

The Measles-Mumps-Rubella Vaccine and Parental Hesitancy:  
The World's Unspoken Pandemic

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**Abstract**

The Measles-Mumps-Rubella vaccine (MMR) is a proven necessity for the prevention of measles, mumps, and rubella, which possess severe and possibly life-threatening complications. However, the means in which these vaccines are produced, mandated, or scheduled raise certain concerns within the medical and pharmaceutical consumer community. In fact, there are various communities around the globe that willfully choose to refuse the MMR vaccine, along with many other pediatric vaccinations, resulting in diminished vaccination rates and risk of possible outbreak of any of these three diseases. With this impending threat on the rise, it is necessary to engage in research to best understand the reasoning for parental vaccine refusal and address alternative research approaches for this vital immunization series.

*Keywords:* Measles, mumps, rubella, vaccine, MMR, ethical, concerns

## **The Measles-Mumps-Rubella Vaccine and Parental Hesitancy:**

### **The World's Unspoken Pandemic**

#### **Problem Identification**

Vaccinations are a vital aspect within the realm of healthcare and worldwide public health, as they drastically decrease the prevalence and incidence of previously widespread or high virality diseases. They are crucially known for preventing overall illness, disability, and death from infectious disease processes by training the human body to build immunity to specified pathogenetic conditions. This process of immunity allows immunized recipients to possess an immune system that creates defense mechanisms against these life-altering diseases without ever contracting the disease. Through an analysis of public health history, it is evident that infectious diseases can quickly spread throughout the world and cause significant damage; therefore, the creation of relevant vaccinations has proven to be a monumental accomplishment within public health services, as they allow for mass protection of entire populations, ultimately preventing deadly transmission of disease to infants, children, and adults around the world.

Previously widespread diseases that now can be protected by vaccination status include high risk, high mortality, and highly contagious illnesses such as polio, tetanus, influenza, hepatitis strains, pertussis, chickenpox, measles, mumps, rubella, and, now even, COVID-19 (Center for Disease Control and Prevention [CDC], 2020). Specifically, measles, mumps, and rubella have been known to have dangerous possibilities within the pediatric and maternal community, if individuals are found to be unprotected by the two-step immunization series of the measles, mumps, and rubella (MMR) vaccine. In the early 1970s, the official MMR vaccine became a recommended vaccination for children, with the first dose given between 12 to 15 months and the second dose administered between 4 to 6 years of age (CDC, 2020). The

effectiveness of this vaccine at preventing disease contraction has proven successful outcomes with the following statistics: 93% effectiveness against measles, 78% effectiveness against mumps, and 97% effectiveness against rubella within the first dose, and 97% effectiveness against measles, 88% effectiveness against mumps, and 97% effectiveness against rubella with the second dose (CDC, 2021). It is evident that the effectiveness of this vaccine is difficult to argue; however, according to the World Health Organization (WHO) in 2019, worldwide measles cases climbed to 869,770 which is the highest reported number of cases since 1996, with 207,500 of these lives resulting in mortality. Within this same year, worldwide rubella cases reached 14,621 cases, and mumps reached 169,799 total cases (WHO, 2020). With an available vaccine to prevent and nearly eradicate these three diseases, it is necessary to investigate the causation of these high incidences of disease. The main reason for high prevalence rates of these diseases can be largely related to under-vaccination and vaccine hesitancy of parents around the globe in relation to the MMR vaccine, resulting in gradually lowering immunization rates against measles, mumps, and rubella.

Specifically, vaccine hesitancy is defined as a delay in acceptance or outright refusal of a vaccine, despite the availability and access of the specific vaccine (Nyugen et al., 2021). Although the necessity of the vaccine series is evident, there are several parents that prefer to leave their children unvaccinated or prolong the vaccination series due to certain ethical concerns or other personal beliefs that surround the MMR vaccine. It is equally important to note that this growing attitude of hesitancy towards children's vaccines is not exclusive to the United States and has evident growth in communities and countries around the globe (Kempe et al., 2020). In fact, in 2019, the WHO designated vaccine hesitancy as one of the ten leading threats to global health. Parental hesitancy may contribute to an approximate 25% of under vaccination within

the pediatric population of the world (Nguyen et al., 2019). Due to this growing phenomenon of anti-vaccination attitudes and hesitancy, this recent increase of vaccine-preventable diseases has prompted clinicians, public health officials, politicians, the media, and the public to place more attention on the concept of vaccine refusal and hesitancy.

### **Significance of Project**

#### ***Measles, Mumps, and Rubella as Diseases***

In order to appropriately discuss the severity of refusal of the MMR vaccine, it is crucial to review the severity of each individual disease that the immunization encompasses. Measles, mumps, and rubella are preventable and highly contagious acute disease processes that can severely affect multiple areas of the body if contracted by the spread of respiratory droplets or small aerosols within close contact of individuals. Firstly, if the measles virus is inhaled, the droplets will infect the respiratory tract, resulting in minor symptoms such as fever, coryza, conjunctivitis, cough, and a rash known as Koplik's spots; however, the virus can continue to spread to distant organs, which can complicate into pneumonia, croup, maternal death, spontaneous abortion, low-birth weight infants, blindness, acute disseminated encephalomyelitis, or meningitis if contracted by an unvaccinated child, pregnant woman, infants, or immunocompromised individuals (Kondamundi & Waymack, 2021). Secondly, infection of mumps will have fever, headache, muscle aches, tiredness, appetite loss, and swollen salivary glands within its symptomology. Further complications can result in swollen testicles or ovaries with subsequent infertility, deafness, inflammation of the brain and tissue covering the spinal cord, and occasional death (Grennan, 2019). Finally, if infected with rubella, an individual may begin to experience fever, sore throat, headache, rash, and itchy eyes; however, if contracted while pregnant, the virus can cause serious birth defects or termination of the fetus (Barnett,

2017). Unfortunately, there is no specific therapy or treatment that is curative for measles, mumps, or rubella. Instead, treatment is focused solely on supportive care for uncomplicated forms of the diseases, and life-saving measures if critical complications occur. Therefore, prevention of these viruses is the principal form of treatment through the use of the MMR vaccine; however, if vaccine hesitancy and refusal is on the rise, how will eradication of outbreaks ever become a reality?

### ***Parental Vaccine Hesitancy and the Healthcare Team***

With the increasing rates of anti-vaccination attitudes culminating within various communities worldwide, the possibility and incidence of these severe diseases resulting in outbreaks continues to remain a serious problem. In fact, since 2014, public health officials have observed gradual increase in these anti-vaccine attitudes, resulting in various epidemic outbreaks of these diseases, which has consequently prompted an in-depth exploration of the ethical, social, and behavioral factors that may influence these beliefs (Benecke & DeYoung, 2019). Due to the severe disease spread that one unvaccinated and infected child can cause, it is important to truly understand the attitudes and concerns behind avoiding vaccination in order to engage with vaccine-hesitant parents most appropriately. Furthermore, having a comprehension of these attitudes will show emphasis on the importance of current and future research taking place to resolve this issue. Therefore, this traditional thesis will focus on an integrative literature review of current research that examines the attitudes, concerns, and ethical considerations of parents surrounding the MMR vaccine and will, in turn, present possible approaches and implications to be considered in practice to resolve this growing worldwide healthcare and public health issue.

### **Research Questions and Purpose Statement**

This literature review aims to synthesize the literature in order to properly identify prevalent multi-level determinants of parental hesitancy and/or refusal towards the MMR vaccine. More specifically, the main desire of this study is to answer the following research question: What are the leading factors that contribute to MMR vaccine hesitancy and/or refusal among parents worldwide? The purpose is to raise awareness among healthcare community about the various reasons parents refuse this childhood vaccination. With the leading causes identified, steps can be taken to best communicate with parents, properly educate, respectfully eliminate unnecessary vaccine conspiracies, and ultimately explore further research into improvement of the vaccine to best resolve the issue at hand.

## **Methods**

### **Conceptual Framework**

This integrative review will be most appropriately organized using the conceptual framework of Whittemore and Knafl (2005). This specific methodology allows for experimental and non-experimental research alike to be utilized, with an emphasis on enhancing data collection, methods of analysis, synthesis, and conclusion of research. The Whittemore and Knafl (2005) framework organizes the entirety of the literary review into the following categories: problem identification, literature search, data analysis, data evaluation, and presentation. The problem of vaccine hesitancy among parents worldwide has previously been identified through the aforementioned background discussion. However, the remaining aspects of the framework will be used throughout the remaining portions of the integrative review. Ultimately, the use of this conceptual framework allows this specific research synthesis to hold a strengthening nursing framework that will enhance the findings, organization, and analysis of this research topic.

## **Theoretical Framework**

To examine the issue of vaccine hesitancy, the theoretical framework of Social-Ecological Model (SEM) can be used to adequately evaluate and analyze the findings within an organized determinant system. The SEM is a community-based nursing model that allows the healthcare team to visualize and understand the multifaceted levels within society that influence a certain outcome (Brown, 2021). The levels of this particular model within this research study include the following determinants: the individual, interpersonal, community, hospital organization, and public health policy. An analyzation of this topic through this framework can be highly applicable to this community-based research synthesis, as the focus of this study is to examine the true reasoning behind parental decision-making in relation to MMR vaccine hesitancy and refusal. Through the perspective of the SEM framework, one is able to visualize the respective categories and how they individually impact the physical and psychological aspects of parents; therefore, the healthcare team may have a more thorough and well-rounded understanding when communicating and promoting future research and/or change in relation to the MMR vaccine. An illustration of the SEM can be visualized in Appendix A (James, 2022).

## **Literature Search**

### **Data Analysis Methods**

Following a selection of conceptual and theoretical frameworks, it became a necessity to perform a literature search for appropriate articles, which required thorough analyzation in order to have a personally unbiased selection that is as relevant as possible to the topic. In order to have a guiding framework for article selection, this particular research study utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) as a framework for literature selection (PRISMA, 2021). Using the PRISMA guidelines substantially

strengthened the review process in order to select a conglomeration of articles from various databases that are highly applicable and specific to the research within this study. This framework allows a four-phase flow diagram to identify, screen, determine eligibility, and include the strongest and most appropriate research. An attached example of the PRISMA flowchart in relation to this synthesis can be visualized in Appendix B.

### **Inclusion Criteria**

After following the PRISMA flowchart to select the appropriate sources, it became a necessity to create a specific set of inclusion criteria, as well as identify articles with substantial strength, in order to further specify a highly selective grouping of literature. This was accomplished through use of set inclusion criteria, as well as the Johns Hopkins Levels of Evidence Scale. The Johns Hopkins Levels of Evidence scale acts as a tool for evaluating research by assigning specific levels of strength to the chosen articles. The assigned level of evidence is based on study designs, quality of results, sample sizes, and utilization of meta-analyses in order to show strength of the research article (Vera, 2022). The identified levels of evidence can be visualized in the data extraction table in Appendix C. In order to remain within the realm of integrative research, the inclusion criteria specified that the literature must consist of high quality, scholarly, and peer-reviewed sources. The inclusion criteria also were set to specify that the literature would be within the last ten years (2012-2022) in order to bring current and relevant resources into this synthesis project, as this research topic is an extremely contemporary worldwide crisis. The inclusion criteria also specified that the articles must be in the English language to prevent language barriers from altering the research findings. In order to keep the research within the specified population, parents were identified as the population sample, rather than healthcare workers or government agencies. The studies also needed to be

specific to the MMR vaccine as the focus of discussion, rather than other pediatric or adult immunization series. These set inclusion criteria provided an excellent process and standard for sorting through the hundreds of resources within the selected databases used for this specific research project. These inclusion criteria also made the resources highly specific and relevant to the desired population and topic of parental attitudes and concerns towards the MMR vaccine.

Three databases were then selected that are all known for containing excellent scholarly and relevant literature to the field of overall healthcare. The selected databases included PubMed, Medline, and Science Direct. Other sources utilized within this study included a careful and unbiased process of hand-picked research articles within the specified inclusion criteria. Key words such as “measles”, “mumps”, “rubella”, “parental attitudes”, “vaccine hesitancy”, and “refusal” were used in order to search and identify the most appropriate peer-reviewed publications within the databases. The criteria of peer-reviewed articles and articles within the last ten years was then adjusted within the database to remain within the inclusion criteria. They were then scanned to remove any duplicates within or across the three databases. With duplicates removed, all articles were analyzed by assessing the titles and available abstracts. If the article title and abstract included the appropriate inclusion criteria, it would progress to the eligibility stage of the PRISMA flowchart. This stage included a thorough analysis of the full text of each of the remaining articles in order to determine the strength and relevance of the literature in relation to research. The PRISMA flowchart proved to be extremely useful in identifying excellent articles appropriate to the study; however, the research still required an identification of relevant themes and findings in order to properly utilize the literature. Therefore, a data extraction table was used in order to organize all of the articles included in the review process. This table included an organization of the literature by first

author, year, study design, study population, sample size, determinants and contributing factors, and the final outcomes reported. This data extraction table allowed effortless and organized access during the research and synthesis process to provide a comprehensive guide for the presentation findings portion of the study. An example of the discussed data extraction table can be viewed within Appendix C.

## **Data Analysis**

### **Overview of Findings**

Before describing the main themes found throughout the selected literature, it is beneficial to further relay the specific statistical data related to the inclusion and exclusion of certain articles. As previously discussed, the databases utilized within this synthesis included PubMed, Medline, and Science Direct. Upon initial search tactics of these databases, the minimally filtered database source totals can be described as follows: 100 from PubMed, 88 from Medline, and 434 from Science Direct. An additional 20 sources were included from hand-picked scholarly and peer-reviewed publications, resulting in a total of 642 preliminary sources to be scanned for eligibility based on inclusion criteria settings. In order to prevent any overlap of sources, screening was performed within and across the databases for duplicating literature, which resulted in the removal of 8 sources. In order to ensure further specificity of desired literature, certain exclusion criteria were established, namely failure to identify parents as the population of the study and failure to mention the specifics of the MMR vaccine in relation to the study. This exclusion criteria resulted in the removal of 575 sources from the initial database findings, resulting in 59 articles progressing into the phase of full-text eligibility analysis. Of these remaining 59 articles, 30 were excluded for not having availability as full text documents.

Following this scrutinizing process of literature identification, 29 articles were chosen as the final set of articles used for this study.

## **Summary of Literature**

### ***Article Type and Quality***

All of the articles selected for this study were scholarly, peer-reviewed, and from recent research that discussed parental attitudes towards the MMR vaccine. These discovered articles can all be found to be between the years 2012 and 2021, exemplifying the significant relevance that this literature and topic yield to modern society. Research articles included within this synthesis are of experimental and non-experimental nature alike in order to get necessary background information combined with relevant real-world results. From the articles were also a variety of study designs, including descriptive research, correlational studies, and qualitative experimental research. The majority of articles included within this synthesis also come from multiple established authors, with minimal exceptions, bringing a variety of researchers into the discussion. Furthermore, several themes emerged through a thorough analysis of the scholarly literature.

### ***Themes from the Literature***

The articles were summarized to identify the main themes found throughout the literature. The themes will be discussed in relation to the SEM framework in order to describe the most prominent factors that influence parental decision-making for the pediatric patient population in relation to MMR vaccine hesitancy and refusal. Using the SEM framework, five main categories were identified to discuss the findings: individual, interpersonal, community, organizational, and policy determinants.

**Individual Determinants.** The individual determinants of the SEM framework relate to an individual's personal decisions, which may be affected by personal knowledge, attitudes, and beliefs. Vaccine hesitancy and refusal is an extremely personal and individualized decision. These individual determinants include education level, personal attitudes, and religious beliefs, which all obviously relate to the personal traits and aspects of the individual. It was found that parents who have lower education levels, predisposed attitudes towards the vaccine, and certain religious convictions have a strong correlation to be hesitant or show refusal towards the MMR vaccine (Nguyen et al., 2021; Byström et al., 2014; Wombwell et al., 2015). Each of these factors will further be discussed in detail.

Firstly, the education levels of the parents who are responsible for acceptance or denial of the vaccine were found to have a direct relationship with the final decision of the parent. A majority of the articles found that the parents who had lower levels of education across the world had an increased risk of feeling hesitant towards the MMR vaccine (Nguyen et al., 2021; Ashkenazi et al., 2020; Brown et al., 2012). In fact, Nguyen et al. (2021) discovered that a parent with a bachelor's degree or higher had a 13.0% rate of vaccine hesitancy/refusal, whereas those with high school education or less had a 31.9% rate of vaccine hesitancy/refusal, showing an 18.9% difference in vaccine uptake can be attributed to educational levels. This close relation between education and parental decision-making for their child to have the vaccine is an evidently an important factor in vaccine hesitancy.

In addition to this, another prominent individual determinant is found to be the predisposed attitudes of parents towards the MMR vaccine for their child. This aspect of vaccine refusal is extremely complex and highly specific to the parent; however, the selected studies revealed several repeating personal attitudes or beliefs of parents. Some parents are fully aware

of the severity of the measles, mumps, and rubella; however, they believe they are making the most realistic and safe choice for their young child. They fear that their 12-month-old to 6-year-old have underdeveloped immune systems that cannot be overwhelmed by an overabundance of childhood vaccines, intentionally eliminating the MMR vaccine for their child. Most parents do indeed want what is best for their child, and this personal belief to avoid or delay the vaccine is viewed as the safest for their child (Byström et al., 2014; McHale et al., 2016; Gowda & Dempsey, 2013). Additionally, the most common concern was the lack of confidence in the safety of the MMR vaccine. If parents are found to be concerned with vaccine safety, this becomes an obvious reason as to why they would refuse or delay immunization for their child. Multiple studies showed that the major safety concerns were related to a fear of unknown adverse reactions, risk for developing autism, immune system inundation, and contraction of disease from the vaccine itself (Byström et al., 2014; Rosso et al., 2019). The causation and reasoning behind these safety concerns will be further discussed in a separate determinant of the SEM. The final theme of personal beliefs towards the MMR vaccine was strongly related to parental empowerment, where parents desired to have absolute autonomy. Parents were found stating they deserve the right to reserve the autonomy for decision-making about their children's health without medical mandate infringement (Fadda et al., 2015). Choosing to refuse the vaccine was perceived as an equally informed and responsible decision for many parents within the studies. Overall, most parents do desire the best physical outcomes for their children; however, the research clearly shows the impact that various personal parental beliefs can have on MMR vaccine refusal rates.

Finally, religious beliefs were a substantial individual determinant that impacted the decision to accept or deny the MMR vaccine. One aspect of this vaccine that differentiates it

from the other immunization series is the fact that it has very unique and controversial components within the ingredients list. The MMR vaccine is a sterile lyophilized preparation of three different viral cultures: ATTENUVAX, which is a live measles virus vaccine propagated in chick embryonic cell cultures; MUMPSVAX which is an attenuated mumps virus from the Jeryl Lynn (B level) strain propagated in chick embryonic cell cultures; and MERUVAX II, which is a live rubella virus composed of the Wistar RA 27/3 strain. This strain utilizes a growth medium known as Minimum Essential Medium (MEM), which can be defined as “a buffered salt solution containing vitamins and amino acids and supplemented with fetal bovine serum containing human serum albumin and neomycin” (RxList, 2021). This medium is then propagated in WI-38 human diploid lung fibroblasts. This MERUVAX II live rubella vaccine specifically utilizes a propagation technique from cells of an electively terminated pregnancy of a three-month-old female fetus during the 1962 rubella pandemic (McKenna, 2018). Throughout research of the selected literatures, this concept became a major underlying concern within the religious and pro-life community. With this particular vaccine production process in question, the ethical dilemma for parents within this community rises. Various studies revealed the cost versus benefit that these parents face, involving the question of objectionability of this vaccine’s production in comparison to the overwhelming dangers of unvaccinated children (Anello et al., 2017; Wombwell et al., 2015). Overall, it became clear that religious beliefs became a major proponent in vaccine hesitancy and refusal, as many parents could not overlook this difficult ethical consideration of the vaccine. To restate, the effect of these highly individualized personal factors of education levels, personal attitudes, and religious beliefs had extremely evident correlation with MMR vaccine hesitancy and refusal in parents across the world.

**Interpersonal Determinants.** Aside from the individual highlights, the interpersonal determinants of the SEM also were found to have a strong impact on MMR vaccine hesitancy, as they relate to cultural, social, and familial influence. This can involve family, friends, colleagues, and overall cultural impacts. With further review of all of the articles, interpersonal themes were found to revolve around factors such as the significance of familial culture, marital status, and opinions of respected friends and family in regard to the MMR vaccine.

First, the culture of the parents had a significant effect on vaccine hesitancy. Specifically, multigenerational family decision-making greatly impacted the attitudes of the parents (Fadda et al., 2015). In various European countries such as Switzerland, the United Kingdom (UK), and Germany, parents described their reasoning towards MMR vaccine refusal to be largely related to the fact that vaccine avoidance had been a decision made by multiple generations of their ancestors. Therefore, they believed that doing anything different from their cultural history would be disrespectful to the years of family history behind them.

Another major interpersonal influence found amongst many of the parents included a reported cultural history of the complementary medicine movement or homeopathy. This cultural and traditional medicinal practice overtook a vast majority of the parental attitudes towards vaccine hesitancy. This worldwide practice is defined as an alternative approach to medicine that focuses on the body's ability to cure itself through natural immune boosting substances. Therefore, parents within these studies showed a desire to refuse the contemporary MMR vaccine and instead focused on obtaining homeopathic prophylactic injections to increase white blood cell counts to fight diseases, focusing on diet/supplements/plant extracts as immunity boosters, or allowing their child to build their own immunity to these diseases through natural exposure to measles, mumps, or rubella (Cassell et al., 2016; McHale et al., 2016). In

fact, one particular study in Canada revealed that only 2.35% of Canadians showed vaccine hesitancy for their children in 2017; however, as of 2021, 13% of parents within the study expressed a desire to utilize these alternative practices for their children, showing the substantial increase in homeopathy in relation to the MMR vaccine hesitancy movement (McGregor & Goldman, 2021). Traditional practices of families and homeopathic medicinal movements clearly show substantial influence on the vaccine hesitancy discussion.

Additionally, marital status played a key role in parental decision-making. It was found that those who are unmarried, divorced, or separated were much more likely to have diminished MMR vaccine uptake (Anello et al., 2017; Kempe et al., 2020). In particular, an Italian population-based cohort study conducted by Anello et al. (2017) found that out of a study of 145,571 children within the specified region, children with married parents accounted for 9.65% of unvaccinated children; however, a larger 14.0% of unvaccinated children had unmarried, divorced, or separated parents. Thus, some studies revealed that marital status is a determinant in MMR vaccine refusal and hesitancy, and the reasoning behind this may be related to the parents' inability to make time for vaccine scheduling, lack of social support, and inability to afford healthcare access due to single parent income (Anello et al., 2017; Kempe et al., 2020).

Finally, the interpersonal relationships of parents and friends or family had a high rate of influencing MMR vaccine hesitancy. This effect can be related to the reported sharing of negative information or negative experiences concerning this vaccine. Multiple studies revealed that the spread of misinformation or opinions such as harmful side effects, autism development conspiracies, or personal desire to leave children unvaccinated spread like informational wildfire through parents globally (Ashkenazi et al., 2020; Hadjipanayis et al., 2020; Miko et al., 2019). In fact, a large-scale survey of 18 European countries revealed that 29% of parents who chose to

refuse the MMR vaccine based their decision off of negative information obtained from friends or family (Hadjipanayis et al., 2020). Therefore, it is evident that the interpersonal determinants parents experience on a day-to-day basis have strong correlation with vaccine hesitancy.

**Organizational Determinants.** The organizational influence within the SEM involves a much higher impact than individual and interpersonal factors. Organizational determinants involve governing institutions that may affect the health-care decisions of the individual. While the other determinants had influential factors, this determinant focused on one overarching theme: healthcare mistrust. For example, two studies reported that the healthcare system was a major factor affecting the decision-making of parents towards the MMR vaccine (Miko et al., 2019; McHale et al., 2016). One major influential factor affecting parents and this vaccine involved an overwhelming mistrust in the healthcare system, including doctors, nurses, healthcare management, and the pharmaceutical industry. One study in particular conducted by Reuben et al. (2020) used a linear regression analysis with a Parental Attitudes about Childhood Vaccines Scale (PACV) to analyze parental relationships with the MMR vaccine, with high PACV scores (>50) indicating strong vaccine hesitancy among parental participants. Results of this study showed that healthcare and provider mistrust were primary predictors for vaccine hesitancy among parents, with high PACV scores between 50 and 75 indicating low levels of trust in the healthcare system. Reasoning for the mistrust included, but was not limited to, beliefs that the healthcare system is either misinformed or has ulterior motives for administering the MMR vaccine, such as massive financial profit by the pharmaceutical companies and/or providers. Parents within these studies further claimed that they believe healthcare providers are misinformed about vaccines, that doctors and nurses themselves do not trust the vaccines they administer, and that healthcare providers are protected from liability for harm caused by

vaccines, resulting in an increased desire for the healthcare system to push the vaccine and a decreased desire for parents to obtain it for their children. However, other major factors found within the literature included a lack of clear communication between provider and patient or feelings of judgment or harassment if expressing vaccine hesitancy to the provider (Reuben et al., 2020; Gowda & Dempsey, 2013). It is clearly evident that factors that influence parental decisions towards the MMR vaccine have substantial external influence.

**Community Determinants.** Further branching into the external factors that affect parent's attitudes towards the MMR vaccine results in an analysis of community determinants. This category largely involves societal norms, values, and overall surroundings of an individual greatly affecting healthcare-related decisions and results. The research of selected literature yielded a common theme of community influence that is an extremely prominent factor in today's society: the anti-vaccination movement and campaigning strategies, engulfing a community informally known as "anti-vaxxers." Although the reasoning behind vaccine hesitancy and refusal can clearly be individually, interpersonally, or organizationally related, the effect that these anti-vaccination strategies have on parents in their decision-making is evident within the literature. The anti-vaccination movement is constituted of a vaccine refusal trend due to numerous reasons, many of which have been discussed; however, the campaigning tactics of this anti-vaccination movement have crept their way into social media and internet organizations, spreading factual and non-factual information alike about the vaccine, highly influencing parents. In relation to the previously discussed organizational determinant of healthcare and provider mistrust, the fact remains that many parents receive the majority of their information concerning the MMR vaccine from the internet/social media, rather than their provider or a trusted source of information. In fact, one cross-sectional study of parents within the United

States found that 19% of parents obtain information regarding the vaccine from the internet, and 13% of information from social media respectively (Ashkenazi et al., 2020). This same study revealed that parents whose main source of information was social media or the internet had a completed MMR immunization rate of 45% for their children, in comparison to parents whose major source of information was their trusted providers, which resulted in a MMR immunization rate of 85%. Multiple studies in countries around the world found very similar conclusions, revealing that the anti-vaccination community and its campaigning techniques held substantial weight in the refusal of parents allowing administration of the vaccine, including Miko et al. (2019) in Romania, Gowda and Dempsey (2013) in the United States, Fadda et al. (2015) in Switzerland, Rosso et al. (2019) in Italy, and many others. According to Reuben et al. (2020), this can be related to the fact that “Anti-vaccination sites focus on emotional appeals, including personal testimonials using pictures and stories of children allegedly harmed by vaccines, threatening needle imagery, and calls for responsible and ethical parenting through standing against harmful vaccinations.” These websites were also found to utilize vaccine-related autism conspiracies, as well as emphasize the supremacy of homeopathic medicine over “toxic” vaccine ingredients, in an effort to further engage parents towards avoidance of the MMR vaccine for their children. When pertaining to the safety of their child, parents rightfully become much more inclined to take this type of information very seriously; therefore, it is apparent that the anti-vaccination community continues to play a substantial role in the rise of MMR vaccine refusal.

**Public Policy Determinants.** The final determinant of the SEM includes the highest and most general category of legislation with national, state, and local laws. This public policy determinant describes how these governmental decisions affect health-related issues amongst the general population. Just as the individual, interpersonal, organizational, and communal factors

can influence vaccine hesitancy among parents, so can the overarching mandates made by governmental agencies concerning the MMR vaccine. According to the CDC (2021) and WHO (2020), the MMR vaccine is highly recommended to all children, with the first dose at 12 to 15 months, and the second dose at 4 to 6 years of age. However, even if the child was not vaccinated during these age ranges, two doses are still recommended at any age, with the first and second dose being, at minimum, 28 days apart. Therefore, from a federal legislative standpoint, the MMR vaccine is not a requirement for children, and is instead a recommendation by global public health officials. However, many countries around the world, including the United States, South America, Central America, Indonesia, and several European and African countries, have implemented state or country-wide mandates that do not allow the child to enter childcare institutions or kindergarten through 12<sup>th</sup>-grade learning facilities unless fully immunized with the MMR vaccine (Marks & Vanderslott, 2019). It is these public policy mandates that have proven to become a highly reported influence affecting parental vaccine hesitancy around the world. The childhood immunization requirements in place begin to question parents on the delicate balance of preserving their autonomy or preserving their child's education. While school mandates appear to substantially improve MMR vaccine uptake, many vaccine-hesitant parents find these mandates to be an infringement of rights and an un-ethical ploy to increase vaccination rates, further contributing to vaccine avoidance (Hendrix et al., 2016; Gowda & Dempsey, 2013). The research articles further discovered that parents who are appalled by school vaccine mandates often opt for homeschooling options or religious exemptions to avoid vaccinating their children, further contributing to this rate of under-vaccination around the world.

It is clearly evident that the reasoning behind vaccine hesitancy among parents requires a multi-faceted approach to understand all the influential factors. Application of the SEM framework shows individual, interpersonal, organizational, community, and political factors, interconnectedly affecting the decision to reject/refuse the MMR vaccine. This framework helps one to visualize the interrelated factors that affect vaccine hesitancy in parents, while simultaneously bringing awareness about this issue can foster necessary improvement.

### **Data Evaluation**

#### **Inconsistent and Supportive Findings**

The results of this integrative review found multiple commonalities amongst the selected literature. Using the SEM framework, many common themes were identified on final synthesis of conclusions. However, it is clear that parental vaccine hesitancy towards the MMR vaccine is a growing public health concern around the world, and that the factors influencing it are compound, intricate, and fascinating when brought into perspective. All articles revealed extremely similar factors that are influencing parents in various different countries, including individual (education, religion, and personal attitudes), interpersonal (familial culture, marital status, and relationships), organizational (patient-healthcare system mistrust), community (anti-vaccination campaigns), and public policy (school mandates) factors. The research all revealed this same theme that solving vaccine hesitancy is a complex issue that requires implementation and integration of solutions at all levels and aspects of life.

Inconsistent findings within the research were minimal. However, one inconsistency is related to the socioeconomic status of parents and how it affects their decision-making regarding the MMR vaccine. To be more specific, some articles revealed that low socioeconomic status was affiliated with lower vaccine coverage due to inability to access healthcare services;

however, other similar articles revealed that higher socioeconomic status was associated with lower vaccine coverage due to the ability to seek other forms of private healthcare. Other articles claimed that the findings related to socioeconomic status were inconclusive. Although this was the main inconsistency found throughout the selected literature, the findings still reflect on the need for solutions in regard to the MMR vaccine hesitancy movement, as it is affecting parents and children from all walks of life.

## **Strengths**

### ***Strengths of Articles Included within the Study***

Careful search of databases using key terms, and inclusion and exclusion criteria helped to identify relevant articles. Also, by using the Johns Hopkins Levels of Evidence, the strength of evidence was established. Due to this article selection process, the articles chosen were also all scholarly and primary sources, thus significantly contributing to the credibility of this project. Finally, the research selected for this literary review came from a compilation of multiple authors from different countries within the last ten years, with all showing the common themes emerging on this topic. These articles revealed many similarities concerning the reasoning behind parental vaccine hesitancy towards the MMR vaccine, and, in addition, all articles deduced the same conclusion: there is a need for action in this particular public health crisis. Overall, the criteria with which these articles were selected, as well as the commonalities of presenting themes, bring great strength to this integrative literature review.

### ***Strengths of Study Methodology***

This study used the methodology of an integrative literary review. An integrative literature review is a research technique that identifies and selects multiple research studies in order to answer the originally stated research question and purpose. The research question for

this literature review involved analyzing what leading factors are contributing to MMR vaccine hesitancy. To answer this research question, this integrative literature review utilized the scholarly articles to bring together a well-rounded and all-encompassing perspective of the common themes found in the research. This allows the research study to be comprehensive, while assisting in elimination of bias from using one article, which may have led to researcher bias. This integrative literature review also desired to analyze parents around the world, rather than in one country; therefore, using a systematic review process significantly strengthened this project to give an all-inclusive viewpoint of multiple authors from different countries worldwide. This integrative literature review also utilized the PRISMA flowchart, Whitemore and Knafl (2005) methodology, and the SEM to assist in organizing them throughout the synthesis. The Whitemore and Knafl (2005) methodology allowed rigor to be added to this study by laying the groundwork for this integrative review and utilizing diverse research methods to conclude evidence-based data findings. The SEM further strengthened this study by providing an organized theoretical framework that emphasized the interconnectedness of each theme from the research findings. Overall, the integrative literary review has proven credibility and is a significant contribution to the literature.

## **Limitations**

### ***Limitations of Articles Included within the Study***

Although there are various strengths associated within the research of this study, one would be remiss to neglect the limitations within the article selection. First, the findings from individual research are highly subjective based on the individuals who were interviewed or studied. Each parent may come from a different experience or position, even if they are within the same region of the world. This makes it difficult to adequately generalize the information to

every parent in the world who is vaccine hesitant; however, the overwhelming similarities of these parents does aid in manifesting the common themes to guide future research. In relation to the SEM, that there is a larger gap in organizational, community, and public policy determinants. Although the research revealed extensive information surrounding individual and interpersonal determinants, the higher external factors require much more research to proportionate the information in this review. Finally, the largest gap within the article selection included the consistent call for further research to be performed in relation to this topic. Each article would conclude with the need for future studies to take place in order to find solutions for this worldwide public health concern. This ultimately shows the inadequacies lying within the current research, as there is an overwhelming necessity to resolve the issue of MMR vaccine hesitancy through future research studies. Furthermore, only articles with the English language and full-text accessibility were included, opening up the possibility of some research being left out of this review. Ultimately, although the included articles provide great strength and validity to this study, limitations still become a possibility when reviewing such substantial and comprehensive research studies.

### ***Limitations of the Study Methodology***

In addition to the limitations of the research articles, there are also areas of limitation in the chosen integrative literature review study methodology. First of all, an integrative literary review analyzes a wide majority of articles; therefore, some of the information, although valuable and relevant, is unable to be included within this particular study, such as other factors contributing to parental hesitancy and interesting background information in order to keep the synthesis within the defined frameworks and to avoid redundancy. The study also failed to incorporate articles outside of the English language, which may result in some unreported

information or studies. Furthermore, only full-text articles were included within this integrative review, which may further limit this thesis. In addition to this discussion of various articles, included the possible failure to include statistics, which can portray less than accurate pictures and comparisons. Furthermore, this comparison of articles may lead to the risk of bias of the researcher through misleading reporting of methods used, ambiguous interpretation of nonsignificant results, or inappropriate exploitation of a patient population not included with the study. Finally, although the PRISMA flowchart was followed, there is continuous possibility that not every relevant article was included within this research study, leading to possible gaps. Overall, the integrative literature review clearly has limitations to its methodology; however, it served as an excellent study method for this synthesis due to its numerous previously discussed strengths.

### **Implications and Recommendations**

The findings regarding parental hesitancy towards the MMR vaccine revealed a growing public health issue and a need for future research and solution. Although this improvement is a worldwide public health priority, parents still deserve to be treated and handled in a respectful manner in order to combat MMR vaccine denial. Researchers are aware of many of the common factors that influence parents; however, they have yet to conclude means for improving the public concern of MMR refusal. Of the numerous factors affecting parents' decisions, including individual, interpersonal, organizational, community, and public policy determinants, at least some could be addressed. An examination of these determinants can help develop informative, reasonable, and supportive recommendations targeting parents who hesitate with the MMR vaccine.

Primarily, raising awareness, education level, pre-conceived personal attitudes, negative opinions from peers, false information received from anti-vaccine campaigns, and answering questions of parents can truly enhance trust with the healthcare team. Although these categories involve extremely different aspects of personal lifestyle, they can simultaneously unite with one recommendation of solution: proper education from a trusted healthcare team. Many of the studies that included parents who willingly refused the MMR vaccine often were informed of incorrect information surrounding the vaccine, specifically related to harmful side effects or diseases. Most of this incorrect information was obtained through anti-vaccination campaign beliefs and internet/social media influence. In order to combat this, proper education from the healthcare team is vital. One prime example of implementation could include the SDM model. This model involves creating a judgment-free zone for the parent, while providing high quality information to create supportive and informed decision making (Elwyn et al., 2012). The SDM model begins by finding out the parent's viewpoints on a subject in order to find the underlying beliefs or concerns. Once established, the clinician is able to understand what is important to the parent so that the healthcare team can properly inform the parent of evidence-based information to reduce any fears and address false beliefs or concerns. The healthcare team may then come alongside the parents in order to support the deliberation of their options. According to the SDM model, the healthcare team contributes to this process through the following: "choice talk", which is informing the patients of reasonable options with minimal and easy-to-understand verbiage; "option talk", which gives more thorough details of the discussed options to the parent; and "decision talk," which involves supporting the consideration of preferences and deciding what is best for this parent. All parents are unique, especially in relation to their decision-making for their child. Therefore, it is important for the healthcare team to come alongside

parents in the difficult decisions of their children's healthcare in order to promote comfortable patient-centered care and a trusting learning environment to master healthy promotion of the MMR vaccine.

In addition to this educational need, a larger ethical concern lies within the depths of the MMR vaccine and parental hesitancy. Some concerns may be surrounding the preparation of the vaccine itself. As previously discussed, this vaccine contains MERUVAX II, the live rubella virus propagated in WI-38 human diploid lung fibroblasts (Mckenna, 2018). This aspect raises obvious refusal amongst religious and non-religious individuals alike, who find themselves within this moral predicament. Due to the nature of this rising movement, the desire for an alternative becomes essential, as solving this aspect of the MMR vaccine could result in increased vaccine uptake in many communities around the world. The research for an alternative has been largely left unexplored in most areas worldwide; however, Japan has begun implementing trials for a new MMR vaccine by replacing the WI-38 strain with the Takahashi strain using quail embryonic fibroblasts, rather than fetal inoculation techniques. As of 2019, studies in Japan have showed this strain to have an incidence of low adverse events with a high rate of immunogenicity in selected children (Nakayama et al., 2019). Although these studies still remain in clinical trials and have a strong need for further research, replacing this ethical concern with the vaccine could imply worldwide changes with vaccine uptake; therefore, it has a crucial implication worth exploring in the future. Although these recommendations may not suffice for all required needs, they truly show the need for a change within the healthcare workforce in order to achieve optimal health, patient satisfaction and trust, and outstanding advancements in research.

### **Conclusion**

This literature review explored the growing health concern of parental vaccine hesitancy towards the MMR vaccine. An integrative literature review was performed to analyze this specific issue. It is found that the individual, interpersonal, organizational, community, and public policy determinants that add to the parental stressors of MMR vaccine uptake, indicating how complex and interconnected this concept is. This study was also able to bring forth many implications to the healthcare team that can bring about change through patient-centered care techniques, as well as furthering research to strive for the best evidence-based practice. Overall, it can be concluded that vaccine hesitancy is, in fact, a growing public health concern; however, the factors impacting this decision are plentiful, unique, and intricate. Each of the individually discussed factors have substantial influence on today's parents around the world, and research surrounding this topic has considerable room for growth and improvement. Healthcare professionals have a crucial role in changing the narrative of vaccine refusal. Through keeping an awareness of these discussed factors, constantly pursuing advancements in research, and building a trusting patient-centered environment, one may begin to see revolutionary change in the worldwide pandemic of MMR vaccine refusal.

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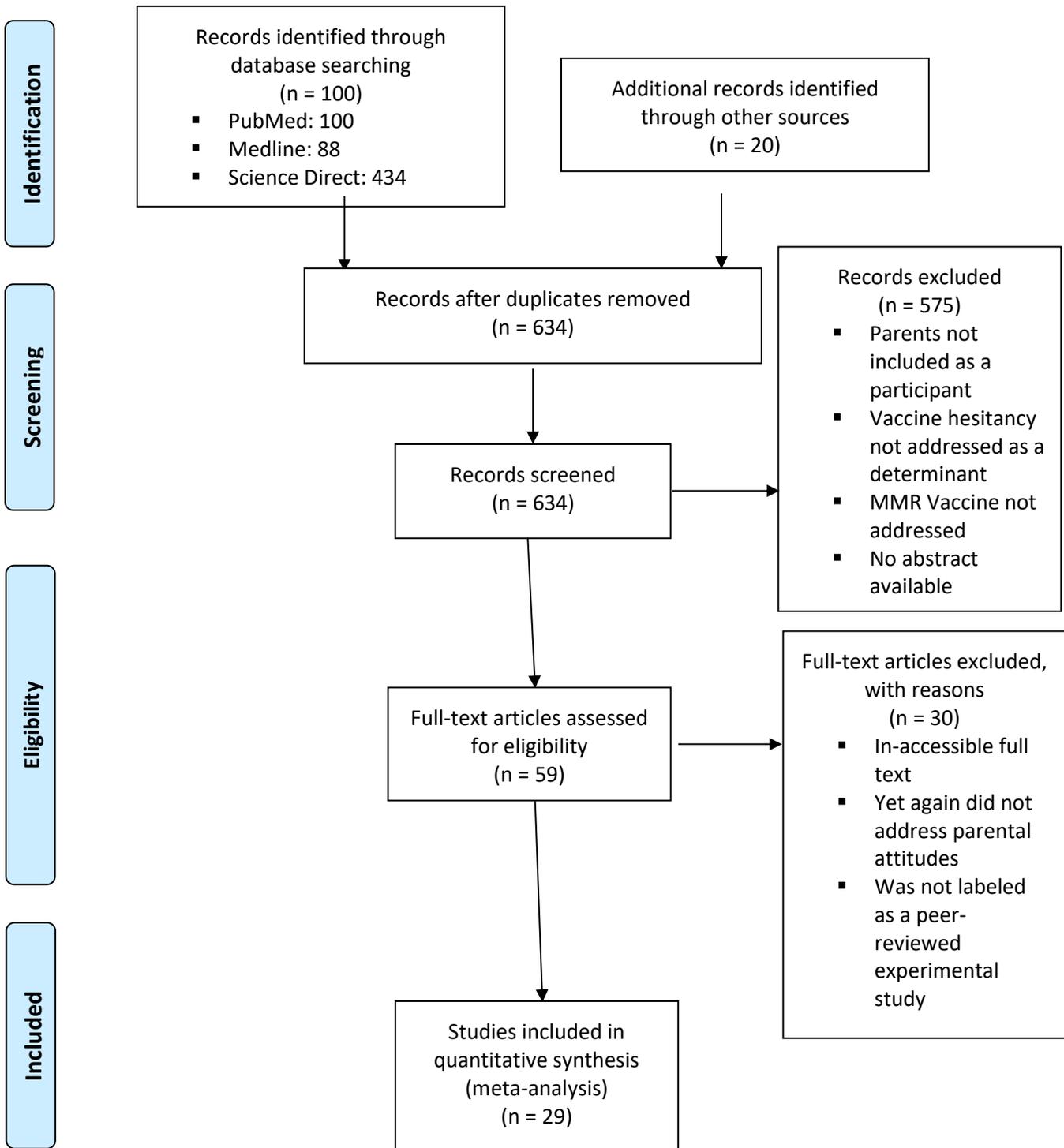
**Appendix**

**Appendix A: Socioecological Model Framework**



(James, 2022)

**Appendix B: PRISMA Flowchart**



From: Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021, June 25). The Prisma 2020 statement: An updated guideline for reporting systematic reviews. Oregon Health & Science University.

<b>First author</b>	<b>Year</b>	<b>Study Design</b>	<b>Study Population</b>	<b>Sample size</b>	<b>Determinants/ contributing factors reported</b>	<b>Outcomes reported</b>	<b>Level of Evidence</b>
<b>Anello, P.</b>	<b>2017</b>	Population-based cohort study	Children unvaccinated under 24 months old within an Italian cohort	145,571 babies born in the Friuli-Venezia Giulia (FVG) region	Parents, marital status, educational status, demographics, socioeconomic	Mothers within this Italian cohort were found to have a rising denial of the MMR vaccine, even in the midst of higher formal education. However, demographics, marital status, and socioeconomics were found to be related to this lower vaccine rate, and further research needs to be conducted.	Level I
<b>Ashkenzi, S.</b>	<b>2020</b>	Cross-sectional survey	Parents across the country in the United States	399 individuals from all over the U.S.	Demographics, sources of information, status of vaccination, parents	Social-media and internet are a common source of information on measles/measles vaccine, and are often associated with incorrect knowledge, which relates significantly to vaccine hesitancy. "Healthcare professionals should be aware of this prevailing behavior and respond	Level I

						accordingly in these platforms, with the aid of experts in social-networking.”	
<b>Brown, K.</b>	<b>2012</b>	Qualitative analysis	Population of mothers within the United Kingdom	24 mothers planning to accept, postpone or decline the first MMR dose for their 11–36-month-old children	Mothers, healthcare mistrust, education levels	This study revealed five main attitudes: MMR vaccine and controversy; Social and personal consequences of MMR decision; Health professionals and policy; Severity and prevalence of measles, mumps and rubella infections; Information about MMR and alternatives.	Level II
<b>Byström, E.</b>	<b>2014</b>	Qualitative research design	Small population of 7,000 in Swedish community	All parents within community invited to participate, with 20 used as the final sample size	Parents, parental attitudes, views of health	For those in this study who chose to avoid the MMR vaccine, the study found the main attitudes of refusal to be focused on age concerns of the infants, concerned with vaccine safety, or wanted to promote natural immunity within their children.	Level I

<b>Carpiano, R. M.</b>	<b>2019</b>	Qualitative study with cross-sectional survey	National Canadian immunization coverage rates through the Childhood National Immunization Coverage Survey (CNICS)	24,853 Canadian children ages 2, 7, and 12-14 (girls only)	Parents, socioeconomic	Child under vaccination remains a pressing public health challenge that requires extensive research for proper handling within the healthcare system.	Level I
<b>Cassell, J.A.</b>	<b>2016</b>	Qualitative survey	Children with mothers with a history of personal attitude or experience with the MMR vaccine in Brighton, England	Children between 15-24 months in a sample of a sample of 1000 MMR uptakers and non-uptakers in a ratio of 1:1 was randomly drawn	Social influence, cultural influence, health beliefs, homeopathy	This study found that mothers interpret MMR vaccines as a huge risk to their child's health; therefore, they strongly turn to complementary medicine, such as homeopathy due to cultural, social, and other influential factors.	Level II
<b>Eileen, W.</b>	<b>2015</b>	Qualitative study with convenience sampling	Philadelphia neighborhood with high socioeconomic status	25 participants (19 mothers and 2 couples) with a child aged 18 months – 6 years	Socioeconomic status, parents/guardians	Decision-making experience becomes overwhelmed by vaccine considerations and lack of education generates a fear and hesitancy with pediatric vaccine schedules.	Level II

<b>Facciola, A.</b>	<b>2019</b>	Distribution of questionnaires in six lower secondary schools of the Italian city of Messina.	Parents with children 13-14 years old in these secondary schools	1,093 questionnaire answers from parents	Education level, personal beliefs, safety concerns	Lack of knowledge, safety concerns of parents, and education level found strong correlations between vaccination status of children within this study. Health education and communication of correct information are cornerstones in resolving this issue in the future.	Level II
<b>Fadda, M.</b>	<b>2015</b>	Qualitative study	Parents of at least one child living in Switzerland	20 participants – 15 mothers and 5 fathers	Parent/guardians, educational levels, religious beliefs, personal beliefs	Parents reported the paradox of free will, giving up power, and demand for shared decision-making alters their decisions in obtaining the MMR vaccine	Level II
<b>Gilkey, M.B.</b>	<b>2016</b>	Qualitative randomized study	Used Vaccination Confidence Scale from a large, population-based sample of U.S. parents	9,354 parents who completed the 2011 National Immunization Survey	Socioeconomics, ethnicity, education, personal attitudes, personal beliefs	This survey noticed the increased need for to put further research into improving vaccination rates and alternative approaches to the vaccine in order to increase MMR vaccine rates.	Level I
<b>Gowda, C.</b>	<b>2013</b>	Non-experimental			External factors, vaccine factors, and	This non-experimental study revealed that	Level III

		research study			patient-specific factors	MMR vaccine hesitancy is a growing public health concern that can be traced to external factors, vaccine-specific factors, and patient-specific factors. This complex issue requires the healthcare system to become a trusting source of information.	
<b>Hadjipanayis, A.</b>	<b>2020</b>	Large-scale qualitative study of 19 European countries	Parents having at least one child between the ages of 1-4, living in one of the specified European countries	A sample size of 3557 participants were included	Demographic characteristics, parental attitudes and behaviors about vaccine safety, religious beliefs, fear of overwhelming immune system	Significant lack of confidence was found in certain European countries, concerning the provided determinant factors, highlighting the need for continuous monitoring, awareness and response plans.	Level I
<b>Hendrix, K. S.</b>	<b>2016</b>	Non-experimental research study			Vaccine attitudes, vaccine ethics, religious beliefs, autonomy	This non-experimental review emphasized the fact that parents desire to make the best choice for their children. Due to personal attitudes and beliefs, parents believe that they are making the smartest and healthiest choice for	Level III

						their child. This also emphasized the need for healthcare education and change.	
<b>Kempe, A.</b>	<b>2020</b>	Qualitative study with randomized sampling	Families with children using the largest online panel generating representative US samples.	2,176 parents responded to the survey out of the 4,445 that the survey was distributed to	Safety concerns, personal beliefs, demographic	Almost 1 in 15 US parents are hesitant about routine childhood vaccines. Furthermore, 1 in 8 parents are concerned about vaccine safety due to personal beliefs.	Level I
<b>McGregor, S.</b>	<b>2021</b>	Non-experimental research study			Risk perception, trust in healthcare providers, social norms	This review showed the vaccine hesitancy that is on the rise in Canada may be related to parents having altered knowledge of the MMR vaccine, poor trust in the healthcare team, and social influence.	Level III
<b>McHale, P.</b>	<b>2016</b>	Descriptive qualitative study	Post-measles outbreak in Merseyside, England with a population of 1.4 million	47 unvaccinated children that had previously been infected with measles	Parents, unvaccinated children, measles outbreak	Concerns with vaccine safety, child was ill at the age of vaccination, healthcare factors, and religious concerns with components of the vaccine were identified as results.	Level II
<b>Miko, D.</b>	<b>2019</b>	Observational cross-	Population of parents in	452 individuals	Parents/guardians; social, cultural,	This review summarized that social	Level I

		sectional study	Cluj-Napoca city, Romania	(parents) that took their children to the four pediatric clinics in the city between May 1 and June 30 of 2018	religious, and political factors	media anti-vaccination campaigns, lack of trust in the healthcare system, safety concerns, and religious beliefs interfered with vaccine acceptance.	
<b>Nguyen, K.</b>	<b>2019</b>		Children aged 19-35 months in the US, District of Columbia, and some territories		Ethnicity, socioeconomics, literacy level	Vaccine hesitancy highest in non-Hispanic black and Hispanic children, parents with low literacy levels, and poverty households. Other concerns involved safety issues, and several implications were given to resolve this issue.	Level III
<b>Reuben, R.</b>	<b>2020</b>	Qualitative assessment research review	Parents in the United States, United Kingdom, and Canada	Sample included 522 participants who were recruited via Amazon MTurk. Participants were excluded if	Personal attitudes, religious beliefs, socioeconomic status, educational levels, trust in healthcare provider	This research study used a linear regression analysis to show that personal parental attitudes, religiosity, low socioeconomic status, low educational levels and poor trust in the healthcare system	Level II

				they were not parents, citizens of the United States, Canada, or the United Kingdom, or did not answer the parental vaccine hesitancy scale, trust in medical profession items, and the disgust sensitivity scale.		were related with low uptake of the MMR vaccine.	
<b>Rosso, A.</b>	<b>2019</b>	Cross-sectional survey through self-distributed questionnaire	Pregnant women attending antenatal classes (CANs) in Rome	458 pregnant women attending (CANs)	Pregnant mothers, education levels, personal beliefs, personal attitudes	Skepticism about safety and mistrust in the healthcare team members contributed to the majority of vaccine hesitancy.	Level II
<b>Sharma, S.</b>	<b>2020</b>	Community-based cross-sectional study with qualitative approach	The total population of the district is over 1.6 million. Nuapda has a total area of	A sample size of 211 households was calculated based on the World Health	Awareness, access, education, religious	An analysis of awareness, access, and acceptability showed strong correlations between parents and vaccine hesitancy.	Level I

			3852 km <sup>2</sup> and has 6 blocks	organization reference of cluster survey for immuniza tion coverage.			
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(Appendix C, n.d.)