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The Effectiveness of California Assembly Bill 2109: Personal Belief Exemptions for Kindergarten Immunizations

Lilli Shizuka Goishi-Bessey

California State University, Northern California Consortium Doctor of Nursing Practice

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THE EFFECTIVENESS OF CALIFORNIA ASSEMBLY BILL 2109:
PERSONAL BELIEF EXEMPTIONS FOR KINDERGARTEN
IMMUNIZATIONS

by

Lilli Shizuka Goishi-Bessey

A project

submitted in partial

fulfillment of the requirements for the degree of

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ABSTRACT

THE EFFECTIVENESS OF CALIFORNIA ASSEMBLY BILL 2109:
PERSONAL BELIEF EXEMPTIONS FOR KINDERGARTEN
IMMUNIZATIONS

The numbers of vaccine preventable diseases (VPDs) in the United States has declined with the development, administration, and effectiveness of vaccines during the 1970s and 1980s. As the eminent threat of VPDs to the public began to wane, parents started questioning the safety and necessity of vaccines. When parents were given the option of selecting personal belief exemption (PBE) waivers for state mandated immunizations for their incoming kindergarten children, an increase in PBEs and the number of VPD outbreaks began to occur. To counter the growing trend of PBEs, and to prevent outbreaks of VPDs in school settings and communities, California Assembly Bill 2109 (AB 2109, 2012) was created to help educate parents about vaccine safety and VPDs. As of January 2014, California Assembly Bill 2109 (AB 2109, 2012) mandated that parents seeking PBEs for state mandated immunizations for students entering kindergarten were required to receive education about vaccine safety and risks along with education regarding VPDs by a health care professional (AB 2109, 2012). The purpose of this study was to examine the effectiveness of AB 2109 by examining data from the top ten most populous counties in California. Data was collected for the 2013-2014, 2014-2015, and 2015-2016 school years to determine if AB 2109 directly impacted the number of PBEs for incoming kindergartners. This project determined that AB 2109 was significant in decreasing the number of PBEs from the 2013-2014, 2014-2015, and 2015-2016 school years by -23.4% in the ten most populous counties in California. Further research beyond this project is necessary to evaluate the continued impact of AB 2109 on PBEs and in decreasing the number of VPD outbreaks throughout California.

Lilli Goishi-Bessey

April 2016

APPROVED

For the California State University, Northern Consortium
Doctor of Nursing Practice:

We, the undersigned, certify that the project of the following student meets the required standards of scholarship, format, and style of the university and the student's graduate degree program for the awarding of the doctoral degree.

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CHAPTER 1: INTRODUCTION

Background and Significance

California law requires students enrolling into kindergarten to be immunized against vaccine preventable diseases (VPDs) including polio, DTaP (diphtheria, tetanus, and acellular pertussis), MMR (measles, mumps, and rubella), hepatitis B, and varicella. These vaccines have been effective in decreasing the numbers of VPDs and in protecting those who are unable to receive vaccines due to certain medical conditions or contraindications (CDC, 1999). Outbreaks and numbers of VPDs have declined, thus fears associated with these diseases have also dissipated. Lacking exposure to the debilitating aftermath of VPDs, parents and society have become unfamiliar with these VPDs and their harmful effects on children and communities.

Effective vaccination coverage and school immunization requirements lend themselves towards reducing the numbers of VPDs. As a result, an increasing emergence of personal belief exemptions (PBEs) in states that permit them has occurred (Orenstein & Hinman, 1999; Jones, Omer, Bednarczyk, Halsey, Moulton, & Salmon, 2012). Efforts to eradicate these VPDs continue and the possibility of a resurgence of these once eradicated VPDs has become a concern. Health care practitioners (HCPs) must make concerted efforts in communicating accurate and credible vaccination information, websites, and resources to parents. They must also be prepared to discredit any unreliable Internet sources that espouse unsupported claims about both vaccine safety and side effects. This may prove challenging for HCPs especially when parents have researched various websites and resources that claim to be legitimate but in reality support the anti-vaccine movement.

As PBE rates in California increase, there is a risk of a corresponding growth in the numbers of VPD outbreaks. Reported cases of VPDs in California have risen in recent years

(CSNO, 2012). Diseases such as varicella, pertussis, mumps, and measles increased in 2014 when comparing reported data from 2013. Varicella cases increased from 32 to 41 cases; for pertussis, 2,537 to 11,213 cases; for mumps, 30 to 37 cases; and for measles, 18 to 75 cases, respectively (CDPH, 2014b). The most recent published VPD outbreak that occurred in California was the measles outbreak that transpired at an Anaheim amusement park in December 2014 (CDC, 2015a; CDPH, 2014b). Fourteen out of the 75 cases that were reported in 2014 were associated with this outbreak, with an onset that began in December 2014 and concluded in April 2015. There were a total number of 131 confirmed cases involving 12 counties, 6 other states, and 2 other countries (CDPH, 2016a).

Prior to January 2014, parents who chose not to vaccinate their child due to personal reasons were not required to present any documentation during the kindergarten registration process. Instead, parents would sign the back of the blue California State Immunization Record (CSIR) card stating that they chose not to vaccinate their child due to personal beliefs. This single school document, once signed, permitted the child to attend school without completing the mandated state immunization requirements (CDPH, 2015a).

After January 2014, parental ability to easily opt for a PBE by signing the back of their child's CSIR card was eliminated. California Assembly Bill 2109 (AB 2109) mandates parents seeking PBEs for state mandated immunizations for students entering kindergarten to receive education from HCPs (medical doctor, doctor of osteopathic medicine, nurse practitioner, naturopathic doctor, physician assistant, or credentialed school nurse) about vaccine safety and the risks along with education about risks of VPDs to the community (AB 2109, 2012).

Problem

With increasing PBEs for state mandated immunizations amongst California kindergarten students, a steady rise in the numbers of under-immunized kindergartners in conjunction with increasing outbreaks of VPDs has become evident. To counter this growing concern of under-immunized students, AB 2109 was enacted in January 2014 in an effort to increase education about vaccine safety and effectiveness and to ultimately decrease the numbers of PBEs.

Description of Project

The purpose of this project is to determine if AB 2109 was significant in decreasing the number of PBEs for incoming kindergartners in the ten most populous counties in California for the 2014-2015 and 2015-2016 school years.

Theoretical Framework

The Health Belief Model (HBM) originated in the United States during the 1950s in response to the lack of public participation in available health programs (Steckler, McLeroy, & Holtzman, 2010). The HBM is an appropriate theoretical framework for this project by helping to determine parental behaviors for selecting vaccination for a school-aged child, particularly an incoming kindergartner enrolling into a California school.

Theory Assumptions

The assumptions for the HBM towards the public health issue of immunizing children are to ultimately prevent outbreaks of VPDs and to maintain optimal state of health. An individual's susceptibility and severity to VPDs along with the individual's ability to reduce the threat are also considered part of the assumptions of the HBM (Champion & Skinner, 2008).

Theory Concepts and Definitions

Initially there were four theoretical constructs in the original HBM: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. More recently, the HBM has expanded to include two other constructs: cue to action and self-efficacy (Champion & Skinner, 2008).

With *perceived susceptibility*, if individuals are presented with facts indicating an increasing susceptibility to contracting a VPD, they may search for ways to decrease the probability of contracting the disease (Champion & Skinner, 2008). Vaccination against a VPD would be an answer to protecting them from contracting and developing the disease. If a kindergarten student is diagnosed with measles, what is the probability of other students in the same classroom who are not immunized with the measles, mumps, and rubella (MMR) vaccine, of contracting the disease compared to those students who received the MMR vaccine? When there is a *perceived susceptibility* for a communicable disease to a child and education about the safety and risks of vaccination against the VPDs are provided by HCPs, parents may be more apt to getting their child immunized.

Perceived severity examines the debilitating effects that a disease could have on an afflicted individual's health. Could the effects be long-term and disabling, both physically and mentally on the affected individual, especially a child (Champion & Skinner, 2008)? Vaccines were developed to eradicate these debilitating diseases but once the severity of these diseases is no longer evident, the perception of severity greatly diminishes.

When parents truly grasp the *perceived benefits* that immunizations provide by decreasing the likelihood of their child contracting a VPD, it then improves the likelihood of parents supporting their child being immunized (Champion & Skinner, 2008). The benefits of immunizations outweigh the risks associated with vaccines. The *perceived benefits* of

kindergartners getting all the required immunizations for school entry only decreases their chances of contracting a debilitating VPD and preventing a VPD outbreak from occurring in the school setting. Another benefit is that students are in compliance with California immunization mandates. Being fully immunized against VPDs may lend itself to decreased absences due to illness, improved class attendance, and increased class time for learning.

Another construct describes *perceived barriers* that prevent an individual from embracing a new health change (Champion & Skinner, 2008). Why would a parent immunize their child if they believe immunizations cause autism, contain dangerous ingredients, and believe that immunizations negatively affect a child's natural immunity? Parents with strong anti-vaccine beliefs may not have the desire to change their current views on vaccines. They must be presented with a health behavior that has enough benefit that would be worthwhile changing their current beliefs. For example, if a family member or friend contracted a VPD that could have been prevented with a simple vaccine, especially if it is a debilitating disease, this may be cause enough to get vaccinated. If, however, a *perceived barrier* to not getting a child immunized may be due to finances or lack of insurance, there are several programs including the federally funded Vaccines for Children (VFC) where the Centers for Disease Control and Prevention (CDC) purchases immunizations at a discounted rate and provides them to grantees, such as school-based health centers, who will provide the immunizations at no cost to those who cannot afford them (CDC, 2014). Additional barriers that may prevent a child from being registered in school are parents' inability to find the immunization record and not being able to get to an appointment to be vaccinated due to various reasons (Adorador, McNulty, Hart, & Fitzpatrick, 2011). These are all potential barriers to a child having completed immunization records for kindergarten registration and why parents may have opted to sign a PBE in the past.

Cues to action are the triggers that could convince an individual to make the behavioral change (Champion & Skinner, 2008). When parents have chosen not to vaccinate their child due to personal beliefs, AB 2109 requires that parents must seek their HCP for education and consultation about the safety of VPDs and how they impact the community before a PBE can be signed (AB 2109, 2012). AB 2109 is the cue to action that includes the HCP and parent interaction to address vaccine safety and concerns. According to Champion and Skinner (2008), Hochbaum perceived cues to be related to environmental or bodily events that triggered and elicited an action.

Self-efficacy is the belief that if someone does not possess the capability to find a clinic or medical office to schedule an appointment for vaccination, therefore they will not get their child immunized (Champion & Skinner, 2008). It takes will power and initiative, and even belief in oneself to be able to overcome any barriers associated with self-efficacy. When the day of registration comes and the child lacks all the mandated shots, the parent will no longer be able to sign the back of the CSIR card to waive the vaccines, which parents were able to do prior to AB 2109 (CDPH, 2015a). The parent will need to visit their HCP to receive education on vaccine and VPDs, and will need to decide whether or not to vaccinate their child or obtain an HCP counseled PBE. AB 2109 eliminates self-efficacy.

This project incorporates the HBM by observing parental behavior with PBEs for required kindergarten immunizations after the implementation of AB 2109.

CHAPTER 2: LITERATURE REVIEW

Literature on vaccines for school aged children is abundant encompassing issues about parental concerns regarding vaccine safety, vaccine mandates, and personal belief exemptions (PBEs). An important factor influencing parental choices about vaccines and impacting immunization rates is the accessibility of vaccine resources existing in the media and internet. HCPs must address these concerns and misconceptions about vaccines by providing credible and accurate vaccine resources for parents. As numbers of PBEs continue to rise in the kindergarten population, HCPs must make concerted efforts toward educating parents about vaccine safety and the dangers of VPDs to children, communities, and to those who are too young or who are unable to be vaccinated. In California, AB 2109, which became effective January 2014, addresses these parental concerns by mandating HCPs to engage in interactive dialog with parents about the safety and risks of vaccines and the dangers of VPDs to children and the community. AB 2109 mandates parents seeking PBEs for state mandated immunizations for students entering kindergarten to receive education from HCPs about vaccines and VPDs. After speaking to the parents, HCPs are required to provide documentation proving that they had reviewed the vaccine information with the parents (see Appendix A). Documentation specifying which mandated immunizations that the child has received or waived along with the HCP documentation form must be provided to the school (AB 2109, 2012).

History of Vaccine Mandates in Schools

Vaccine mandates for school entry in the United States started with the smallpox vaccine mandate at a Boston school in 1827. Massachusetts became the first state to mandate the smallpox vaccination for children attending public schools in 1855 (Lantos et al., 2010;

Diekema, 2014). However, even with the smallpox vaccine available, inconsistencies with enforcing state and local vaccination mandates compromised the effectiveness of vaccines, and outbreaks of smallpox disease occurred (Diekema, 2014).

Eventually, newer vaccines were developed and additional vaccine mandates for school attendance were established in the United States. In the 1930s, diphtheria vaccine was mandated in some states, and polio and measles in the 1960s. However, ineffective school vaccine mandates contributed to decreased immunization coverage against the measles disease and numerous measles outbreaks occurred in the 1970s (Omer, Salmon, Orenstein, deHart, & Halsey, 2009). With the implementation of the 1977 Childhood Immunization Initiative, vaccines became a requirement for school. By the 1980s, school vaccine mandates existed in all fifty states with the intent to reduce outbreaks of VPDs and increase protection to communities (Omer, Salmon, Orenstein, deHart, & Halsey, 2009; Lantos et al., 2010; Domachowske & Suryadevara, 2013; Diekema, 2014).

School vaccine mandates are decided on by each state (Siddiqui, Salmon, & Omer, 2013; Fry-Bowers & Duderstadt, 2015). In 1905, with *Jacobson v. Massachusetts*, the U.S. Supreme Court established that the compulsory vaccination law was in the power of the state to approve (Jacobson v. Massachusetts, 1905). Vaccine recommendations stem from the United States Department of Health and Human Services, Advisory Committee on Immunization Practices (ACIP) (CDC, 2014a). These requirements were instituted to ensure school children were protected from VPDs.

In California, immunization mandates for school entry began in 1977 (Buttenheim, Jones, & Baras, 2012). Currently in California, students enrolling into kindergarten must provide evidence of immunizations for polio, DTaP (diphtheria, tetanus, and acellular pertussis), MMR

(measles, mumps, and rubella), hepatitis B, and varicella (CDPH, 2015b) (see Appendix B). Parents of children with a medical condition that prevents them from receiving a mandated vaccine are required to provide written documentation from a licensed physician specifying the immunization they are medically exempt from (CDPH, 2015b). Parents may also opt for a PBE if the mandated immunizations are contrary to the philosophical belief of the parent (CDPH, 2015b). According to AB 2109, parents must visit their HCP who will review vaccine safety and risks along with dangers that VPDs pose to the community (AB 2109, 2012). This added contact between the parent and the HCP serves as an ideal opportunity for the HCP to address parental concerns and misconceptions about mandated vaccines (Luthy, Beckstrand, & Meyers, 2012). Besides California, Oregon and Washington are the only two other states that require information on the benefits and risks of vaccines to be provided by HCPs to parents seeking PBEs (CDC, 2015b).

Personal Belief Exemptions

Vaccines have played an integral role in eradicating the once prevalent communicable diseases in the United States. However, public concerns are no longer focused on the once prevalent and visible VPD but rather on the concerns associated with the efficacy of and potential side effects of vaccines (Opel, Diekema, Lee, & Marcuse, 2009). As a result of this, there has been a gradual increase in the number of personal belief exemptions (PBEs) for required vaccinations for children entering kindergarten. Between 1991 and 2004, states permitting PBEs saw PBE percentages escalate from 0.99% to 2.45% (History of Vaccines, 2010). California is one of the twenty states that permits PBEs. (History of vaccines, 2010; Buttenheim, Jones, & Baras, 2012; CDC, 2015b).

In California, PBE rates increased from 0.63% in 1998-1999 (CDPH, 2000) to 3.15% in 2013-2014 (CDPH, 2014a). These unvaccinated children entering California schools are more susceptible to contracting a VPD and subsequently disseminating it to those children who either have medical or religious exemptions from mandated vaccinations or to infants who are unable to be vaccinated due to age (Luthy, Beckstrand, Callister, & Spencer, 2012; Siddiqui, Salmon, & Omer, 2013). These potential dangers placed other individuals at risk for contracting communicable diseases that were once thought to be eradicated.

As PBEs have increased, so have the numbers of medical exemptions. All fifty states grant medical exemptions from mandated vaccines for children with specific medical reasons when entering kindergarten (History of vaccines, 2010; Domachowske & Suryadevara, 2013; Fry-Bowers & Duderstadt, 2015). According to Siddiqui, Salmon, and Omer (2013), medical exemptions had risen between 2004 through 2011, especially in states exhibiting easier to medium exemption criteria for medical exemptions. For states with more stringent criteria for non-medical exemptions, they exhibited higher numbers of medical exemptions (Siddiqui, Salmon, & Omer, 2013). Areas with higher numbers of PBEs and medical exemptions need to be monitored to evaluate for possible outbreaks of VPDs. As previously mentioned, PBEs in California were 0.63% in 1998-1999 (CDPH, 2000) and 3.15% in 2013-2014 (CDPH, 2014a). An increase is also noted with medical exemptions in California, 0.10% in 1998-1999 (CDPH, 2000) and increasing to 0.19% in 2013-2014 (CDPH, 2014a). According to Seither et al. (2015), California had the highest number of medical (1066) and nonmedical exemptions (13,993) for kindergarteners enrolling for the 2014-2015 school year.

Herd Immunity

Vaccine mandates in the United States have contributed to increased coverage from VPDs which have helped decrease numbers of VPDs and have improved herd immunity, or community immunity, which ultimately benefits the vaccinated individual and the community (Omer, Salmon, Orenstein, deHart, & Halsey, 2009). Herd immunity results from increased vaccination rates in a community that assists in decreasing the probability of disease transmission (Omer, Salmon, Orenstein, deHart, & Halsey, 2009; Fry-Bowers & Duderstadt, 2015). If the herd immunity becomes compromised due to high rates of exemptions, chances of outbreaks of VPDs may occur (Wang, Clymer, Davis-Hayes, & Bутtenheim, 2014). Maintaining the herd immunity is imperative to protect infants and those with medical conditions that contraindicate vaccinations (Omer, Salmon, Orenstein, deHart, & Halsey, 2009).

Recently in communities in California and throughout the United States where clusters of unimmunized children exist, measles outbreaks have occurred. In California, there were 18 reported cases of measles in 2013, and 75 reported cases in 2014 (CDPH, 2014b). It is imperative that children be vaccinated against measles and other VPDs to prevent outbreaks and protect children and those with medical conditions contraindicating vaccinations (Blank, Caplan, & Constable, 2013; Siddiqui, Salmon, & Omer, 2013). HCPs must find ways to ensure that parents understand the risks of VPDs and the need for and safety provided by vaccines.

Vaccine Hesitancy

Vaccine hesitancy has existed since the introduction of the smallpox vaccination (Omer, Salmon, Orenstein, deHart, & Halsey, 2009). With the effectiveness of several vaccines to control and eradicate many VPDs, fears of VPDs have waned and conversely qualms about vaccines have risen (Smith, 2010). Parents who choose not to vaccinate their kindergartner due to varying philosophical beliefs may ultimately contribute to increasing their child's chances of

acquiring the VPD and in turn transmitting it to children who are too young to be vaccinated or to those with medical conditions contraindicating vaccinations (Siddiqui, Salmon, & Omer, 2013).

Factors that may impart parental reluctance towards vaccines are the quantities of mandated vaccines, numbers of vaccines administered at one time to a child, perceptions that VPD are no longer a public health threat, and the vast availability and accessibility of vaccine resources unsupported by the medical community. Due to these factors, parents may either shun the ideology of vaccines, delay vaccinations for their children, or with some reservation and reluctance have their child vaccinated (Domachowske & Suryadevara, 2013).

Vaccine Refusal

Vaccine refusal stems from unsupported claims lacking scientific credibility, such as association between vaccines and autism, the possible exposures to mercury in vaccines affecting the health of children, excessive immunizations that will overpower the immune system of a child, concern of contracting a disease from the vaccine, parents' preference of the child naturally acquiring the disease, advice from alternative HCP, infringement on parental rights, and religious objection (Kennedy, Brown, & Gust, 2005; Kennedy & Gust, 2008; Omer, Salmon, Orenstein, deHart, & Halsey, 2009; Luthy, Beckstrand, Callister, & Cahoon, 2011; Luthy, Beckstrand, & Meyers, 2012).

In a now infamous article published in the *Lancet* in February 1998, Andrew Wakefield et al., postulated a causative link between the MMR vaccine and autism. Subsequently, in an article by Gerber and Offit (2009), twenty different epidemiological studies performed in various countries were done that failed to support the causative links between the MMR vaccine and

autism (thirteen studies) and thimerosal in vaccines and autism (seven studies), that Wakefield et al. had claimed. In February 2010, the Lancet fully retracted Wakefield's article (Lancet, 2010).

Vaccine refusals can be determined by the proportion of exemptions from mandated school vaccine requirements (Omer, Salmon, Orenstein, deHart, & Halsey, 2009). In a study by Omer et al. (2006), the authors concluded that between 2001 and 2004, those states where PBEs were allowed, there was a significant increase in the numbers of exemptions when compared to states with only religious exemptions. Phadke, Bednarczyk, Salmon, & Omer (2016) reviewed seven outbreak reports and summaries of reported measles cases from January 2000 until November 2015 and determined that of the 970 measles cases, 70.6% of the individuals who were unvaccinated had nonmedical exemptions. This continuing increase in PBEs could negatively impact the herd immunity and create a surge of VPD outbreaks.

In January 2008, an unvaccinated seven year-old boy who had contracted the measles disease during his family trip to Switzerland, returned to San Diego unaware that he had contracted the VPD. The child had inadvertently exposed hundreds of people to the measles virus and eleven unvaccinated children contracted the disease (CDC, 2008; Pediatric Infectious Disease Society, 2011). Beside the aforementioned 2014 outbreak in Anaheim, California, there were 668 other reported cases of measles in the U.S. in 2014, which has been the largest total number of measles cases since the U.S. declared its elimination of measles in 2000 (Phadke, Bednarczyk, Salmon, & Omer, 2016).

In March 2016, the California Department of Public Health reported that an unvaccinated student who had traveled overseas and returned home to Nevada County had attended school while infectious with measles (CDPH, 2016c). At Yuba River Charter School where the

unvaccinated student attends, only 43% of the kindergartners are fully vaccinated, the other 56% have claimed PBEs, for the 2015-2016 school year. Nevada County has the second to the lowest number of students who are up-to-date with their mandated kindergarten immunizations, only 77.1% are fully vaccinated, Trinity County has 77.0% (CDPH, 2016a). According to Seither et al. (2015) and Phadke, Bednarczyk, Salmon, & Omer (2016), a substantial number of individuals with confirmed cases of measles since 2000, had intentionally chosen not to be vaccinated against the disease.

Anti-vaccination Websites

Anti-vaccination websites spurn the safety and effectiveness of vaccines by claiming that vaccines contribute to idiopathic illnesses and harm, that vaccine mandates are a direct infringement on an individual's rights, and that the government and the pharmaceutical industry are collaborating to gain profit from the production and sales of vaccines. Other claims present on anti-vaccination websites are that vaccine immunity is ineffective and the decline in VPDs is not correlated with vaccination mandates and efforts (Davies, Chapman, & Leask, 2002; Wolf, Sharp, & Lipsky, 2002). According to a study by Wolfe, Sharp, and Lipsky (2002), 55% of the anti-vaccination websites that were studied included parental accounts of harm inflicted to their child from vaccinations. When a medical community fails to provide the cause for an idiopathic disease in children, this failure transforms into an opportunity for the anti-vaccination movement who will provide answers and support for these families (Davies, Chapman, & Leask, 2002).

Personal accounts that exclude scientific evidence and credibility dominate anti-vaccination websites. Also, evidence of incomplete and inconsistent referencing to scientific sources, prominent support of alternative medicine, and claims such as the derangement of

natural immunity by vaccinations are espoused on these websites (Davies, Chapman, & Leask, 2002).

Promoting Vaccination Education

Prior to the administration of a vaccine, HCPs must review the benefits and risks of the specific vaccination with the patient. Along with that, the HCP must be able to address any concerns that the patient or parent may have regarding the vaccine. The National Childhood Vaccine Injury Act requires that information about vaccines must be provided to the parent (The NVIC, 2016). The Vaccine Information Statements (VISs) are printouts about each vaccine that HCPs must share with their patients or parents (CDC, 2015c).

According to Jones et al. (2012), the parents that participated in their study were primarily younger than 41 years of age, were a college graduate or higher, and had a median household income of \$70,000 or higher. These parents were more likely to utilize the internet as a vaccination information source, accept the advice from an alternative/complimentary health care provider (chiropractor or acupuncturist) over traditional medicine (physician), and have decreased awareness about the safety and effectiveness of vaccines. These parents were also less likely to comprehend the concerns about VPDs as these diseases have become less visible in today's society (Jones et al., 2012).

One of the U.S. Department of Health and Human Services' Healthy People 2020's goals is to increase vaccination rates which will contribute to decreasing the numbers of VPDs. Healthy People 2020 is aimed towards maintaining the levels of vaccination coverage for kindergartners at a target of 95% (Healthy People 2020, 2016). Immunizations rates for 2013-2014 were: Polio (95.1%); Tdap (95%); MMR (94.7%); Hepatitis B (95.8%); and Varicella (93.3%) (Healthy People 2020, 2016).

Significance to Nursing

A synergistic collaboration between advanced practice nurses, credentialed school nurses, pediatric health care providers, and public health departments must exist in order to better educate parents about the significance of vaccines and the threats that VPDs pose to children and the community (Cowell, 2013). HCPs, encompassing advanced practice nurses and school nurses, along with physicians and physician assistant colleagues, must effectively dispel the misinformation about vaccines that are presented to them by parents. They must successfully provide accurate information about vaccine safety and risks to better inform parents and help decrease the risks that VPD pose to children and the community (Edmunds, 2012; NAPNAP, 2015). AB 2109 provides the platform that HCPs need to assist parents in developing a better understanding for the purpose and effectiveness of vaccines.

CHAPTER 3: METHODOLOGY

Institutional Review Board Approval

Approval by the California State University, Fresno Institutional Review Board was obtained prior to collecting the data for this project.

Research Design

This project was a retrospective evaluation of reported immunization data from the CDPH's website. State immunization reports for the current school year are reported in October by California school districts. These results are made available via public domain on the CDPH's website.

Sample

The target populations for this study were students enrolled in kindergarten for the 2013-2014, 2014-2015, and 2015-2016 school years in the ten most populous counties in California including Los Angeles, San Diego, Orange, Riverside, San Bernardino, Santa Clara, Alameda, Sacramento, Contra Costa, and Fresno (United States Census Bureau, 2015). There were approximately 370,000 students registered for kindergarten for the 2013-2014 school year, approximately 380,000 students registered for the 2014-2015 school year, and approximately 391,000 students registered for the 2015-2016 school year in these California counties (CDPH, 2016a).

Data Collection

Data was collected from the CDPH's website on excel spreadsheets. The data was inputted directly into SPSS.

Data Analysis

A two-way multivariate analysis of covariance (MANCOVA) was conducted to determine the effect of school year and county of school on PBEs and kindergarten enrollment while controlling for school type (private or public). Univariate analysis of variance (ANOVA) was conducted on each dependent variable as a follow-up test to MANCOVA.

Criteria for Inclusion and Exclusion

Kindergarten students enrolled in public and private schools in the top ten most populous counties in California were included in this study. For the 2013-2014 school year, kindergarten students with PBEs were included. For the 2014-2015 school year, kindergarten students whose parents signed a PBE prior to January 1, 2014, who received an HCP counseled PBE, or students who received religious PBEs were included in this study. For the 2015-2016 school year, kindergarten students who received an HCP counseled PBE and students who received a religious PBE were included in this study. Kindergarten students with medical exemptions, those who were up-to-date with their immunizations, those with conditional school entrance, and those who were homeschooled were excluded from this project.

CHAPTER 4: RESULTS

This study reviewed the PBE data from 5,140 private and public schools for the 2013-2014 (n=5,068), 2014-2015 (n=5,140), and 2015-2016 (n=5,092) school years with at least 10 kindergarten students enrolled in schools in the ten most populous counties in California. Table 1 provides the breakdown of number of schools, kindergarten enrollment, and PBEs by county and school year.

Table 1

Frequency of School, Kindergarten Enrollment, and PBEs by County between School Years (N=5,140)

County	2013-2014			2014-2015			2015-2016		
	<i>n</i>	Enrollment	PBEs	<i>n</i>	Enrollment	PBEs	<i>n</i>	Enrollment	PBEs
Alameda	328	19,633	347	326	20,718	314	314	21,587	259
Contra Costa	201	14,786	338	204	14,603	274	206	15,317	302
Fresno	203	17,749	278	212	17,895	173	210	18,691	175
Los Angeles	1,874	130,054	2,865	1,892	129,494	2,074	1,863	133,398	1,941
Orange	540	42,781	1,545	550	41,821	1,238	546	41,718	1,248
Riverside	343	33,735	951	350	34,256	842	342	34,329	714
Sacramento	277	19,181	1,031	300	19,462	882	297	20,579	834
San Bernardino	403	32,472	905	390	33,643	714	388	33,939	629
San Diego	548	43,026	1,918	558	43,607	1,495	561	45,386	1,612
Santa Clara	351	26,021	445	358	24,460	377	365	26,175	425
Total	5,068	379,438	10,623	5,140	379,959	8,383	5,092	391,119	8,139

Table 2 provides the total breakdown of kindergarten enrollment and PBEs by school type and school years.

Table 2

Frequency of Kindergarten Enrollment and PBEs by County between School Years (N = 5,140)

	2013-2014	2014-2015	2015-2016
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School Type	<i>n</i>	Enrollment	PBEs	<i>n</i>	Enrollment	PBEs	<i>n</i>	Enrollment	PBEs
Private	1,258	30,688	1,591	1,269	29,804	1,457	1,242	31,252	1,390
Public	3,810	348,750	9,032	3,871	350,155	6,926	3,850	359,867	6,749
Total	5,068	379,438	10,623	5,140	379,959	8,383	5,092	391,119	8,139

Between the 2013-2014 and 2015-2016 school years, overall kindergarten enrollment increased 3.1% while the total number of PBEs decreased -23.4%. Table 3 provides the change in percent by county for enrollment and PBEs.

Table 3

Percent of Change for Kindergarten Enrollment and PBEs by County between School Years (N = 5,140)

County	Enrollment %	PBEs %
Alameda	10.0%	-25.4%
Contra Costa	3.6%	-10.7%
Fresno	5.3%	-37.1%
Los Angeles	2.6%	-32.3%
Orange	-2.5%	-19.2%
Riverside	1.8%	-24.9%
Sacramento	7.3%	-19.1%
San Bernardino	4.5%	-30.5%
San Diego	5.5%	-16.0%
Santa Clara	0.6%	-4.5%
Total	3.1%	-23.4%

Table 4

Percent of Change for Kindergarten Enrollment and PBEs by School Type between School Years (N = 5,140)

School Type	Enrollment %	PBEs %
Private	1.8%	-12.6%
Public	3.2%	-25.3%
Total	3.1%	-23.4%

Data on reason for PBEs was only collected for the 2014-2015 and 2015-2016 school year. Of the 16,522 PBEs for the 2014-2015 and 2015-2016 school years, HCP was cited as the main reason, accounting for 69.5%, followed by 23.2% and 7.3% for religious and Pre-Jan PBE, respectively.

Table 5

Frequency and Percent for Reason for PBE between School Years (N = 16,522)

School Year	Health Care Practitioner		Religious		Pre January PBE	
	<i>n</i>	<i>f</i>	<i>n</i>	<i>f</i>	<i>n</i>	<i>f</i>
2014 - 2015	5,342	63.7%	1,834	21.9%	1,207	14.4%
2015 - 2016	6,136	75.4%	2,003	24.6%	0	0
Total	11,478	69.5%	3,837	23.2%	1,207	7.3%

Inferential Statistics

A two-way multivariate analysis of covariance (MANCOVA) was conducted to determine the effect of school year and county of school on PBEs and kindergarten enrollment while controlling for school type (private or public). MANCOVA results revealed significant differences on PBEs and kindergarten enrollment between school year ($p < .001$) and county ($p < .001$). Univariate analysis of variance (ANOVA) was conducted on each dependent variable as a follow-up test to MANCOVA. School year differences were significant for PBE's ($p < .001$), but not for kindergarten enrollment ($p = .124$). County of school differences were significant for PBEs ($p < .001$) and kindergarten enrollment ($p < .001$). Differences were significant for PBEs ($p < .001$) and kindergarten enrollment ($p < .001$) for the covariate school type (private vs. public). Post hoc analysis revealed a significant decrease in PBEs between the 2013-2014, 2014-2015, and 2015-2016 school years; however, there was no significant decrease in PBEs between

the 2014-2015 and 2015-2016 school years. There was no significant increase in kindergarten enrollment between the 2013-2014, 2014-2015, and 2015-2016 school years.

CHAPTER 5: DISCUSSION

Significance of AB 2109

AB 2109 was created to increase awareness about vaccine safety and the risks of VPDs to children and the community. The California mandate significantly reduced the number of PBEs for kindergarten students enrolled in the ten most populous counties in California by -23.4% and improved the vaccination rates of kindergartners for the 2013-2014, 2014-2015, and 2015-2016 school years. The reduction of PBEs and increase in vaccinated children in California schools will decrease a child's chances of contracting a VPD and disseminating it to other individuals in the classroom, at school, or in the community, especially to those who are unable to be vaccinated. This will directly benefit the herd immunity and contribute to the decreasing probability of VPD transmissions and outbreaks (Omer, Salmon, Orenstein, deHart & Halsey, 2009).

The ease of attaining a PBE for mandated vaccines during the registration process of a kindergarten student has been eliminated. Parents who are hesitant or opposed to mandated vaccines must now approach an HCP who is mandated to review the safety and risks of vaccines along with the dangers that VPDs pose to the community. Concurrently, HCPs can ensure that parental concerns and misconceptions about mandated vaccines are addressed (Luthy, Beckstrand, & Meyers, 2012). This is the opportune time for the parents to pose questions and elicit answers about vaccines from HCPs.

California, along with Oregon and Washington, are the only states that require HCPs to educate about vaccine safety and risks (CDC, 2015b). AB 2109 provides an opportunity for HCPs to educate parents and also allows parents to ask questions and share their concerns about vaccines.

Significance to Nursing

Existing in the K-12 school environment, credentialed school nurses (CSNs) are at the forefront working with parents and the community about vaccine education (CSNO, 2012). Besides managing student immunizations, vaccine outbreaks, and dealing with exclusions, CSNs also handle an array of health issues that arise on a daily basis in school settings. Regarding AB 2109, CSNs are the ideal educational resource that concerned parents can resort to when questioning mandated immunizations and searching for clarification on misconceptions about vaccine safety and VPDs. Using terminology less riddled with hard to decipher medical jargon specifically utilized by the medical professionals, CSNs are valuable resources in relaying factual, evidence-based vaccine information to concerned and vaccine-hesitant parents, thereby alleviating apprehensions about vaccine safety and effectiveness, dispelling any correlating myths about vaccines and autism, and improving the timeliness of vaccinations (Luthy, Beckstrand, Callister & Cahoon, 2012). CSNs are the key in optimizing the uptake and increase of immunizations in the kindergarten population and strengthening the herd immunity as facilitators of evidence-based education to parents in the K-12 school environment.

Establishing trusting relationships with parents, nurse practitioners (NPs) are another vital vaccine resource for parents. NPs have the ability to improve vaccination rates during well-child visits, either in the primary care setting or in school-based health centers, when having dialogues with parents about vaccines. With AB 2109, vaccine hesitant and concerned parents have the opportunity to openly communicate with NPs who are well-versed in vaccine education. NPs possess the significant knowledge to answer an array of vaccine-related questions encompassing vaccine administration schedules, safety and risks of vaccines, vaccine components, VPDs versus vaccinations, and evidence-based vaccination resources, types of

questions that concerned parents have that may stem from their refusal to vaccinate their child (Anderson, 2015).

Along with CSNs, NPs have the opportunity to better inform vaccine hesitant parents and improve the vaccination rates of kindergarten students by establishing open and trusting communication with these parents. AB 2109 has allowed vaccine hesitant parents to engage in HCP counseled communication which has not only decreased the numbers of PBEs but has increased awareness about vaccines and improved vaccines rates.

Limitations

This project had no ethical limitation since the immunization data was collected from the CDPH's website and is open access data. Selection of the ten most populous counties in California covered all major geographical areas: Northern, Southern, and Central California. However, some of California's forty-eight other counties with smaller populations may have harbored higher numbers of PBEs (California Demographics, 2016). Kindergarten students with medical exemptions, who were up-to-date with their immunizations, those with conditional school entrances, and those who were home-schooled were excluded from the study. Schools with less than ten students were also excluded from the study. In addition, some schools in the ten counties failed to submit their kindergarten immunization data to the CDPH for the specified years of this project.

Suggestions for Future Research

Further research to determine how effective AB 2109 was in decreasing the numbers of VPD outbreaks in California between the 2014-2015 and 2015-2016 school years should be considered. This effectiveness would entail monitoring and tracking the numbers of VPD outbreaks in counties and correlating them with the specified numbers of PBEs.

SB 277 (CDPH, 2015b), which became effective January 1, 2016, no longer permits PBEs for kindergarten immunizations in California. California joins Mississippi and West Virginia, states that do not allow non-medical exemptions (Omer et al., 2006). Without the ability to select a PBE, will parents who oppose SB 277 opt to home-school or enroll their children into independent-study programs. Ascertaining if SB 277 was influential in significantly decreasing the numbers of VPD outbreaks in California schools and counties can be further researched. Without the option to waive vaccines, could an increasing trend towards medical exemptions occur and potentially contribute to more VPD outbreaks. Do we anticipate SB 277 to significantly improve the health of children and the community and decrease morbidity and mortality from VPDs? If outbreaks of VPDs begin to occur more frequently in California, how else could the immunization mandate be modified to protect children and the communities?

Another area to research is determining if parents are more accepting of AB 2109 versus SB 277. A vaccine mandate which allows parents the option to waive immunizations after HCP counseled PBE versus a mandate that does not allow any PBEs, will this create more resistance and strengthen the anti-vaccine movement? Which law will improve and protect the health of the child? Will parents initially resistant to AB 2109 consider vaccinating their child after receiving vaccine education from an HCP?

Personal perceptions of vaccines and varying approaches to education may create inconsistencies and subjectivity in relaying vaccine information by HCPs possibly hindering the educational process. Do HCPs provide sufficient time during scheduled appointments to listen to parents share their concerns and questions about vaccines? How the HCPs approach parents on this issue could significantly differ from one practitioner to another. HCPs who are confident

with their knowledge about vaccine safety and risks will exude that same message when communicating with parents about their recommendations about vaccines. HCPs must remain knowledgeable in eliciting questions about vaccines from parents and addressing them (Kestenbaum & Feemster, 2015).

Other areas of research may target existing states that permit PBEs. Are VPD outbreaks increasing in frequency in states with immunization mandates that are less stringent than SB 277? Will those states begin implementing laws similar to SB 277? Mississippi, having the highest kindergarten vaccination rate with 99.7 percent for the 2013-2014 school year, only permits medical exemption requests from Mississippi licensed practitioners (pediatricians, family practice and internist) (MSDH, 2015a). The request is then submitted to the Mississippi State Department of Health (MSDH) who then grants and issues a certificate of medical exemption that is signed by the District Health Officer (MSDH, 2015b). Currently, Mississippi House Bill 938 is heading to the state senate. If this bill becomes law, it would remove the public health department's authority to grant medical exemptions, allowing medical exemptions to be dispensed by HCPs minus the granting authority of the MSDH (Mississippi Legislature, 2016). Why would a state with such a high success rate of kindergarten vaccinations need to alter their current exemption law?

HCPs face numerous challenges with parents who are adamantly opposed to vaccinating their children. They need to consider measures to improve parental awareness of the importance of vaccines and reach those vaccine-hesitant parents who express concerns about vaccine safety. As new vaccines and mandates occur, will parents be more accepting or resistant to vaccines? Would the internet help or further hinder efforts to protect children and society from VPDs? Could other studies like Wakefield et al. (1998) fuel the anti-vaccine movement and cause more

parents to reject vaccinating their children? Research promoting the education and the importance of vaccinations must continue in order to improve the health and safety of children and communities.

Conclusion

AB 2109 has significantly decreased the numbers of kindergarten PBEs from the 2013-2014, 2014-2015, and 2015-2016 school years by -23.4% in the ten most populous counties in California. AB 2109 also allowed HCPs, such as CSNs and NPs, the opportunity to help educate parents about vaccine safety and the risks of VPDs to children and the community by consistently providing accurate and evidence-based vaccine information and resources to parents either hesitant or resistant to vaccinations. Continued collaborative efforts amongst all HCPs must resume thereby decreasing and sustaining low numbers of PBEs. This will help strengthen the herd immunity and protect the health and safety of all children and communities against VPDs.

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APPENDICES

APPENDIX A:

Personal Belief Exemption to Required Immunizations – cdph 8262

PERSONAL BELIEFS EXEMPTION TO REQUIRED IMMUNIZATIONS


STUDENT NAME (LAST, FIRST, MIDDLE)	GENDER <input type="checkbox"/> M <input type="checkbox"/> F	BIRTHDATE MONTH DAY YEAR ____/____/____	TELEPHONE NUMBER
PARENT/GUARDIAN – NAME		ADDRESS	
A. AUTHORIZED HEALTH CARE PRACTITIONER LICENSED IN CALIFORNIA – FILL OUT THIS SECTION			
I am a (check one): <input type="checkbox"/> M.D./D.O. <input type="checkbox"/> Nurse Practitioner <input type="checkbox"/> Physician Assistant <input type="checkbox"/> Naturopathic Doctor <input type="checkbox"/> Credentialed School Nurse			
Provision of information: I have provided the parent or guardian of the student named above, the adult who has assumed responsibility for the care and custody of the student, or the student if an emancipated minor, with information regarding 1) the benefits and risks of immunization and 2) the health risks to the student and to the community of the communicable diseases for which immunization is required in California (immunizations listed in Table below).			
Signature of authorized health care practitioner		Practitioner name, address, telephone number.	
Date - within 6 months before entry to child care or school			
B. PARENT OR GUARDIAN – FILL OUT THESE SECTIONS			
I. Check one of the boxes below:			
<input type="checkbox"/> Receipt of information: I have received information provided by an authorized health care practitioner regarding 1) the benefits and risks of immunization and 2) the health risks to the student named above and to the community of the communicable diseases for which immunization is required in California (immunizations listed in Table below).			
<input type="checkbox"/> Religious beliefs: I am a member of a religion which prohibits me from seeking medical advice or treatment from authorized health care practitioners. (Signature of a health care practitioner not required in Part A.)			
Signature of parent or guardian		Date - within 6 months before entry to child care or school	
II. AFFIDAVIT			
Immunizations already received: I have provided the child care or school with a record of all immunizations the student has received that are required for admission (California Health and Safety Code §120365).			
Immunizations for which exemption is requested: An unimmunized student and the student's contacts at school and home are at greater risk of becoming ill with a vaccine-preventable disease. I understand that an unimmunized student may be excluded from attending school or child care during an outbreak of, or after exposure to, any of these diseases for the protection of the student and others (17 CCR §6060). I hereby request exemption of the student named above from the required immunizations checked below because such immunization is contrary to my beliefs.			
School Category	Table of Required Immunizations – Check box(es) to request exemption.		
Child Care Only	<input type="checkbox"/> <i>Haemophilus influenzae</i> type b (Hib meningitis)		
Child Care and K-12 th Grade	<input type="checkbox"/> DTaP (Diphtheria, Tetanus, Pertussis [whooping cough])	<input type="checkbox"/> Hepatitis B	
	<input type="checkbox"/> MMR (Measles, Mumps, Rubella)	<input type="checkbox"/> Polio	<input type="checkbox"/> Varicella (Chickenpox)
7 th Grade Advancement (or admission at 7-12 th Grade)	<input type="checkbox"/> Tdap (Tetanus, reduced Diphtheria, Pertussis [whooping cough])		
Signature of parent or guardian		Date	

The California Department of Public Health places strict controls on the gathering and use of personally identifiable data. Personal information is not disclosed, made available, or otherwise used for purposes other than those specified at the time of collection, except with consent or as authorized by law or regulation. The Department's information management practices are consistent with the Information Practices Act (Civil Code Section 1798 et seq.), the Public Records Act (Government Code Section 6250 et seq.), Government Code Sections 11015.5 and 11019.9, and with other applicable laws pertaining to information privacy.

APPENDIX B:

Parents' Guide to Immunizations Required for School Entry

PARENTS' GUIDE TO IMMUNIZATIONS REQUIRED FOR SCHOOL ENTRY



Entry Requirements by Age and Grade:

Vaccine	4-6 Years Old Elementary School at Transitional-Kindergarten/ Kindergarten and Above	7-17 Years Old Elementary or Secondary School	7th Grade*
Polio (OPV or IPV)	4 doses (3 doses OK if one was given on or after 4th birthday)	4 doses (3 doses OK if one was given on or after 2nd birthday)	
Diphtheria, Tetanus, and Pertussis (DTaP, DTP, DT, or Tdap)	5 doses of DTaP, DTP, or DT (4 doses OK if one was given on or after 4th birthday)	4 doses of DTaP, DTP, DT, Tdap, or Td (3 doses OK if last dose was given on or after 2nd birthday. At least one dose must be Tdap or DTaP/ DTP given on or after 7th birthday for all 7th-12th graders.)	1 dose of Tdap (Or DTP/DTaP given on or after the 7th birthday.)
Measles, Mumps, and Rubella (MMR or MMR-V)	2 doses (Both doses given on or after 1st birthday. Only one dose of mumps and rubella vaccines are required if given separately.)	1 dose (Dose given on or after 1st birthday. Mumps vaccine is not required if given separately.)	2 doses of MMR or any measles-containing vaccine (Both doses given on or after 1st birthday.)
Hepatitis B (Hep B or HBV)	3 doses		
Varicella (chickenpox, VAR, MMR-V or VZV)	1 dose	1 dose for ages 7-12 years. 2 doses for ages 13-17 years.	

*New admissions to 7th grade should also meet the requirements for ages 7-17 years.

WHY YOUR CHILD NEEDS SHOTS:

The California School Immunization Law requires that children be up to date on their immunizations (shots) to attend school. Diseases like measles spread quickly, so children need to be protected before they enter. California schools are required to check immunization records for all new student admissions at Kindergarten or Transitional Kindergarten **through** 12th grade and all students advancing to 7th grade before entry.

THE LAW:

Health and Safety Code, Division 105, Part 2, Chapter 1, Sections 120325-120380; California Code of Regulations, Title 17, Division 1, Chapter 4, Subchapter 8, Sections 6000-6075

WHAT YOU WILL NEED FOR ADMISSION:

To attend school, your child's Immunization Record must show the date for each required shot above. If you do not have an Immunization Record, or your child has not received all required shots, call your doctor now for an appointment.

If a licensed physician determines a vaccine should not be given to your child because of medical reasons, submit a written statement from the physician for a **medical exemption** for the missing shot(s), including the duration of the medical exemption.

A personal beliefs exemption is no longer an option for entry into school; however, a valid personal beliefs exemption filed with a school before January 1, 2016 is valid until entry into the next grade span (7th through 12th grade). Valid personal beliefs exemptions may be transferred between schools in California. For complete details, visit ShotsforSchool.org.

You must also submit an immunization record for all required shots not exempted.

Questions? Visit ShotsForSchool.org or contact your local health department (bit.do/immunization).