulted in almost 400 cases, but presented a smaller threat than in California due to limited interaction with people outside the secluded community. This group of people could potentially benefit the most from vaccination education. There are no specific rules against receiving routine immunizations, but the Amish have poor access to health-care, and most are concerned about vaccine safety (Wombell et al., 2015). With the implementation of vaccine safety and recommended education among this sub-culture, there would likely be fewer cases and outbreaks among this group.

While there are people who choose willingly to forego vaccination for one reason or another, there are certain individuals who should not receive or should delay receiving the injection. This group of medical exceptions includes people who have HIV/AIDs or other conditions that affect the immune system, those who have allergies to the MMR vaccine or its

ingredients, those who have had any type of cancer or are currently receiving treatment, and those who have gotten another vaccine within the past 4 weeks (CDC, 2015e). This group of people is at highest risk of contracting communicable diseases like measles due to their weakened immune systems. These are the people who are most in need of others to vaccinate themselves and create the protective effects of herd immunity. They need the protective effects of herd immunity since they are not physically healthy enough to protect themselves. Because measles is a highly infectious disease, “the herd immunity threshold is somewhat fragile in that it requires a large proportion (96%–99%) of a given population to be vaccinated to confer maximal protection” (Hendrix, Sturm, Zimet, & Meslin, 2016, p.274). When the threshold level is crossed, the community is left vulnerable; however, when the disease is considered eliminated, this group of people does not have to worry as much about being exposed.

Current Informative Methods

The main method currently used to attempt to change people’s minds about vaccinations is evidence-based reasoning, which includes research and scientific experiment results, has not been effective because people are biased and do not always fully comprehend scientific information (Browne, Thomson, Rockloff, & Pennycook, 2015). As was seen with the polio vaccine, people are not always well-informed about current scientific findings or do not believe what has been tested and proven. Although the polio vaccine was scientifically proven to be safe and effective, a multitude of people declined to get protection (Smith et al.,2011).

The negative attitudes surrounding vaccinations are hypothesized to stem from sources outside scientific evidence and may also lead people towards complementary and alternative medicine (CAM). After testing some psychosocial factors associated with CAM, it was found that educational levels did not predict vaccination rejection, but preferring CAM over

conventional medicine, using spirituality as a source of knowledge, and general openness to new ideas all pointed toward negative attitudes to vaccination (Browne et al., 2015). Smith and colleagues (2011) studied the current vaccine confidence gap; they discovered that there was increased hesitancy among parents who take advice from practitioners of complementary medicine, many of whom do not accept vaccines. It has been suggested that more research be done by public health professionals to understand vaccine safety, particularly social research specifically designed to understand an individual's vaccine decisions (Poland & Jacobson, 2001).

Today there are three systems available to health care professionals, parents, and others that track vaccine safety and adverse side effects to vaccines. These systems include Vaccine Adverse Event Reporting System (VAERS), the Vaccine Safety Datalink (VSD), and the Clinical Immunization Safety Assessment (CISA) Network. Because vaccines are reserved for healthy individuals and serve the purpose of preventing health issues, patients have a low tolerance for complications and side effects (Epling et al., 2014). Additionally, "well over 100 million doses of vaccines are given each year, yet the VAERS receives, on average, only 28,000 adverse event reports per year" (Epling et al., 2014, p. E6). When put into perspective, vaccines have a high success rate, producing only a very small percentage of complications.

The current recommendations suggest children get two doses of the vaccine (one between 12-15 months, and the second between 4-6 years of age); the guidelines assume the parents are able to make informed decisions for their children as well as objectively weigh the benefits of the vaccine against the risks of the disease (CDC, 2015e; Fadda, Depping, & Schulz, 2015).

One of the first decisions a parent is faced with is whether or not to immunize their newborn child. Parents who took part in a qualitative study done in Switzerland gave different reasons for denying their children vaccine protection. One justification stemmed from parents believing that if measles were a serious disease, the vaccination would be required. Other parents

felt ill-equipped to make this health decision and relied either on the child's pediatrician or other parents' viewpoints to decide. A third justification consisted of parents being unsure if the vaccination would harm their child or protect them from a harmful disease. Some parents even thought their child was receiving too many shots and wanted to spread out the immunizations. The most common response recorded was parents wanting to make the decision with physician input (Fadda et al., 2015). The recommendations for parents coincide with most school immunization requirements; however, many states allow exceptions for religious or philosophical beliefs. Parents have been exploiting the personal belief loophole, causing vaccination rates to drastically decrease and allowing room for recent outbreaks.

Potential Solutions

Some parents may, in fact, feel strongly about denying vaccination, but it is likely that many of them are simply in need of reassurance and guidance about making this decision for their children. This is where public health advocates and health care professionals can make the biggest impact. Because scientific evidence alone has not proven to be effective in increasing and maintaining high vaccination rates, a trusting connection between a provider and a parent is crucial for delivering valid health information. It is suggested that practitioners meet face-to-face with hesitant parents to discuss the concerns they have about vaccines, in hope of quashing any misconceptions that may be held and coming up with a plan of action (Hendrix et al., 2016). If parents and practitioners are able to create a dynamic that incorporates current medical recommendations and also addresses the concerns that parents have, there could be a significant change in rates.

A randomized control study done in England compared the use of paper leaflets (control group) and a parent meeting in the community along with paper materials (intervention group).

The results concluded that parents in the intervention group who received the in-person information had a greater decrease in decisional conflict and more often chose to vaccinate their children. This supports the method of using a multi-faceted, personal approach to provide health information. In addition, parents who were making vaccination decisions for their first child were more cautious about choosing to vaccinate (Jackson et al., 2011). This opens the opportunity for interventions guided toward first-time parents to decrease decisional conflict.

According to Glanz and colleagues, the current interventions include “online decision aids, reminder/recall systems, patient and provider education, provider communication techniques, and financial incentives” (2015, p.3); however, convincing evidence proving the success of these intervention techniques has not been provided. Glanz and colleagues (2015) stated that “recent studies show that strong provider recommendations and individually tailored approaches may be effective in increasing vaccine acceptance” (p. 3). This tailored method approach may allow parents to feel more important and may reinforce their role in the overall health of the community.

Orenstein and Seib suggested that in order “to prevent measles from being reestablished as an endemic disease in the United States, we must first do better in vaccinating our at-risk population” (2014, para. 7). This can be done by making vaccines easily accessible to those who need them, especially people traveling outside the Western Hemisphere or coming to the United States from a country with prevalent disease, as well as educating and convincing parents who are hesitant to vaccinate their children (Orenstein & Seib, 2014). Easy access and low cost could diminish barriers and increase parents’ confidence in the vaccine.

Social media could be the next step for public health education regarding vaccine recommendations and safety. Instead of using a top-down approach where providers present information to parents and patients, it has been suggested that advocates of vaccines utilize a

side-to-side approach where parents can advocate to their peers (Glanz et al., 2015). Social media presents a channel through which information is easily passed, which could either prove helpful for health advocates, or detrimental, which is also possible if the wrong ideas are shared.

One tactic utilized by the public health professionals in Italy, resulting in recent dramatic increases in vaccinations, could pose as an example for future vaccination promotion interventions. In Italy, “some immunizations (diphtheria, poliomyelitis, tetanus, Viral Hepatitis B) were traditionally compulsory, while others (pertussis, measles, mumps, rubella) were only recommended. The major differences were that compulsory vaccinations were offered for free, necessary for school admission, with different vaccination schedules compared to those recommended” (d’Onofrio, Manfredi, & Poletti, 2012, p.1). Efforts were made by the country’s public health services to create a comprehensive immunization schedule that does not discriminate between required and recommended vaccines. They offered free MMR vaccines for one-year-olds, as well as promoted a national campaign targeting school-aged children (d’Onofrio et al., 2012). This made clear the significance of immunizations and made a profound impact on the health of the Italian community.

Some have suggested that policy-makers instate certain laws that require all those who are deemed healthy enough receive a collection of mandated vaccines. This raises the ethical question: “to what extent is it ethically appropriate to restrict individual autonomy by compulsory immunization requirements in order to achieve a sufficient collective protection of the community?” (Tafuri et al., 2013, p. 4862). Finding a balance between “respecting parental rights and autonomy and maximizing the greater good of herd immunity may seem an intractable problem, especially in the current climate of heated vaccine debates. It undoubtedly calls for a multifaceted set of interventions” that will effectively prevent further outbreaks (Hendrix et al., 2016, p. 277). There is a conflict between creating a law requiring people to get vaccines and

maintaining people's free will. There can be, for instance, a law requiring communication of up-to-date medical suggestions, recommendations regarding vaccines, and general public health topics to all people. This form of intervention could increase the public's confidence in the health system and in the success of vaccines.

Interestingly enough, "Mississippi consistently leads the United States in childhood vaccination with a greater than 99% measles–mumps–rubella vaccination rate for children entering kindergarten" (Cawkwell & Oshinsky, 2015, p.1). This is the same state that lags behind the country averages in almost every other health category, especially obesity and diabetes, and it has historically been called the "unhealthiest state in America." The state has successfully outlawed religious and philosophical exemptions, denying the opportunity for parents to find loopholes in the regulations. Although the state still allows for some medical exemptions, the process is very strict, having to be approved by the Department of Public Health within the state. Mississippi has credited their successful immunization record to "the absence of legal pathways to exemptions, ... the legal infrastructure built by the Department of Public Health, ...accountability from the school system, support from pediatricians and family physicians in the community, and a 'really comprehensive vaccine registry'" (Cawkwell & Oshinsky, 2015, p. 2). The cooperation of all components are all crucial to Mississippi's success in becoming and staying measles-free.

THE HEALTH BELIEF MODEL

The Health Belief Model (HBM) is a widely-utilized health behavior change model composed of five categories that contribute to a person's decision to perform a behavior: perceived threat (sometimes separated into perceived severity/seriousness and perceived susceptibility), perceived benefits, perceived barriers, cues to action, and self-efficacy. See

Appendix A for a diagram that explains the Health Belief Model. The model helps demonstrate what factors contribute to a person's health decision, including "demographic characteristics of the [children] or parents, their knowledge about [measles] and [measles] vaccination, and their views, attitudes, and health beliefs" (Guvenc, Seven, & Akyuz, 2015, p.5). In the case of increasing vaccination rates, the factors involved can be sorted into these categories to better outline a person's decision-making process. Before continuing, it is important that the different constructs of the Health Belief Model are defined and explained prior to being applied to the topic of vaccines.

Construct Definitions

The six construct definitions were taken verbatim from *Introduction to Health Behavior Theory* (Hayden, 2014, p. 35):

Perceived Severity/Seriousness:

An individual's judgement as to the severity of the disease

Perceived Susceptibility:

An individual's assessment of his or her chances of getting the disease

Perceived Benefits:

An individual's conclusion as to whether the new behavior is better than what he or she is already doing

Perceived Barriers:

An individual's opinion as to what will stop him or her from adopting the new behavior

Cues to Action:

Those factors that will start a person on the way to changing behavior

Self-efficacy:

Personal belief in one's own ability to do something

Construct Applications

The first construct of the Health Belief Model is perceived threat, which will be separated into perceived severity and perceived susceptibility. Perceived severity (also known as perceived seriousness) addresses a person's belief about how serious a disease or condition is, in this case: measles. This construct is most often influenced by medical information or input, but can also be altered by personal beliefs and influences. Today, many people do not know or believe measles is a serious disease, perhaps because they have not come in close contact with anyone who has been affected by the condition. This is in part due to the success of vaccines in preventing widespread disease. However, many people are simply not aware of the debilitating outcomes of this disease because of the wide variety of diseases and conditions present today. It is difficult for the general public to have a deep knowledge about all different diseases, symptoms, and recommendations. In order to reduce the prevalence of vaccine-preventable diseases, it is important that they be made known.

The second aspect of the perceived threat construct is perceived susceptibility. Hayden stated that "it is only logical that when people believe they are at risk for a disease, they will be more likely to do something to prevent it from happening" (2014, p. 32). This means that if people believe they can catch a disease, they will do what is necessary to prevent it. Unfortunately, the opposite is also true: if people do not believe they are at risk for a disease, they will not take the steps to keep themselves healthy. If people are aware of this disease's ability to spread from person to person, they might be more willing to take measures to protect themselves. Parents who worry their kids can be infected by attending school and visiting places

that put them in direct contact with other people believe their children are susceptible to the disease. This may guide the parents toward immunizing their children.

The second construct, perceived benefits, outlines the rewarding aspects of adopting a healthy behavior as a way of decreasing the risk of getting a disease. As Hayden described, “people tend to adopt healthier behaviors when they believe the new behavior will decrease their chances of developing a disease” (2014, p.32). Some people may be influenced to receive the MMR vaccine if they believe it will provide the benefit of protecting their body from the disease. Early immunization would prevent illness later on in life, which would lead to loss in individual productivity and result in additional health care costs. Beyond personal benefit, people may recognize the shielding effects that comprehensive vaccination can have on the vulnerable individuals (herd immunity). People may recognize the impact their individual action and the contribution to the greater good of society. The recognition of responsibility to the people around them could impact a person’s perceptions about the benefits of vaccination.

A decidedly important step in the behavior change process is understanding the concept of perceived barriers to change, which addresses the internal and external challenges and obstacles standing in the way of a person adopting a new behavior. Change does not come easily to most people; therefore, it has been proposed that “of all the constructs, perceived barriers are the most significant in determining behavior change” (Hayden, 2014, p. 33). Some external barriers to receiving vaccinations include poor access to medical care, unavailable transportation to care, and high monetary cost of the actual medication. An internal barrier to receiving the vaccine could be the general worry a parent has for their child, especially if the parent believes the vaccination could cause more harm than good for their child.

Cues to action are all of the factors that lead a person toward (or away from) adopting a healthy behavior. These include “events, people, or things that move people to change their

behavior” (Hayden, 2014, p.33). Cues to action are everywhere and are not specific to one type of experience. For instance, “[health care] providers likely influence parents’ attitudes and beliefs about immunization, given how widely providers are used as a source for vaccine information and their credibility for such information” (Mergler et al., 2013, p. 4593). The popular media is also a factor to be acknowledged in the decision-making process, as people are bombarded by the actions of celebrities via social media outlets. For example, Mark Zuckerberg, the inventor of Facebook, shared his stance on the vaccine issue after deciding to protect his firstborn child (Wang, 2016). In addition, celebrity late-night talk show host Jimmy Kimmel voiced his approval of vaccinations to all of his viewers and fans by recommending that everyone protect themselves and their children.

Cues to action might be the largest category when it comes to vaccines because it includes all of the everyday influences in a person’s life. People are often overwhelmed by opinions and information from family members, friends, health care providers, media outlets, and printed health information. A person’s decisions are influenced by their daily experiences, including the illness of a family member, media reports, mass media campaigns, advice from peers, reminder postcards from a health care provider, or health warning labels on a product. In addition to cues to action that guide a person toward the healthy behavior, there are also cues to refrain from the healthy action. Despite the insistence from the CDC and other credible health organizations that there is no causal connection between the MMR vaccine and autism, the anti-vaxxer community consistently references the single article written by Andrew Wakefield falsely claiming the connection. While there are celebrities in support of universal vaccination, there are others who support the anti-vaxxer views and spread them to their followers. The most famous example of this is actress Jenny McCarthy, who became an anti-vaccine activist after her young son, who received the measles vaccination, was diagnosed with autism. These negative cues to

action get in the way of people choosing the healthy route and could also fall under the perceived barriers construct.

The final construct of the Health Belief Model is self-efficacy, or “the belief in one’s own ability to do something” (Hayden, 2014, p.34). People normally will not do something unless they believe they will be successful. If parents believe their child would be protected from a harmful disease if they are vaccinated (perceived benefit), but the parents do not know where to receive the vaccine (perceived barrier), it is likely the parent will not vaccinate their child. One way to increase inoculation rates would be to make the process of receiving the vaccine simple and stress-free by offering low-cost or free vaccinations, administration of vaccines in convenient locations, or including several immunizations into one appointment. These strategies would likely increase parents’ idea of self-efficacy and improve people’s confidence in their ability to perform the healthy behavior of immunization against measles.

DISCUSSION

For years, public health professionals have studied human behavior and decision making in order to guide people toward health and wellness. It is the collective goal of health professionals to promote overall well-being at all different levels and with various issues. The concept of anti-vaccination movements has been an age-old public health issue, and it is one that has not yet been resolved. The recent disease outbreaks, caused by low vaccination rates, resulting largely from the anti-vaccination movement, are posing a health threat and are preventing the re-elimination of measles in the United States. The break in the herd immunity, caused by incomplete vaccination, is allowing for the spread of a disease that was at one time eliminated from the country. It was because of the reliability of vaccines that this eradication was even possible, but people’s confidence in the vaccine has decreased in recent years.

Even though there are immunization regulations in place for children to attend school, the decision is ultimately up to the parents, some of whom are exploiting philosophical loopholes in school regulations, thus jeopardizing the health of the entire school community. The current setup puts a great amount of responsibility on the parents to make an informed decision when they might not be well-educated on the topic. The exceptions to school requirements were designed for special cases, not for the majority of parents. For this reason, “the ethics of public health policy surrounding childhood immunization extend to issues beyond individuals’ vaccination decisions; they also include issues such as vaccine mandates and how easily and by what process exemptions may be obtained” (Hendrix et al., 2016, p. 274). Because a number of people have taken advantage of the current regulations, not only have the protective effects of herd immunity been diminished, but policy makers are now considering requiring all children in school to be vaccinated (Hendrix et al., 2016).

According to the research done by Cawkwell and Oshinsky (2015), there are 19 states in the process of creating legislation that would either eliminate exemptions altogether or make it more difficult to receive them. This would no doubt limit the number of exclusions among schoolchildren. By reducing or altogether removing the number of philosophical exemptions, vaccines become essentially required for school attendance. This would mean that the government publicly prioritizes public health over personal freedoms, posing a serious ethical issue that would no doubt create further controversy. Something for policy makers to keep in mind is “whether patients (or their parents) bear a responsibility to consider that their immunization decisions can affect others. Is there a line to be drawn between respecting vaccine refusers’ choices and maximizing the greater good through herd immunity?” (Hendrix et al., 2016, p. 275). To what extent is the government expected to protect personal freedoms rather than the public health and safety of its constituents?

CONCLUSION

Measles is a serious disease; even though it starts off with mild symptoms, it can progress to more dangerous symptoms and complications, which can land the afflicted in the hospital. This disease can be prevented by a safe and effective vaccine that people normally receive in two doses as children. Widespread use of the vaccine can lead to the elimination of the disease, just as was the case in the year 2000. However, when people refuse to protect themselves and their children, the disease becomes more prevalent and spreads throughout communities. Low vaccination rates reduce the protective effects of herd immunity, and the disease spreads more easily. This thesis explored the existing literature addressing the current anti-vaccine movement, applied the factors involved in the decision-making process to the Health Belief Model, and proposed potential solutions to increase vaccination rates.

There are a few reasons people use to justify not receiving the protective vaccine: religious doctrine, health restrictions, and personal beliefs. Although religious and health reasons can be validated by the medical community, personal beliefs that go against proven medical findings are fueling the decreasing vaccination rates nation-wide. Many people categorized as anti-vaxxers have been wrongly influenced by false claims about the MMR vaccine.

The Health Belief Model (HBM) is a health behavior change model commonly used to explain and influence health behaviors. As such, it can be applied to encouraging people to receive the vaccine that protects from measles, mumps, and rubella (MMR). The constructs of the HBM include perceived threat (made up of perceived seriousness and perceived susceptibility), perceived benefits, perceived barriers, cues to action, and self-efficacy.

There is an issue with people believing popular ideas over science-based information regarding vaccine safety and recommendations. It is important that public health professionals promote the correct information and create a coalition with parents to collectively make smart

health decisions for children. Health care workers play a vital role in the education of children and parents, and in the case of public health, they have a responsibility to guide people toward making the healthy decision. The next step toward creating a widely vaccinated community is for parents to trust their health care providers enough to help them make the best decisions for the health and well-being of children.

In addition to providing care to children, health care professionals also act as role models for parents, as they are almost always up-to-date with their immunizations. Some hospitals and medical facilities have even denied people work opportunities because they were not vaccinated. One consideration to take into account is whether parents are comfortable sending their unvaccinated children to be cared for by health professionals who are not themselves vaccinated. These individuals could easily spread diseases to their patients. Is it reasonable for organizations outside the health profession to use immunization records as a hiring qualification?

Another concern is that measles is not the only disease currently being resisted. As was stated earlier, anti-vaccine movements have occurred throughout history with various diseases. Further investigation about which diseases have the highest vaccination rates could shed light on how best to implement the vaccines that lag behind. The differences in coverage rates, as well as what factors influenced parents to decide, could allow health professionals to improve the delivery of vaccines and related educational information.

News and media outlets are plentiful nowadays, and because they present a plethora of information, it is imperative that they uphold a certain responsibility to present credible, reliable information. Society has come to a point where the trust of news stations and popular media challenges the trust and intake of scientific knowledge and findings. The two groups should not be separate; rather, they should work together to promote the advancement of society health.

Because measles is a highly-contagious, burdensome disease, it is crucial that people get

vaccinated. As a disease that has once before been eliminated from American society, there is potential to rule it out again. This can only happen with widespread immunization, which creates the protective effects of herd immunity. Public health and medical specialists battle the misconceptions that have been spread, and they are working toward creating a well-informed public that values the access to protection from illness.

LITERATURE CITED

- Browne, M., Thomson, P., Rockloff, M. J., & Pennycook, G. (2015). Going against the herd: psychological and cultural factors underlying the 'vaccination confidence gap'. *Plos ONE*, 10(9), 1-14.
- Brunson, E. (2013). *Vaccine*, 31 (How parents make decisions about their children's vaccinations), 5466-5470.
- Camargo Jr., K., & Grant, R. (2015). Public Health, Science, and Policy Debate: Being Right Is Not Enough. *American Journal Of Public Health*, 105(2), 232.
- Cawkwell, P.B., & Oshinsky, D. (2015). *Vaccine* 30 (Childhood vaccination requirements: Lessons from history, Mississippi, and a path forward).
- Centers for Disease Control and Prevention. (2015a). Measles. Retrieved from <http://www.cdc.gov/measles/>.
- Centers for Disease Control and Prevention. (2015b). Measles cases and outbreaks during 2014. Retrieved from <http://stacks.cdc.gov/view/cdc/27146>.
- Centers for Disease Control and Prevention. (2015c). Measles vaccination. Retrieved from <http://www.cdc.gov/measles/vaccination.html>.
- Centers for Disease Control and Prevention. (2015d). Thimerosal in vaccines. Retrieved from <http://www.cdc.gov/vaccinesafety/Concerns/thimerosal/index.html>.
- Centers for Disease Control and Prevention. (2015e). Vaccines and immunizations. Retrieved from <http://www.cdc.gov/vaccines/vpd-vac/should-not-vacc.htm#mmr>.
- Centers for Disease Control and Prevention. (2015f). Vaccines do not cause autism. Retrieved from <http://www.cdc.gov/vaccinesafety/concerns/autism.html>.
- d'Onofrio, A., Manfredi, P., & Poletti, P. (2012). The Interplay of Public Intervention and Private Choices in Determining the Outcome of Vaccination Programmes. *Plos ONE*, 7(10).

- Epling, J. W., Savoy, M. L., Temte, J. L., Schoof, B. K., & Campos-Outcalt, D. (2014). When vaccine misconceptions jeopardize public health. *Journal of Family Practice*, 63(12), E1-E7.
- Fadda, M., Depping, M. K., & Schulz, P. J. (2015). Addressing issues of vaccination literacy and psychological empowerment in the measles-mumps-rubella (MMR) vaccination decision-making: a qualitative study. *BMC Public Health*, 15(1), 1-13.
- Frankel, T. C. (2015). Mississippi – yes, Mississippi – has the nation’s best child vaccination rate. Here’s why. *Washington Post*.
- Glanz, J. M., Kraus, C. R., & Daley, M. F. (2015). Addressing parental vaccine concerns: engagement, balance, and timing. *PLoS Biology* 13(8).
- Guvenc, G., Seven, M., & Akyuz, A. (2015). *Journal of Pediatric and Adolescent Gynecology* (Health Belief Model scale for Human Papilloma Virus and its vaccination: Adaptation and psychometric testing).
- Hayden, J.A. (2014). *Introduction to Health Behavior Theory* (2nd ed.). Jones and Bartlett Publishers, LLC.
- Hendrix, K. S., Sturm, L. A., Zimet, G. D., & Meslin, E. M. (2016). Ethics and Childhood Vaccination Policy in the United States. *American Journal Of Public Health*, 106(2), 273.
- Kata, A. (2010). *Vaccine*, 28 (A postmodern Pandora's box: Anti-vaccination misinformation on the Internet), 1709-1716.
- Jackson, C., Cheater, F. M., Harrison, W., Peacock, R., Bekker, H., West, R., & Leese, B. (2011). Randomised cluster trial to support informed parental decision-making for the MMR vaccine. *BMC Public Health*, 11(1), 475-485.

- Mergler, M., Omer, S., Pan, W., Navar-Boggan, A., Orenstein, W., Marcuse, E., ... & Salmon, D. (2013). *Vaccine*, 34 (Association of vaccine-related attitudes and beliefs between parents and health care providers), 4591-4595.
- Orenstein, W., & Seib, K. (2014). Mounting a Good Offense against Measles. *New England Journal of Medicine*, 371, 1661-1663. Retrieved from <http://www.nejm.org/doi/full/10.1056/NEJMp1408696>.
- Poland, G. A., & Jacobson, R. M. (2001). *Vaccine*, 19 (Understanding those who do not understand: a brief review of the anti-vaccine movement), 2440-2445.
- Smith, P. J., Humiston, S. G., Marcuse, E. K., Zhao, Z., Dorell, C. G., Howes, C., & Hibbs, B. (2011). Parental Delay or Refusal of Vaccine Doses, Childhood Vaccination Coverage at 24 Months of Age, and the Health Belief Model. *Public Health Reports*. Retrieved from <http://www.jstor.org/stable/41639293>.
- Tafari, S., Gallone, M., Cappelli, M., Martinelli, D., Prato, R., & Germinario, C. (2014). Addressing the anti-vaccination movement and the role of HCWs. *Vaccine*, 32(Vaccine-preventable diseases and vaccinations among health-care workers), 4860-4865.
- Taylor, L., Swerdfeger, A., & Eslick, G. (2014). Vaccines are not associated with autism: An evidence-based meta-analysis of case-control and cohort studies.
- Wang, Y. (2016, January 11). Mark Zuckerberg gets his baby vaccinated. Anti-vaxxers go nuts. *The Chicago Tribune*.
- Wombwell, E., Fangman, M. T., Yoder, A. K., & Spero, D. L. (2015). Religious Barriers to Measles Vaccination. *Journal of Community Health*, (3), 597.
- World Health Organization. (2015). Measles Fact Sheet. Retrieved from <http://www.who.int/mediacentre/factsheets/fs286/en/>.

APPENDIX A

Health Belief Model (Hayden, 2014, p.34)

