



Associations between religion, religiosity, and parental vaccine hesitancy

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ABSTRACT

Introduction: Religious vaccine exemptions are widely available and increasing despite decreases in American religiosity. We tested associations between religion, religiosity, and caregiver vaccine hesitancy in a sample of caregivers of 2-year-olds.

Methods: We analyzed data from a 2020 survey in three pediatric clinics, estimating distinct multivariable logistic regression models to examine associations.

Results: Our sample included 255 predominantly poor, Latino, Christian, and English-speaking caregivers (response rate: 90%); 13% were vaccine hesitant. Caregivers identifying with major faith traditions were not more likely to be hesitant than those without a tradition (adjusted odds ratio 1.46; 95% CI 0.29, 7.26). There were no significant associations between caregiver vaccine hesitancy and three religiosity domains. **Conclusions:** We found no associations between parental vaccine hesitancy, religiosity, or adherence to a major faith tradition in a sample of mostly poor, Latino, Christian mothers. Additional work is needed to inform exemption policies and public health and faith leaders.

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Introduction

Religious vaccine exemptions were created decades ago to accommodate schoolchildren of parents belonging to a small number of religious groups whose formal teachings objected to vaccines [1]. In the years since, religious exemptions to vaccines required for daycare or school have become widely available and increasingly used [2], even though all religions now support vaccination [3] and Americans decreasingly self-identify as religious [4]. This increase in religious exemptions is concerning, as high rates of non-medical vaccine exemptions have been linked to outbreaks of measles and pertussis in children and adults [5,6]. In recent years, epidemiological and qualitative data scrutinizing religious exemptions have suggested that parents misuse religious exemptions when alternative non-medical exemptions are unavailable [2,7,8].

For these reasons and others, professional organizations, such as the American College of Preventive Medicine and the American Academy of Pediatrics, have called for the elimination of all non-medical vaccine exemptions [9,10]. However, after a thorough

literature review, we were unable to identify any quantitative studies rigorously testing associations between parental religion or religiosity and vaccine hesitancy or religious vaccine exemptions for routine pediatric vaccines required for school or daycare attendance.

To complement existing qualitative and epidemiological findings, inform calls to modernize pediatric non-medical exemption policies, and equip public health and faith leaders with current data, we aimed to test whether religious affiliation or religiosity were associated with vaccine hesitancy in a sample of caregivers of 2-year-olds at three large pediatric clinics in Denver, Colorado. We hypothesized that there would be no association between parental vaccine hesitancy and four variables assessing religion and religiosity.

Methods

Survey design and study setting

We analyzed data from a 2020 cross-sectional survey of caregivers at 3 pediatric safety-net clinics in the Denver Health system (Denver, CO, USA), which was powered for a separate outcome [11]. Eligible caregivers spoke English or Spanish and had a

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Table 1
Caregiver demographics, stratified by religious service attendance, private religious activities, and religiosity.

Caregiver-Level Covariate	Overall Sample N = 255 (%)	Religious Service Attendance			Private Religious Activities			Intrinsic Religiosity Subscale (3-15)		
		Never N = 50 (%)	Less than Weekly N = 154 (%)	Weekly or more often N = 51 (%)	Rarely/Never N = 153 (%)	Less than Daily N = 75 (%)	Daily or more often N = 27 (%)	3 (Least Religious) N = 21 (%)	4-14 N = 167 (%)	15 (Most Religious) N = 67 (%)
Preferred Language										
English	153 (60)	40 (80)	90 (58)	23 (45)	94 (61)	37 (49)	22 (81)	18 (86)	102 (61)	33 (49)
Spanish	102 (40)	10 (20)	64 (42)	28 (55)	59 (39)	38 (51)	5 (19)	3 (14)	65 (39)	34 (51)
Age (years)										
<30	125 (49)	31 (62)	73 (47)	21 (41)	82 (54)	32 (43)	11 (41)	13 (62)	86 (51)	26 (39)
≥30	130 (51)	19 (38)	81 (53)	30 (59)	71 (46)	43 (57)	16 (59)	8 (38)	81 (49)	41 (61)
Highest Education level										
Less than GED	73 (29)	17 (34)	43 (28)	13 (25)	47 (31)	22 (29)	4 (15)	7 (33)	46 (28)	20 (30)
GED or more	182 (71)	33 (66)	111 (72)	38 (75)	106 (69)	53 (71)	23 (85)	14 (67)	121 (72)	47 (70)
Insurance										
Public (e.g. Medicaid)	237 (93)	46 (92)	146 (95)	45 (88)	75 (49)	39 (52)	14 (52)	20 (95)	155 (93)	62 (93)
Other	18 (7)	4 (8)	8 (5)	6 (12)	77 (51)	36 (48)	13 (48)	1 (5)	12 (7)	5 (7)
Race/Ethnicity										
Black	26 (10)	5 (10)	16 (10)	5 (10)	10 (7)	10 (13)	6 (22)	4 (19)	17 (10)	5 (7)
Latino	189 (74)	31 (62)	117 (76)	41 (80)	117 (76)	55 (73)	17 (63)	10 (48)	124 (74)	55 (82)
Non-Latino White	28 (11)	10 (20)	15 (10)	3 (6)	18 (12)	7 (9)	3 (11)	4 (19)	19 (11)	5 (7)
Other	12 (5)	4 (8)	6 (4)	2 (4)	8 (5)	3 (4)	1 (4)	3 (14)	7 (4)	2 (3)
Number of children										
1	61 (24)	14 (28)	37 (24)	10 (20)	38 (25)	18 (24)	5 (19)	5 (24)	43 (26)	13 (19)
≥2	194 (76)	36 (72)	117 (76)	41 (80)	115 (75)	57 (76)	22 (81)	16 (76)	124 (74)	54 (81)
Religious Affiliation										
None	24 (9)	20 (40)	4 (3)	0 (0)	21 (14)	2 (3)	1 (4)	6 (29)	17 (10)	1 (1)
Major Faith Tradition ¹	173 (68)	17 (34)	112 (73)	44 (86)	101 (66)	55 (73)	17 (63)	10 (48)	107 (64)	56 (84)
"Other"	32 (13)	3 (6)	(73)	5 (10)	14 (9)	14 (19)	4 (15)	3 (14)	22 (13)	7 (10)
Not to Answer	26 (10)	10 (20)	14 (9)	2 (4)	17 (11)	4 (5)	5 (19)	2 (10)	21 (13)	3 (4)

Bolded cells indicate significant differences (at P < 0.05) in proportions for bivariable comparisons across the category. Comparisons made using Chi Square tests or Fisher exact tests (if any of the expected cell counts were < 5).

¹ Includes: Buddhism (2), Catholicism (134), Christian Science (1), Greek Orthodoxy (7), Islam (2), Jehovah's Witnesses (1), Judaism (2), Mormonism (3), Protestantism (20), and Universalism (1). No respondents self-identified with Baha'i, Hindu, Taoist, or Unity Church faith traditions.

2-year-old child who had attended a well visit in the last 18 months (i.e., were empaneled per Denver Health criteria). Caregivers whose preferred language was something other than English or Spanish or who had lapses in care greater than 18 months in our clinic system were ineligible. Eligible parents were approached by a trained professional research assistant in waiting rooms prior to sick or well-child visits on random weekdays, consented, and asked to take the survey on a tablet in a quiet setting. Participants were provided with a \$5 incentive for participation. We collected caregiver-level demographics, religious affiliation, self-reported religiosity across three domains (Religious Service Attendance, Private Religious Activities, Intrinsic Religiosity) [12], and vaccine hesitancy status (assessed by the Parent Attitudes about Childhood Vaccines tool) [13], analyzing responses as previously published on a transformed scale of 0–100 with scores of 50 or greater indicating vaccine hesitancy [13]. Also, we asked: “Have you ever delayed or refused a shot for your child for religious reasons?” This study was approved by the Colorado Multiple Institutional Review Board.

Primary outcome variables, independent variables, and analyses

Our outcome variable was parental vaccine hesitancy, defined as “not hesitant” or “hesitant,” in accordance with prior validation work [13]. Independent variables of interest were religion (one of 13 major American traditions, none, “other,” or “prefer not to answer”) and ordinal measures of religious service attendance, private religious activities, and intrinsic religiosity per validated Duke Religiosity Index scoring criteria [12]. Additional independent variables included in regression modeling were caregiver language, caregiver age, caregiver highest educational level, and child’s insurance.

Using the R statistical computing environment (R Foundation for Statistical Computing; Vienna, Austria), we estimated multivariable logistic regression models to examine the dependence of the outcome vaccine hesitancy on religious affiliation and 3 separate religiosity domains. For our multivariable model exploring hesitancy and religion, we used 3 nominal categories: none, major religious tradition, and “Other”/“Prefer not to answer”. We combined “Other” and “Prefer not to answer” due to results from initial bivariable comparisons. We created distinct models to examine associations between our outcome variable of parental vaccine hesitancy and religious service attendance, private religious activities, and intrinsic religiosity. Prior work suggests combining all of these covariates in a single statistical model could lead to

multicollinearity and interfere with accuracy of estimates of effects for each covariate or cancel one another out [12].

Results

There were 263 caregivers recruited for the 2020 cross-sectional survey across three pediatric clinics; however, 2 surveys were submitted blank and 6 caregivers participated twice. Thus, the final dataset included 255 predominantly Latino, Christian, English-speaking, publicly insured caregivers of 2-year-olds (response rate: 90%). Table 1 presents demographic information for participants, stratified by religiosity domains. Of all caregivers, 68% identified with a major faith tradition, 20% attended religious services weekly, 11% prayed or meditated daily, and 26% were highly religious. Parents who spoke Spanish and parents who identified with a major faith tradition were significantly more religious across all domains (Table 1).

Thirty-three (13%) parents were vaccine hesitant. In categorical comparisons, only 8% of parents reporting no religious affiliation and 8% of parents adhering to a major religious tradition were vaccine hesitant, compared to 28% of parents marking “Other” and 35% of parents marking “Prefer not to Answer” ($\chi^2 = 22.3$; $P < 0.001$). Five parents (2%) reported delaying or refusing a vaccine for religious reasons; three of these identified with “Other” tradition, 1 with “None”, and 1 with “Catholicism.” In multivariable regression analyses, parents from major faith traditions were not significantly more likely to be vaccine hesitant than those identifying with no tradition (adjusted odds ratio 1.46; 95% CI 0.29, 7.26). However, parents who identified with an “Other” tradition or who preferred not to provide a religious affiliation were over five times more likely to be vaccine hesitant than parents who did not identify with any religious tradition (adjusted odds ratio 5.10; 95% CI 1.06, 24.50). Given the numbers of Catholic and Protestant respondents, we also estimated a multivariable regression model subdividing “Major Faith Traditions” into 3 separate categories – Catholicism, Protestantism, and Other Major Traditions; in this exploratory model, parents identifying with Catholicism (adjusted odds ratio 0.70; 95% CI 0.14, 3.51) or Protestantism (adjusted odds ratio 0.58; 95% CI 0.05, 6.90) were still no more likely to be hesitant than parents marking “none”.

Associations between parental vaccine hesitancy and all three religiosity domains were not statistically significant (Table 2). In all models, Spanish language was significantly inversely associated with the odds of parental vaccine hesitancy ($P < 0.05$ for each). No

Table 2
Multivariable logistic regression models, examining associations between religious affiliation, religious activities, and religiosity, and the outcome of parental vaccine hesitancy.¹

Model and Category	Independent Variable Level	Adjusted Odds Ratio	95% CI
What is your present religion, if any?	None	Referent	[Ref]
	Major Faith Tradition	1.46	(0.29, 7.26)
	“Other”/ Prefer Not to Answer	5.10*	(1.06, 24.50)*
How often do you attend church or other religious meetings?	Never	Referent	[Ref]
	Rarely to A few times/month	1.70	(0.81, 2.08)
	Weekly or more often	1.21	(0.32, 4.56)
How often do you spend time in private religious activities?	Rarely or Never	Referent	[Ref]
	Monthly to Twice weekly	1.22	(0.45, 2.94)
	Daily or More Often	2.66	(0.94, 8.45)
Intrinsic Religiosity (e.g. My beliefs lie behind my approach to life.)	3 (Least religious)	Referent	[Ref]
	4–14	1.72	(0.36, 8.12)
	15 (Highly religious)	3.15	(0.61, 16.27)

¹ Pre-specified adjustment variables in these models were language (English, Spanish), parent age (<30, ≥30), parent highest educational level (less than GED, GED or more), and child’s insurance (Medicaid, Other).

* Indicates statistical significance.

other covariates were significantly associated with vaccine hesitancy in these adjusted models.

Discussion

In our sample of mostly poor, Latino, Christian mothers, we found no statistically significant associations between parental vaccine hesitancy and adherence to major faith traditions or three domains of religiosity. Only one caregiver from a major faith tradition – which supports childhood vaccines – reported delaying or refusing a vaccine for religious reasons, and parental hesitancy was no more likely among adherents of major faith traditions than among parents without a religious faith. These findings can inform efforts to modernize religious exemption policies and have implications for public health and faith partnerships.

First, our findings support our hypothesis and augment existing qualitative and epidemiologic studies documenting infrequent religious resistance from within contemporary major religions. Although we did not measure exemption use, the high level of hesitancy outside of major faith traditions also provides circumstantial evidence that question the nature of religious exemptions as a non-medical exemption category in a changing US religious landscape. Religious exemptions were created decades ago to accommodate specific religious groups whose formal teachings opposed vaccination; many policies include language requiring parents to be bona fide members of faith communities whose teachings are contrary to vaccines [1]. Today, the US is increasingly secular and spiritual but not religious [4], all major religions support vaccines [3], and parents increasingly misuse religious exemptions when non-medical alternatives are unavailable [7,8].

At a minimum, if most vaccine hesitant parents and those using religious exemptions belong to unorganized traditions or those without formal teachings contrary to childhood vaccines, policies should be revised to account for these trends in spirituality. At the most, if subsequent studies in diverse settings corroborate the patterns seen in our pilot data, vaccination advocates could seek to eliminate religious exemptions as an outdated category harmful to public health. As a third way, states could collapse religious and personal belief exemptions into a single “non-medical” exemption category to encompass a range of beliefs. Despite strong opposition, Colorado successfully pursued this strategy in 2020, creating a single non-medical exemption category with rigorous yearly requirements [14]. This balanced approach remains sensitive to claimants with sincere religious objections but recognizes the detrimental public health effects of high non-medical exemption rates for children and communities.

In addition to providing insights for exemption policies, our data also equip public health and faith partnerships seeking to improve vaccination confidence. Few parents in this study reported refusing vaccines on religious grounds, and only one identified with a major faith tradition. While there may be some value in addressing religious roots of vaccine hesitancy within official denominations, this study suggests few hesitant parents within established faith traditions may refuse vaccines for religious reasons alone. Past community-engaged work with diverse congregations corroborates this idea and has suggested that secular vaccine concerns – not religious ones – predominate among religious people [15]. Thus, public health and faith partnerships may be unable to reach increasing numbers of spiritual but not religious individuals who are not part of brick-and-mortar congregations or identify with official denominations [16,17]. However, such partnerships will remain a critical way to assuage concerns among religious adherents whose hesitancy is grounded in secular concerns (e.g. vaccine development processes, vaccine side effects) with the support of trusted religious leaders.

This pilot study had several limitations, including its one geographic area, demographic homogeneity, and its sample size, which resulted in statistical uncertainty in some estimates. Future studies with larger sample sizes may unveil associations between religion and parental vaccine hesitancy or religious vaccine exemptions which we were not powered to detect. Recent reports linking religious communities to vaccine hesitancy, such as those highlighting hesitancy among Evangelical Christians regarding COVID-19 vaccines [18,19], suggest associations may exist for certain vaccines and specific religious groups. However, these associations appear to be grounded in conservative Christians' distrust of scientists and in their political affiliations, not exclusively religious tenets [20,21]. If associations exist for pediatric vaccines required for school or daycare attendance and parental religion or religiosity, our negative findings here suggest they are likely to be weak. Furthermore, we suspect they will also be mediated or moderated by distrust of science and political affiliations, not theology [20,21].

Conclusions

Despite its limitations, this sentinel pilot study augments existing qualitative and epidemiological data in academically rigorous and spiritually sensitive ways to inform the revision of non-medical exemption policies. It also provides a framework for future research in diverse settings that will assist public health and religious stakeholders who work alongside each other to build safe and flourishing communities that reflect the shared ideals of public health and religious teachings.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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