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RELIGIOSITY AND COVID-19 PREVENTIVE BEHAVIOUR[♣]

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ABSTRACT

This study examines the impact of religiosity on preventive measures during the COVID-19 pandemic in the United States, specifically on mask usage, vaccine administration, booster doses, and the probability of testing positive for COVID-19. This study employs an extensive, recurrent dataset from 2020 to 2022 to analye the behaviors of many religious groups, focusing specifically on the differences between born-again and non-born-again Protestants. The results indicate that born-again Protestants exhibit a lower propensity to adhere to preventive measures, such as mask-wearing and immunisations. In contrast, non-born-again Protestants and Catholics demonstrate a higher likelihood of compliance with these guidelines. Unsurprisingly, born-again Protestants exhibit an increased propensity for testing positive for COVID-19 and are, therefore, more likely to have contributed to its heightened spread in the US. This research is essential for understanding the relationship between religiosity and health behaviours, as it emphasises the significant influence of religious identity on public health outcomes. It provides new insights into adherence to health directives, addressing significant gaps in the research by distinguishing among religious subgroups, analysing various preventative behaviours, and monitoring changes over an extended period throughout the United States.

Key words: Covid-19, religiosity, health behaviour

JEL classification: Z12, I12, I18

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1. INTRODUCTION

Faith and health have historically been interconnected, with religious convictions influencing individuals' perceptions of illness, healing, and safeguarding. During crises, such as a global pandemic, these beliefs can significantly affect individuals' attitudes towards preventive measures, including vaccination, mask-wearing, and social isolation. Religiosity significantly influences these behaviours, either through profound faith in divine protection or a moral obligation to protect others. These activities are not merely individual decisions but frequently arise from overarching religious frameworks that either encourage or obstruct adherence to public health norms. Studies indicate that religious beliefs and practices might influence health-related decisions, with certain populations prioritising faith, divine will, and spiritual interpretations of health outcomes (Kranz et al., 2023; Martens & Rutjens 2022; Bentzen, 2021). This may result in resistance to scientific advice, especially among factions that value personal liberty or divine safeguarding more than governmental initiatives. In contrast, religious doctrines highlighting collective responsibility and altruism frequently promote adherence to public health protocols, enhancing the propensity to participate in preventive actions. The frequency of religious engagement and the authority of religious leaders either enhance or reduce compliance with these measures, as religious authorities wield considerable power over their adherents (Martens & Rutjens, 2022; Wiltse, 2021; Stein et al., 2020). The convergence of faith, social responsibility, and health research is crucial for explaining the diverse reactions to preventative behaviour within society, as religiosity informs public health responses via its impact on cultural values, doctrines, and community interactions.

In the United States, religion is a fundamental component of social identity, religiosity frequently interacts with cultural and geographical factors to determine health behaviours. The multifaceted religious landscape, encompassing evangelical Protestantism, Roman Catholicism, and other faith traditions, results in disparate reactions to public health efforts. The interaction between faith and preventative behaviour illustrates personal views as well as broader society values and geographical disparities, rendering the U.S. an intriguing case for evaluating the impact of religious convictions on reactions to emergencies in health.

The impact of religiosity on preventative behaviour in the U.S. has been studied in multiple ways, indicating a number of challenges in public health compliance. DeFranza et al. (2021) noted that persons in devout religious communities exhibited lower compliance with shelter-in-place mandates, perceiving these restrictions as infringements on their freedom of worship. Similarly, Hill et al. (2020) demonstrated that states with a stronger religious presence experienced slower reductions in movements during the initial phases of the pandemic, highlighting the conflict between faith-based practices and compliance with public health directives.

A further aspect of this subject is the convergence of religion and national identity. Perry, Whitehead, and Grubbs (2020) investigated the influence of Christian nationalism, on behaviours such as mask aversion and social gatherings, they identified that Christian nationalism was the strongest predictor of incautious behaviors and resistance to public health guidelines, driven by distrust in science, a belief in divine protection, and political allegiance to Mr. Trump. This finding suggests that the response of far-right religious groups to the pandemic was shaped by ideological factors, particularly Christian nationalism, rather than religious faith itself. Jacobi et al. (2022) investigated the impact of reported alterations in religiosity during the pandemic on psychological well-being at an individual level. Their findings demonstrated that reductions in religious participation were associated with diminished levels of psychological well-being, which may partially explain the hesitance to comply with preventive measures. Pirutinsky et al. (2020) explored an alternative psychological pathway, finding that religious coping strategies, such as faith in God, alleviated stress and promoted a more favourable mental state, although this did not consistently result in adherence to health measures.

Vaccine hesitancy represents an additional dimension of the correlation between religiosity and health behaviour. Martens and Rutjens (2022) discovered that areas with elevated religiosity demonstrated reduced COVID-19 immunisation rates, indicating that strongly held spiritual convictions may hinder vaccine adoption, despite extensive public health initiatives. Wiltse (2021) emphasised the capacity of religious leaders to positively impact health outcomes, revealing that individuals were more inclined to accept vaccines when motivated by religious leaders rather than by political officials or medical professionals.

Significant disparities exist among various religious groups about vulnerability to the virus. Stein et al. (2020) reported a notable increase in excess mortality within Amish and Mennonite communities, attributing this trend to their hesitance to embrace preventive measures due to their closed religious backgrounds. Kranz et al. (2023) introduced a psychological dimension, revealing that extremely religious individuals frequently exhibited increased emotional worry and tended to engage in impulsive rather than deliberate preventive behaviours, such as hoarding instead of practicing social distancing or handwashing.

This study contributes to the existing literature in several respects. The existing research has a limited focus on how diverse religious affiliations shape preventive health behaviors during the COVID-19 pandemic. While much of the literature either focuses narrowly on a single religious group or examines specific religious attributes, this study uniquely introduces all relevant religious affiliations. Additionally, it distinguishes between born-again and „traditional" (non-born-again) Protestants. By focusing on these distinctions, the study sheds new light on how religious identity influences compliance with preventive measures such as mask-wearing, vaccination, and booster uptake, which has been underexplored in the literature.

Additionally, this research breaks new ground by going beyond mere adherence to preventive measures to examine actual health outcomes. Specifically, it assesses which religious groups are more likely to test positive for COVID-19, a connection that has been largely overlooked. While prior studies (Perry et al., 2020; Martens & Rutjens, 2022) have documented the reluctance of certain religious groups to comply with public health directives, few if any have directly linked this non-compliance to concrete health outcomes. By correlating religious affiliation with COVID-19 infection rates, this study establishes a direct connection between religious behaviour and tangible health risks, offering a more comprehensive understanding of the consequences of non-compliance.

The use of a large, longitudinal dataset from 2020 to 2022 across all U.S. states underscores the thoroughness of this study. Unlike previous studies often limited by short time frames or regionally confined data, this comprehensive approach allows for an in-depth analysis of how religious behavior and health outcomes evolved throughout the pandemic. The broad temporal and geographical range provide a comprehensive picture of the relationship between religiosity and preventive health behavior in the US. This thorough approach, including diverse religious affiliations and distinctions within Protestantism, fills a critical gap in the literature and offers valuable insights for both public health policy and academic discourse.

The study identifies variations in the influence of religious beliefs on preventive behaviour. Born-again Protestants exhibit a significantly lower propensity to adhere to preventive health measures, demonstrating a lower likelihood of wearing masks, obtaining vaccinations, or receiving booster doses. This reduced compliance is associated with an increased probability of testing positive for COVID-19. Conversely, Protestants who are not born again, along with Catholics, are more inclined to adhere to health rules, especially regarding vaccinations and boosters. This indicates that their religious beliefs may correspond more closely with public health guidelines, affecting their increased propensity for compliance.

These findings directly enhance several significant areas of literature. Initially, they contribute to the research on the impact of religiosity on public health behaviours, demonstrating that religious views and affiliations affect the propensity to comply with preventative measures. The study elucidates significant distinctions between religious groupings by differentiating between born-again and non-born-again Protestants, which had been previously neglected. This enhances the comprehension of religious diversification and its influence on behaviours such as mask-wearing, vaccination, and booster shot administration. Secondly, the study contributes to the literature on vaccination reluctance, particularly regarding cultural and religious influences on vaccine attitudes. The diminished probability of vaccine acceptance among born-again Protestants corresponds with established studies on religious skepticism regarding medical treatments. However, the increased acceptance among non-born-again Protestants and Catholics contests the idea of homogeneous resistance across religious sects. The study establishes a direct correlation between religious affiliation and the probability of testing positive for COVID-19, elucidating the relationship between adherence to public health measures and health outcomes, thereby offering new perspectives on how religious practices affect behavior and the consequences of non-compliance during a public health emergency. Although the study differs in significance from other studies on COVID-19 in the US and beyond that have focused on issues of misreporting and the factors that account for it (Kpeli et al., 2024; Kofonov et al. 2023; Knutsen., & Kolvani, 2022), it contributes to the literature on the likelihood of religiosity enhancing the spread of the covid-19 virus.

The paper is structured as follows: Section 2 offers an overview of COVID-19 in the United States. Section 3 describes data sources, dependent variables, and controls. Section 4 presents the empirical setup. Section 5 discusses the results, first for the determinants of preventive behavior and then for the determinants of being tested positive for COVID-19. Section 6 presents the robustness test. Section 7 concludes.

2. COVID-19 IN THE UNITED STATES

The COVID-19 pandemic significantly impacted the United States beginning in early 2020. The Center for Disease Control and Prevention (CDC) confirmed the first documented case of COVID-19 in the United States on January 21, 2020, specifically in Washington state (Holshue et al., 2020). On January 31, 2020, the U.S. Department of Health and Human Services officially declared a public health emergency in response to the increasing virus threat.

As the virus spread throughout the country, states took action. On March 19, 2020, California became the first state to issue a statewide stay-at-home order, mandating residents to stay indoors except for essential activities (Bornstein & Miller, 2023; Henson, 2021; Zanocco et al., 2021). Following California's lead, many other states imposed similar lockdowns to control the spread of the virus. However, the intensity and timing of restrictions varied from state to state.

The pandemic overwhelmed the U.S. healthcare system. Hospitals, particularly in heavily impacted areas like New York City, faced shortages of personal protective equipment (PPE) and ventilators. By April 2020, New York had emerged as the epicenter of the pandemic, with over 350,000 confirmed cases and more than 17,000 deaths (Gonzalez-Reiche et al., 2020; Storti et al., 2022). Throughout 2020, New York, alongside states like New Jersey and California, continued to report the highest number of confirmed cases and fatalities.

The development of vaccines in record time marked a turning point. In December 2020, the U.S. Food and Drug Administration (FDA) granted emergency use authorization to the BioNTech-Pfizer-vaccine, making it the first COVID-19 vaccine available to the American public (Tanne, 2021; Shimabukuro, 2021). The Moderna vaccine was also approved in in the same month (Mahase,2020;Ioannou et

al.,2022). Vaccination efforts initially prioritized healthcare workers, elderly populations, and individuals with preexisting health conditions.

Despite the widespread availability of vaccines by mid-2021, vaccine hesitancy slowed the overall pace of inoculation. Political divisions and misinformation about the virus and vaccines fuelled public resistance in many parts of the country. Some states saw a lag in vaccine rates, while others saw a spike in cases. (Bolsen & Palm, 2022; Burleigh, 2021)

The emergence of new variants, such as Delta and Omicron, led to spikes in cases throughout 2021 and 2022. Although the vaccines effectively reduced severe illness and deaths, new outbreaks forced states to reconsider restrictions, with some reintroducing mask mandates and other public health measures.

3. DATA

The research is based on data from the American Trends Panel (ATP) of the Pew Research Center, gathered across seven waves: 72, 74, 79, 83, 94, 108, and 114, spanning the years 2020 to 2022. Waves 72, 74, and 79 were collected between August and November 2020. Waves 83 and 94 were collected in February and August 2021, respectively. Waves 108 and 114 were collected in May and September 2022, respectively. The dataset comprises a total of 16,143 observations. Although each wave includes different questions, the dataset consistently covers inquiries regarding individuals' social and demographic characteristics, enabling a comprehensive longitudinal analysis.

Dependent Variable

The ATP dataset contains three variables measuring preventive behavior in response to COVID-19:

Mask wearing: This binary variable indicates whether an individual has worn a mask often in the past month.

Vaccine uptake: This binary variable indicates whether an individual has taken a vaccine to prevent COVID-19.

Booster adoption: These variables measure whether an individual has taken a booster to prevent COVID-19.

The dataset also contains information about COVID-19 incidents, which is used as an endogenous variable in Section 5.2. *Testing Positive for COVID-19*: This binary variable takes a value of 1 if an individual has tested positive for COVID-19 since February 2020 and 0 otherwise. It is employed to examine the outcome of preventive behaviour.

Explanatory Variables

Religiosity is captured using dummy variables, each representing different religious affiliations: born-again Protestants, not born-again Protestants (comprised of the Methodists, Lutherans, Presbyterians, Episcopalians, and members of the Church of Christ), Catholics, Jews, other Christians (Mormons and Orthodox), Muslims, other religions (Buddhist and Hindu), and no religion (agnostic or nothing in particular). Each variable is binary, taking the value 1 if the individual identifies with that denomination and 0 otherwise. The reference category for religious affiliation is "no religion."

Religious intensity is characterized by the frequency of an individual's attendance at religious services. It is categorized into three levels: frequent attendance (at least once a week), infrequent (several times a month or year), and rare/no attendance. Each level is denoted as a binary variable, with infrequent attendance as the reference category.

This study also examines a range of social, political, economic, and demographic factors. Age is divided into three groups: old (65 and above), middle-aged (30-64), and young (18-29), with the middle-aged group serving as the reference category. Gender was a binary variable, with females as the reference category.

The educational level is categorized into three groups: less than high school or high school, college (or equivalent), and postgraduate, with college education as the reference group. The income levels are divided into lower, middle, and upper-income categories, with middle-income serving as the reference group. Individuals are classified as lower-income if their family income falls below two-thirds of the median adjusted income, middle-income if between two-thirds and double the median, and upper-income if above double the median. This classification accounts for household size and geographical differences in cost of living, ensuring a more accurate reflection of economic realities(Bennett, 2021). Party allegiance is classified into three groups: democratic, republican, and other political parties, with other political parties as the reference group. Race is categorized based on an individual's racial heritage, including White, Black, Asian, Hispanic, or other, with "other race" serving as the reference group. Geographic location is determined based on whether an individual resides in an urban, suburban, or rural area with the reference category being suburban. The summary statistics is provided in table A1 in the Appendix.

4. Empirical Approach

The impact of religiosity on preventive health behaviors is estimated using Ordinary Least Squares (OLS) regression analysis, incorporating robust standard errors, census division and wave-fixed effects, and in some specifications census division*wave fixed effects. .

The baseline equation is as follows:

$$P_i = \alpha + \beta RD_i + X_i\theta + \delta_i + \gamma_t + (\delta_i * \gamma_t) + \epsilon_i \quad (1)$$

Where P_i represents the preventive behavior (mask-wearing, vaccinated, had a booster shot). Religious denomination (RD) is a vector of binary variables that takes the value one if a person belongs to a particular religious denomination.

X is a vector of control variables, including age group, gender, education level, income level, race, and metropolitan area indicators. δ_i denotes census division fixed effects, γ_t is wave fixed effects. $\delta_i * \gamma_t$ is the interaction between wave and census division fixed effects, ϵ_i is the error term.

5. RESULTS

5.1 Protective Behaviour

The regression results can be found in Tables 1-4, each comprising 6 specifications. Columns 1, 2, and 3 showcase a parsimonious model, while columns 4, 5, and 6 encompass additional control variables, expanding on the initial model. Moreover, these specifications consider regional variations and wave characteristics by incorporating wave; census division fixed effects, and their interactions. Specifically, wave-fixed effects are included in columns 1 and 4, while columns 2 and 5 incorporate both wave and

census division fixed effects.[1] In columns 3 and 6, wave, census division, and wave-by-census-division interaction terms are all considered to ensure a comprehensive analysis.

Table 1 shows the regression results on religiosity and mask-wearing behavior. A significant negative correlation is observed between mask-wearing behavior and born-again Protestants, a finding that holds across all models. This suggests that born again Protestants are significantly less likely to wear masks. Other Christians also show a consistently negative effect on mask-wearing behavior, implying that Orthodox and Mormons do not wear masks compared to non-religious people.[2]

The findings from the control variables are noteworthy. It was observed that, in comparison to individuals with other political affiliations, Republicans are less inclined to wear masks, whereas Democrats are more likely to do so. Additionally, individuals with a postgraduate degree are more inclined to wear masks than those with a college degree. Moreover, older individuals prefer wearing masks to those in the middle age bracket, while younger people are less likely to do so. This makes sense as the risk of being severely affected by COVID-19 increases with age. Furthermore, males are less likely to wear masks compared to females. Blacks, Asians, and Hispanics are significantly more likely to wear masks compared to other races. In terms of location, urban residents demonstrate a higher likelihood of wearing masks, while rural residents do not, compared to residents of suburban areas.

Table 1: Religiosity and Mask Wearing

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Mask wear					
Protestant born again	-0.0923***	-0.0848***	-0.0837***	-0.0488***	-0.0445***	-0.0434***
	(0.00744)	(0.00814)	(0.00812)	(0.00783)	(0.00849)	(0.00848)
Protestants not born again	-0.0326***	-0.0228***	-0.0219***	-0.0154**	-0.00902	-0.00819
	(0.00756)	(0.00831)	(0.00831)	(0.00756)	(0.00833)	(0.00833)
Catholic	-0.00354	-0.00683	-0.00535	0.00665	0.00707	0.00882
	(0.00663)	(0.00746)	(0.00744)	(0.00697)	(0.00780)	(0.00779)
Other Christians	-0.111***	-0.0983***	-0.0998***	-0.0622***	-0.0589***	-0.0607***
	(0.0210)	(0.0228)	(0.0229)	(0.0206)	(0.0224)	(0.0225)
Jewish	0.00355	-0.0110	-0.0109	-0.0207	-0.0366**	-0.0363**
	(0.0151)	(0.0169)	(0.0170)	(0.0151)	(0.0169)	(0.0170)
Muslim	0.0392	0.0303	0.0302	0.00804	0.00635	0.00609
	(0.0260)	(0.0270)	(0.0268)	(0.0270)	(0.0292)	(0.0291)
Other Religion	0.0418**	0.0196	0.0222	0.000340	-0.00586	-0.00236
	(0.0185)	(0.0215)	(0.0213)	(0.0201)	(0.0242)	(0.0240)
Democrat				0.0620***	0.0608***	0.0603***
				(0.00522)	(0.00582)	(0.00581)
Republicans				-0.0857***	-0.0931***	-0.0933***
				(0.00802)	(0.00857)	(0.00856)
High school				-0.0183**	-0.0164*	-0.0120
				(0.00874)	(0.00939)	(0.00937)
Postgraduate				0.0303***	0.0296***	0.0310***
				(0.00620)	(0.00686)	(0.00684)
Upper Income				0.0109*	0.0110	0.0115*
				(0.00601)	(0.00670)	(0.00670)
Lower Income				-0.00387	-0.00538	-0.00505

[1] These sets of fixed effects capture regionally diverse quality and quantity of medical facilities which may affect availability of information, vaccines and testing facilities; they may also capture regionally and temporally differing incidence prevalences which may affect protective behavior as well as the likelihood of being tested positively for COVID-19.

[2] „Other“ Protestants show in some specifications also a significantly lower incidence of mask wearing (compared to the reference group), but the coefficient is consistently much lower in absolute value than for the “born again” Protestants and it is insignificant in my preferred specifications 5 and 6.

				(0.00725)	(0.00799)	(0.00795)
Old age				0.0336***	0.0384***	0.0380***
				(0.00568)	(0.00627)	(0.00626)
Young				-0.0245***	-0.0207**	-0.0211**
				(0.00899)	(0.00998)	(0.00997)
Male				-0.0331***	-0.0353***	-0.0352***
				(0.00522)	(0.00579)	(0.00578)
White				0.00865	0.0265*	0.0252
				(0.0133)	(0.0155)	(0.0155)
Black				0.0579***	0.0676***	0.0658***
				(0.0142)	(0.0162)	(0.0162)
Asian				0.100***	0.0946***	0.0920***
				(0.0174)	(0.0222)	(0.0223)
Hispanic				0.0624***	0.0699***	0.0673***
				(0.0142)	(0.0165)	(0.0165)
Urban				0.0170***	0.0158**	0.0161**
				(0.00639)	(0.00721)	(0.00722)
Rural				-0.0738***	-0.0724***	-0.0734***
				(0.00894)	(0.00953)	(0.00950)
Constant	0.916***	0.938***	0.942***	0.867***	0.873***	0.877***
	(0.00412)	(0.0109)	(0.0108)	(0.0147)	(0.0196)	(0.0194)
Observations	15,831	13,537	13,537	15,831	13,537	13,537
R-squared	0.352	0.362	0.368	0.395	0.403	0.409
Wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Census division Fixed Effect	No	Yes	Yes	No	Yes	Yes
Wave*census division Fixed Effect	No	No	Yes	No	No	Yes
Adj.R^2	0.351	0.361	0.366	0.394	0.402	0.406

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In Table 2, the findings indicate a correlation between religiosity and vaccine uptake behavior. Across all models, there is a notable adverse correlation between being a born-again Protestant and vaccine uptake, suggesting a strong inclination against vaccination within this group. Conversely, non-born-again Protestants are more inclined to receive vaccines. Catholics consistently demonstrate a significant positive association with vaccine uptake. Other religious groups, including the Buddists and Hindus, also exhibit a favorable correlation with vaccine uptake compared to individuals without religion.

The data also suggests that political leaning significantly impacts vaccine acceptance. Democrats are considerably more inclined to get vaccinated, whereas Republicans exhibit a lower tendency to do so. Additionally, individuals with postgraduate qualifications are more likely to receive the vaccine. On the other hand, those with a high school education or lower are less inclined to participate in vaccination, highlighting disparities in health-related behavior.

Socioeconomic status is a significant factor, with individuals in higher income brackets being more likely to get vaccinated while those in lower income brackets are less inclined to do so. Age also plays a crucial role, as older individuals are more likely to receive the vaccine. Gender is another determining factor, with men showing a higher likelihood of getting vaccinated compared to women. Moreover, vaccination rates are higher among White, Asian, and Hispanic populations compared to other racial groups. Furthermore, there is a notable difference in vaccination rates based on residential location, with rural residents being significantly less likely to be vaccinated than those in suburban areas.

Table 2: Religiosity and Vaccine Uptake

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Vaccine Uptake					
Protestant born again	-0.113***	-0.0835***	-0.0829***	-0.0491***	-0.0363***	-0.0367***

	(0.0109)	(0.0122)	(0.0122)	(0.0111)	(0.0123)	(0.0123)
Protestants not born again	0.0203*	0.0445***	0.0450***	0.0248**	0.0375***	0.0374***
	(0.0109)	(0.0119)	(0.0119)	(0.0104)	(0.0114)	(0.0114)
Catholic	0.0471***	0.0605***	0.0601***	0.0514***	0.0556***	0.0559***
	(0.00981)	(0.0110)	(0.0110)	(0.00980)	(0.0109)	(0.0109)
Other Christians	-0.0142	0.0156	0.0178	0.0355	0.0521*	0.0537*
	(0.0253)	(0.0283)	(0.0284)	(0.0246)	(0.0276)	(0.0278)
Jewish	0.0992***	0.110***	0.110***	0.00118	0.00323	0.00384
	(0.0194)	(0.0217)	(0.0217)	(0.0182)	(0.0201)	(0.0202)
Muslim	0.0145	0.0372	0.0354	-0.0283	-0.00410	-0.00558
	(0.0482)	(0.0535)	(0.0530)	(0.0481)	(0.0549)	(0.0541)
Other Religion	0.116***	0.134***	0.131***	0.0274	0.0636**	0.0603*
	(0.0234)	(0.0284)	(0.0285)	(0.0254)	(0.0310)	(0.0313)
Democrat				0.149***	0.153***	0.153***
				(0.00764)	(0.00843)	(0.00845)
Republican				-0.101***	-0.0991***	-0.0981***
				(0.0103)	(0.0110)	(0.0110)
High school				-0.0426***	-0.0423***	-0.0432***
				(0.0118)	(0.0126)	(0.0127)
Postgraduate				0.0807***	0.0887***	0.0874***
				(0.00856)	(0.00937)	(0.00939)
Upper Income				0.0350***	0.0326***	0.0328***
				(0.00788)	(0.00871)	(0.00872)
Lower Income				-0.0657***	-0.0677***	-0.0688***
				(0.0105)	(0.0115)	(0.0115)
Old age				0.132***	0.139***	0.139***
				(0.00824)	(0.00905)	(0.00907)
Young				0.0107	0.00442	0.00591
				(0.0134)	(0.0148)	(0.0148)
Male				0.0382***	0.0354***	0.0359***
				(0.00720)	(0.00789)	(0.00789)
White				0.0531***	0.0700***	0.0693***
				(0.0205)	(0.0231)	(0.0231)
Black				-0.000240	0.0163	0.0177
				(0.0235)	(0.0261)	(0.0262)
Asian				0.156***	0.171***	0.169***
				(0.0241)	(0.0289)	(0.0289)
Hispanic				0.0674***	0.0840***	0.0801***
				(0.0225)	(0.0257)	(0.0257)
Urban				0.0104	0.00832	0.00898
				(0.00863)	(0.00970)	(0.00973)
Rural				-0.0629***	-0.0603***	-0.0594***
				(0.0102)	(0.0109)	(0.0109)
Constant	0.817***	0.866***	0.868***	0.617***	0.632***	0.632***
	(0.00695)	(0.0153)	(0.0163)	(0.0230)	(0.0283)	(0.0289)
Observations	11,178	9,618	9,618	11,178	9,618	9,618
R-squared	0.026	0.029	0.033	0.149	0.152	0.156
Wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Census division Fixed Effect	No	Yes	Yes	No	Yes	Yes
Wave*census division Fixed Effect	No	No	Yes	No	No	Yes
Adj.R^2	0.0250	0.0271	0.0282	0.147	0.149	0.150

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In Table 3, the findings reveal a positive and significant correlation between religiosity and vaccine booster adoption. Specifically, the data indicates that Protestants who are not born again and Catholics are more likely to receive vaccine boosters compared to individuals not affiliated with any religion.

The findings regarding the control variables demonstrate a consistent pattern similar to that observed with mask-wearing and vaccine uptake. The data indicates a clear preference among Democrats for receiving booster shots, while Republicans show less inclination to do so. Moreover, individuals with postgraduate degrees exhibit a significantly higher likelihood of obtaining a booster shot, indicating that education plays a critical role in shaping health-related behaviors. Income level also emerges as a significant factor, with those in higher-income brackets showing a stronger propensity for receiving booster shots compared to those in lower-income brackets. Additionally, older individuals are more likely to choose to receive booster shots. Race and ethnicity also have a substantial impact, with individuals identifying as White, Black, Asian, and Hispanic displaying a significantly higher likelihood of receiving booster shots compared to individuals from other racial groups. Lastly, geographic location also influences booster uptake, with rural residents consistently showing a lower likelihood of receiving booster shots compared to their suburban counterparts.

Table 3: Religiosity And Vaccine Booster Uptake

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Vaccine Booster Uptake					
Protestant born again	-0.0641***	-0.0479***	-0.0476***	-0.0238**	-0.0182	-0.0185
	(0.00985)	(0.0110)	(0.0111)	(0.0103)	(0.0114)	(0.0114)
Protestants not born again	0.0221**	0.0379***	0.0378***	0.0208**	0.0287***	0.0280***
	(0.00970)	(0.0106)	(0.0106)	(0.00966)	(0.0106)	(0.0106)
Catholic	0.0393***	0.0425***	0.0424***	0.0438***	0.0417***	0.0419***
	(0.00877)	(0.00987)	(0.00991)	(0.00900)	(0.0101)	(0.0102)
Other Christians	-0.00537	0.0160	0.0167	0.0302	0.0404	0.0406
	(0.0232)	(0.0253)	(0.0254)	(0.0228)	(0.0250)	(0.0251)
Jewish	0.0730***	0.0810***	0.0796***	0.00552	0.0114	0.0104
	(0.0173)	(0.0185)	(0.0186)	(0.0164)	(0.0173)	(0.0175)
Muslim	0.0640*	0.0576	0.0551	0.0282	0.0207	0.0181
	(0.0339)	(0.0404)	(0.0404)	(0.0344)	(0.0407)	(0.0403)
Other Religion	0.0722***	0.0750**	0.0739**	0.0233	0.0290	0.0281
	(0.0238)	(0.0301)	(0.0302)	(0.0253)	(0.0314)	(0.0315)
Democrat				0.114***	0.116***	0.116***
				(0.00685)	(0.00755)	(0.00757)
Republican				-0.0665***	-0.0653***	-0.0651***
				(0.00958)	(0.0103)	(0.0103)
High school				-0.0180	-0.0135	-0.0145
				(0.0111)	(0.0119)	(0.0119)
Postgraduate				0.0702***	0.0743***	0.0735***
				(0.00782)	(0.00857)	(0.00861)
Upper Income				0.0330***	0.0331***	0.0328***
				(0.00708)	(0.00784)	(0.00785)
Lower Income				-0.0271***	-0.0270**	-0.0278***
				(0.00988)	(0.0108)	(0.0108)
Old age				0.0930***	0.101***	0.102***
				(0.00767)	(0.00845)	(0.00848)
Young				0.0197	0.0258*	0.0267*
				(0.0126)	(0.0138)	(0.0138)
Male				0.0261***	0.0253***	0.0252***
				(0.00661)	(0.00727)	(0.00728)
White				0.0595***	0.0792***	0.0777***
				(0.0197)	(0.0225)	(0.0226)
Black				0.0699***	0.0887***	0.0893***
				(0.0218)	(0.0246)	(0.0248)
Asian				0.116***	0.140***	0.139***

				(0.0234)	(0.0281)	(0.0282)
Hispanic				0.0695***	0.0879***	0.0856***
				(0.0214)	(0.0248)	(0.0249)
Urban				-0.00462	-0.00623	-0.00737
				(0.00792)	(0.00894)	(0.00898)
Rural				-0.0401***	-0.0364***	-0.0355***
				(0.00924)	(0.00989)	(0.00989)
Constant	0.862***	0.893***	0.909***	0.680***	0.676***	0.691***
	(0.00629)	(0.0139)	(0.0139)	(0.0223)	(0.0272)	(0.0276)
Observations	10,731	9,241	9,241	10,731	9,241	9,241
R-squared	0.014	0.018	0.020	0.099	0.102	0.104
Wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Census division Fixed Effect	No	Yes	Yes	No	Yes	Yes
Wave*census division Fixed Effect	No	No	Yes	No	No	Yes
Adj.R^2	0.0131	0.0155	0.0151	0.0968	0.0988	0.0984

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5.2 COVID-19 Incidence

Table 4 displays the correlation between religiosity and the probability of testing positive for COVID-19. The study seeks to ascertain whether different types of religious beliefs can forecast the likelihood of an individual testing positive for COVID-19 and to elucidate the association between religiosity and adherence to preventive measures. Born-again Protestants are more likely to test positive for COVID-19. A possible explanation for this outcome is that, as indicated in the previous results, they are not as compliant with preventive behaviours as other religious denominations.

The analysis of the control variable indicates that Republicans, males, and rural and urban dwellers are more likely to test positive for COVID-19. In contrast, individuals with postgraduate degrees, older individuals, and Asians are less likely to test positive for COVID-19. Unsurprisingly, this broadly adheres to the patterns of preventive behavior.

Table 4: Religiosity And testing positive for Covid-19

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Tested positive for COVID					
Protestant born again	0.0314***	0.0246***	0.0247***	0.0262***	0.0237***	0.0239***
	(0.00730)	(0.00801)	(0.00803)	(0.00784)	(0.00853)	(0.00855)
Protestants not born again	-0.000159	-0.00431	-0.00425	0.0112	0.00835	0.00871
	(0.00770)	(0.00840)	(0.00842)	(0.00787)	(0.00861)	(0.00863)
Catholic	0.0149**	0.00922	0.00981	0.0129	0.0103	0.0107
	(0.00760)	(0.00835)	(0.00837)	(0.00793)	(0.00875)	(0.00876)
Other Christians	0.0260	0.0290	0.0290	0.0226	0.0291	0.0293
	(0.0190)	(0.0215)	(0.0215)	(0.0186)	(0.0211)	(0.0211)
Jewish	-0.0175	-0.0247	-0.0245	0.0170	0.00846	0.00875
	(0.0164)	(0.0181)	(0.0181)	(0.0163)	(0.0179)	(0.0179)
Muslim	-0.0347	-0.0280	-0.0323	-0.0377	-0.0281	-0.0327
	(0.0290)	(0.0338)	(0.0343)	(0.0293)	(0.0341)	(0.0345)
Other Religion	0.00866	0.00501	0.00575	0.0241	0.0255	0.0262
	(0.0247)	(0.0302)	(0.0300)	(0.0259)	(0.0316)	(0.0315)
Democrat				-0.0161***	-0.0121*	-0.0123*
				(0.00625)	(0.00687)	(0.00689)
Republican				0.0210***	0.0218***	0.0214***
				(0.00752)	(0.00810)	(0.00812)
High school				0.00389	0.00604	0.00466

				(0.00858)	(0.00916)	(0.00918)
Postgraduate				-0.0274***	-0.0243***	-0.0238***
				(0.00652)	(0.00711)	(0.00712)
Upper Income				0.00132	0.00316	0.00268
				(0.00648)	(0.00716)	(0.00718)
Lower Income				0.0103	0.0102	0.0112
				(0.00765)	(0.00832)	(0.00832)
Old age				-0.0634***	-0.0613***	-0.0607***
				(0.00618)	(0.00674)	(0.00676)
Young				0.0139	0.0150	0.0154
				(0.0103)	(0.0112)	(0.0112)
Male				0.0205***	0.0222***	0.0227***
				(0.00549)	(0.00602)	(0.00602)
White				-0.0118	-0.0190	-0.0193
				(0.0131)	(0.0149)	(0.0149)
Black				0.0208	0.0182	0.0183
				(0.0154)	(0.0171)	(0.0171)
Asian				-0.0364*	-0.0572**	-0.0578**
				(0.0192)	(0.0239)	(0.0238)
Hispanic				0.0243	0.0223	0.0236
				(0.0152)	(0.0172)	(0.0172)
Urban				0.0268***	0.0266***	0.0272***
				(0.00789)	(0.00875)	(0.00878)
Rural				0.0271***	0.0257***	0.0255***
				(0.00793)	(0.00846)	(0.00849)
Constant	0.147***	0.131***	0.125***	0.180***	0.174***	0.167***
	(0.00478)	(0.0124)	(0.0141)	(0.0147)	(0.0198)	(0.0208)
Observations	15,831	13,537	13,537	15,831	13,537	13,537
R-squared	0.030	0.033	0.036	0.049	0.051	0.053
Wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Census division Fixed Effect	No	Yes	Yes	No	Yes	Yes
Wave*census division Fixed Effect	No	No	Yes	No	No	Yes
Adj.R^2	0.0296	0.0318	0.0320	0.0474	0.0482	0.0485

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5.3 Summary of Results

The research findings suggest that individuals who identify as born-again Protestants are less inclined to follow COVID-19 preventive measures, such as wearing masks and getting vaccinated. This increases their risk of testing positive for the virus and raises the potential for transmission to others. In contrast, non-born-again Protestants and Catholics are more likely to receive vaccines and boosters, providing them with greater protection against infection and reducing the likelihood of spreading the virus. Additionally, Democrats, those with postgraduate education, and older individuals are more likely to adhere to preventive measures, thereby reducing their risk of contracting and spreading COVID-19. Conversely, Republicans and individuals living in rural areas are less likely to adhere to these measures, making them more vulnerable to infection and contributing to greater virus transmission. The differences in protective behaviors ranslates into differences in the probability of testing positive for COVID.

6. ROBUSTNESS

Additionally, the study investigates the impact of the intensity of religiousity as measured by the frequency of attending service on preventive behavior. The findings are detailed in Table 5-8, which includes 9 different specifications. Columns 1, 2, and 3 outline a simplified model focusing on the core

variables, while columns 4, 5, and 6 introduce additional control variables to provide a more comprehensive analysis of the relationships. The final set of models in columns 7, 8, and 9 incorporates interaction terms for religious service attendance and religious affiliation, along with the control variables. These models also consider regional and temporal variations by including fixed effects for wave and census divisions and their interactions. Specifically, wave-fixed effects are applied in columns 1, 4, and 7, while columns 2, 5, and 8 include wave and census division fixed effects. The most comprehensive models in columns 3, 6, and 9 account for wave, census division, and their interactions, ensuring a thorough and robust analysis.

The robustness checks confirm that the results are largely consistent with the initial findings from Tables 1 to 4, with only minor variations related to religious service attendance. Regular attendance at religious services generally does not significantly affect preventive behavior. However, the interaction between service attendance and religious affiliation reveals limited significance, with two key exceptions: other Christians who frequently attend services are slightly more likely to wear masks, while Jews who regularly attend services are marginally less likely to take vaccines, both at the 10% significance level.

A notable observation from the robustness analysis is that born-again Protestants and Jews who regularly attend services are more likely to test positive for COVID-19. This result is particularly significant for born-again Protestants because, in the initial findings, this group showed no strong adherence to preventive behaviors like mask-wearing or vaccination. The interaction result reinforces this pattern, suggesting that, even when they are more engaged in religious services, born-again Protestants remain unlikely to adopt preventive health measures, which may explain their higher likelihood of contracting the virus.

Table 5: Religiosity and Mask wearing

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					mask wear				
Protestant born again	-0.0935***	-0.0897***	-0.0879***	-0.0484***	-0.0474***	-0.0457***	-0.0336***	-0.0312***	-0.0283**
	(0.00888)	(0.00968)	(0.00966)	(0.00903)	(0.00980)	(0.00979)	(0.0111)	(0.0120)	(0.0120)
Protestants not born again	-0.0340***	-0.0255***	-0.0244***	-0.0157*	-0.0106	-0.00964	-0.0220**	-0.0155	-0.0150
	(0.00816)	(0.00893)	(0.00893)	(0.00811)	(0.00891)	(0.00891)	(0.00894)	(0.00980)	(0.00980)
Catholic	-0.00510	-0.00997	-0.00819	0.00647	0.00518	0.00715	0.00158	0.000323	0.00227
	(0.00741)	(0.00827)	(0.00826)	(0.00766)	(0.00854)	(0.00854)	(0.00829)	(0.00924)	(0.00925)
Other Christians	-0.112***	-0.103***	-0.104***	-0.0618***	-0.0618***	-0.0630***	-0.0949***	-0.113***	-0.114***
	(0.0216)	(0.0235)	(0.0236)	(0.0212)	(0.0230)	(0.0231)	(0.0347)	(0.0368)	(0.0371)
Jewish	0.00224	-0.0131	-0.0128	-0.0211	-0.0378**	-0.0375**	-0.0184	-0.0313*	-0.0308*
	(0.0152)	(0.0170)	(0.0171)	(0.0152)	(0.0171)	(0.0172)	(0.0161)	(0.0179)	(0.0180)
Muslim	0.0377	0.0265	0.0269	0.00803	0.00422	0.00430	-0.0116	-0.00591	-0.00259
	(0.0263)	(0.0273)	(0.0271)	(0.0271)	(0.0294)	(0.0293)	(0.0353)	(0.0386)	(0.0390)
Other Religion	0.0405**	0.0176	0.0202	3.56e-05	-0.00700	-0.00343	0.00162	-0.00173	-0.000813
	(0.0187)	(0.0217)	(0.0215)	(0.0202)	(0.0243)	(0.0242)	(0.0212)	(0.0253)	(0.0252)
Often attend service	-0.00413	0.00265	0.00139	-0.00310	0.00146	0.000379	-0.0222	-0.00447	-0.00419
	(0.00777)	(0.00840)	(0.00838)	(0.00755)	(0.00818)	(0.00815)	(0.0247)	(0.0267)	(0.0269)
Seldom or never attend service	-0.00526	-0.00489	-0.00495	-0.00196	-0.00314	-0.00321	-0.00175	-0.00266	-0.00260
	(0.00706)	(0.00777)	(0.00776)	(0.00688)	(0.00757)	(0.00756)	(0.00694)	(0.00764)	(0.00763)
Democrat				0.0620***	0.0610***	0.0605***	0.0620***	0.0611***	0.0605***
				(0.00523)	(0.00583)	(0.00582)	(0.00523)	(0.00582)	(0.00581)
Republican				-0.0857***	-0.0932***	-0.0935***	-0.0850***	-0.0925***	-0.0927***
				(0.00802)	(0.00857)	(0.00856)	(0.00804)	(0.00859)	(0.00857)
High school				-0.0183**	-0.0162*	-0.0119	-0.0180**	-0.0159*	-0.0115
				(0.00874)	(0.00939)	(0.00937)	(0.00874)	(0.00938)	(0.00936)
Postgraduate				0.0304***	0.0294***	0.0308***	0.0309***	0.0299***	0.0313***
				(0.00621)	(0.00687)	(0.00686)	(0.00621)	(0.00688)	(0.00686)
Upper Income				0.0109*	0.0111*	0.0115*	0.0105*	0.0108	0.0112*
				(0.00601)	(0.00671)	(0.00670)	(0.00601)	(0.00671)	(0.00670)
Lower Income				-0.00388	-0.00538	-0.00506	-0.00425	-0.00572	-0.00543
				(0.00725)	(0.00799)	(0.00795)	(0.00726)	(0.00799)	(0.00795)
Old age				0.0338***	0.0383***	0.0379***	0.0336***	0.0381***	0.0378***
				(0.00572)	(0.00631)	(0.00630)	(0.00572)	(0.00631)	(0.00630)
Young				-0.0245***	-0.0207**	-0.0212**	-0.0243***	-0.0204**	-0.0208**
				(0.00899)	(0.00997)	(0.00997)	(0.00899)	(0.00998)	(0.00998)
Male				-0.0331***	-0.0352***	-0.0351***	-0.0333***	-0.0353***	-0.0352***
				(0.00523)	(0.00579)	(0.00578)	(0.00523)	(0.00579)	(0.00578)

White				0.00868	0.0267*	0.0254	0.00813	0.0263*	0.0252
				(0.0133)	(0.0155)	(0.0155)	(0.0134)	(0.0155)	(0.0155)
Black				0.0580***	0.0673***	0.0656***	0.0578***	0.0670***	0.0655***
				(0.0142)	(0.0162)	(0.0162)	(0.0142)	(0.0162)	(0.0162)
Asian				0.100***	0.0944***	0.0919***	0.0991***	0.0935***	0.0915***
				(0.0174)	(0.0222)	(0.0223)	(0.0175)	(0.0223)	(0.0224)
Hispanic				0.0623***	0.0700***	0.0674***	0.0623***	0.0704***	0.0679***
				(0.0142)	(0.0165)	(0.0165)	(0.0142)	(0.0166)	(0.0166)
Urban				0.0170***	0.0159**	0.0161**	0.0170***	0.0162**	0.0164**
				(0.00639)	(0.00721)	(0.00722)	(0.00638)	(0.00720)	(0.00721)
Rural				-0.0738***	-0.0724***	-0.0733***	-0.0740***	-0.0727***	-0.0736***
				(0.00894)	(0.00953)	(0.00951)	(0.00894)	(0.00954)	(0.00951)
Protestants born again*often attend service							-0.00590	-0.0202	-0.0233
							(0.0270)	(0.0291)	(0.0292)
Protestants not born again*often attend service							0.0430	0.0262	0.0272
							(0.0274)	(0.0297)	(0.0298)
Catholic* often attend service							0.0334	0.0211	0.0202
							(0.0264)	(0.0287)	(0.0288)
Other Christians*often attend service							0.0722	0.0931*	0.0915*
							(0.0485)	(0.0516)	(0.0519)
Jewish*often attend service							-0.00225	-0.0373	-0.0394
							(0.0496)	(0.0562)	(0.0563)
Muslim*often attend service							0.0702	0.0310	0.0217
							(0.0569)	(0.0613)	(0.0610)
Other religion* often attend service							0.00465	-0.0286	-0.0121
							(0.0629)	(0.0743)	(0.0737)
Constant	0.921***	0.943***	0.947***	0.868***	0.876***	0.879***	0.869***	0.877***	0.880***
	(0.00752)	(0.0132)	(0.0131)	(0.0158)	(0.0207)	(0.0206)	(0.0159)	(0.0209)	(0.0207)
Observations	15,831	13,537	13,537	15,831	13,537	13,537	15,831	13,537	13,537
R-squared	0.352	0.362	0.368	0.395	0.403	0.409	0.395	0.404	0.410
wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
census division Fixed Effect	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
wave*census division Fixed Effect	No	No	Yes	No	No	Yes	No	No	Yes
adj.R^2	0.351	0.361	0.366	0.394	0.401	0.406	0.394	0.402	0.407

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Religiosity and Vaccine Uptake

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Vaccine uptake								
Protestant born again	-0.118***	-0.0943***	-0.0932***	-0.0530***	-0.0431***	-0.0431***	-0.0379**	-0.0302*	-0.0300*
	(0.0130)	(0.0143)	(0.0144)	(0.0129)	(0.0141)	(0.0141)	(0.0160)	(0.0173)	(0.0173)
Protestants not born again	0.0186	0.0397***	0.0404***	0.0211*	0.0323***	0.0323***	0.00886	0.0201	0.0201
	(0.0117)	(0.0128)	(0.0128)	(0.0111)	(0.0122)	(0.0122)	(0.0121)	(0.0132)	(0.0132)
Catholic	0.0447***	0.0544***	0.0543***	0.0475***	0.0499***	0.0503***	0.0546***	0.0565***	0.0569***
	(0.0110)	(0.0122)	(0.0122)	(0.0108)	(0.0120)	(0.0120)	(0.0115)	(0.0128)	(0.0128)
Other Christians	-0.0193	0.00506	0.00776	0.0315	0.0449	0.0469	-0.00990	0.00728	0.0112
	(0.0264)	(0.0293)	(0.0295)	(0.0255)	(0.0286)	(0.0287)	(0.0406)	(0.0432)	(0.0434)
Jewish	0.0981***	0.107***	0.107***	-0.00216	-0.00130	-0.000678	0.0104	0.0204	0.0208
	(0.0195)	(0.0219)	(0.0219)	(0.0184)	(0.0203)	(0.0205)	(0.0180)	(0.0192)	(0.0194)
Muslim	0.0113	0.0291	0.0276	-0.0321	-0.0104	-0.0116	-0.00656	0.0118	0.0121
	(0.0485)	(0.0539)	(0.0534)	(0.0483)	(0.0551)	(0.0544)	(0.0597)	(0.0699)	(0.0692)
Other Religion	0.115***	0.131***	0.127***	0.0241	0.0585*	0.0552*	0.0257	0.0575*	0.0535
	(0.0238)	(0.0289)	(0.0289)	(0.0256)	(0.0313)	(0.0316)	(0.0262)	(0.0329)	(0.0334)
Often attend service	0.00826	0.0120	0.0109	-0.00706	-0.00490	-0.00626	0.0214	0.0191	0.0187
	(0.0110)	(0.0117)	(0.0118)	(0.0105)	(0.0112)	(0.0112)	(0.0371)	(0.0420)	(0.0419)
Seldom or never attend service	-0.000344	-0.00549	-0.00562	-0.0116	-0.0143	-0.0147	-0.00989	-0.0130	-0.0134
	(0.0103)	(0.0112)	(0.0112)	(0.00966)	(0.0105)	(0.0105)	(0.00973)	(0.0106)	(0.0106)
Democrat				0.149***	0.153***	0.153***	0.149***	0.153***	0.153***
				(0.00764)	(0.00844)	(0.00846)	(0.00765)	(0.00844)	(0.00846)
Republican				-0.101***	-0.0996***	-0.0985***	-0.100***	-0.0987***	-0.0977***
				(0.0103)	(0.0110)	(0.0110)	(0.0103)	(0.0110)	(0.0110)
High school				-0.0424***	-0.0419***	-0.0429***	-0.0424***	-0.0419***	-0.0428***
				(0.0118)	(0.0126)	(0.0127)	(0.0118)	(0.0126)	(0.0127)
Postgraduate				0.0806***	0.0883***	0.0871***	0.0809***	0.0886***	0.0874***
				(0.00858)	(0.00940)	(0.00941)	(0.00859)	(0.00941)	(0.00942)
Upper Income				0.0348***	0.0324***	0.0326***	0.0340***	0.0314***	0.0316***
				(0.00789)	(0.00872)	(0.00873)	(0.00790)	(0.00873)	(0.00874)
Lower Income				-0.0658***	-0.0678***	-0.0688***	-0.0659***	-0.0677***	-0.0688***
				(0.0106)	(0.0115)	(0.0115)	(0.0106)	(0.0115)	(0.0115)
Old age				0.133***	0.139***	0.140***	0.132***	0.139***	0.139***
				(0.00827)	(0.00909)	(0.00911)	(0.00827)	(0.00909)	(0.00911)
Young				0.0104	0.00426	0.00574	0.0102	0.00413	0.00563
				(0.0134)	(0.0148)	(0.0148)	(0.0134)	(0.0148)	(0.0148)

Male				0.0383***	0.0356***	0.0361***	0.0385***	0.0359***	0.0364***
				(0.00720)	(0.00789)	(0.00789)	(0.00720)	(0.00789)	(0.00789)
White				0.0535***	0.0706***	0.0699***	0.0553***	0.0727***	0.0720***
				(0.0205)	(0.0232)	(0.0232)	(0.0205)	(0.0232)	(0.0232)
Black				-0.000568	0.0157	0.0171	0.000207	0.0166	0.0181
				(0.0235)	(0.0262)	(0.0262)	(0.0236)	(0.0262)	(0.0262)
Asian				0.156***	0.170***	0.169***	0.158***	0.172***	0.171***
				(0.0241)	(0.0289)	(0.0289)	(0.0241)	(0.0289)	(0.0290)
Hispanic				0.0670***	0.0835***	0.0796***	0.0678***	0.0847***	0.0809***
				(0.0225)	(0.0257)	(0.0257)	(0.0226)	(0.0257)	(0.0257)
Urban				0.0105	0.00843	0.00906	0.0110	0.00916	0.00981
				(0.00862)	(0.00969)	(0.00973)	(0.00862)	(0.00968)	(0.00971)
Rural				-0.0628***	-0.0601***	-0.0592***	-0.0632***	-0.0604***	-0.0595***
				(0.0102)	(0.0109)	(0.0109)	(0.0102)	(0.0109)	(0.0109)
Protestants born again*often attend service							-0.0496	-0.0421	-0.0433
							(0.0400)	(0.0448)	(0.0447)
Protestants not born again*often attend service							0.0315	0.0347	0.0337
							(0.0397)	(0.0445)	(0.0444)
Catholic* often attend service							-0.0462	-0.0418	-0.0424
							(0.0393)	(0.0442)	(0.0441)
Other Christians*often attend service							0.0414	0.0418	0.0377
							(0.0613)	(0.0676)	(0.0677)
Jewish*often attend service							-0.103	-0.151*	-0.150*
							(0.0740)	(0.0816)	(0.0818)
Muslim*often attend service							-0.0884	-0.0729	-0.0772
							(0.104)	(0.116)	(0.114)
Other religions* often attend service							-0.0333	-0.00750	-0.00317
							(0.0886)	(0.0979)	(0.0961)
Constant	0.817***	0.871***	0.873***	0.627***	0.645***	0.645***	0.623***	0.643***	0.643***
	(0.0116)	(0.0185)	(0.0193)	(0.0246)	(0.0299)	(0.0304)	(0.0248)	(0.0301)	(0.0306)
Observations	11,178	9,618	9,618	11,178	9,618	9,618	11,178	9,618	9,618
R-squared	0.026	0.029	0.033	0.149	0.152	0.156	0.150	0.154	0.157
wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
census division Fixed Effect	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
wave*census division Fixed Effect	No	No	Yes	No	No	Yes	No	No	Yes
adj.R^2	0.0249	0.0271	0.0282	0.147	0.149	0.150	0.148	0.150	0.151

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Religiosity and Booster Uptake

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Vaccine Booster Uptake								
Protestant born again	-0.0660***	-0.0550***	-0.0544***	-0.0237**	-0.0210	-0.0210	-0.0229	-0.0196	-0.0193
	(0.0117)	(0.0130)	(0.0130)	(0.0119)	(0.0130)	(0.0130)	(0.0148)	(0.0161)	(0.0161)
Protestant not born again	0.0223**	0.0360***	0.0361***	0.0205**	0.0274**	0.0269**	0.0165	0.0230*	0.0226*
	(0.0104)	(0.0114)	(0.0114)	(0.0103)	(0.0113)	(0.0113)	(0.0112)	(0.0122)	(0.0122)
Catholic	0.0391***	0.0394***	0.0396***	0.0436***	0.0401***	0.0405***	0.0458***	0.0436***	0.0435***
	(0.00982)	(0.0109)	(0.0109)	(0.00990)	(0.0110)	(0.0111)	(0.0106)	(0.0118)	(0.0118)
Other Christians	-0.00721	0.00932	0.0104	0.0304	0.0376	0.0382	0.0671**	0.0753**	0.0769**
	(0.0238)	(0.0259)	(0.0260)	(0.0234)	(0.0255)	(0.0257)	(0.0316)	(0.0328)	(0.0329)
Jewish	0.0735***	0.0799***	0.0786***	0.00519	0.0103	0.00951	0.0142	0.0225	0.0219
	(0.0174)	(0.0186)	(0.0187)	(0.0165)	(0.0175)	(0.0176)	(0.0160)	(0.0169)	(0.0171)
Muslim	0.0633*	0.0529	0.0508	0.0281	0.0186	0.0162	0.0382	0.0319	0.0308
	(0.0342)	(0.0408)	(0.0407)	(0.0347)	(0.0410)	(0.0406)	(0.0441)	(0.0533)	(0.0528)
Other Religion	0.0728***	0.0744**	0.0734**	0.0230	0.0281	0.0274	0.0361	0.0394	0.0392
	(0.0240)	(0.0303)	(0.0305)	(0.0254)	(0.0315)	(0.0316)	(0.0239)	(0.0302)	(0.0304)
Often attend service	0.00832	0.0151	0.0150	-0.00217	0.00279	0.00276	0.0193	0.0309	0.0309
	(0.00989)	(0.0106)	(0.0106)	(0.00962)	(0.0103)	(0.0103)	(0.0338)	(0.0369)	(0.0372)
Seldom or never attend service	0.00426	0.00240	0.00286	-0.00156	-0.00197	-0.00147	-0.000750	-0.000983	-0.000465
	(0.00924)	(0.0100)	(0.0101)	(0.00889)	(0.00965)	(0.00966)	(0.00896)	(0.00972)	(0.00973)
Democrat				0.114***	0.116***	0.117***	0.114***	0.116***	0.116***
				(0.00686)	(0.00757)	(0.00759)	(0.00686)	(0.00757)	(0.00759)
Republican				-0.0665***	-0.0655***	-0.0652***	-0.0662***	-0.0652***	-0.0649***
				(0.00958)	(0.0103)	(0.0103)	(0.00958)	(0.0103)	(0.0103)
High school				-0.0180	-0.0133	-0.0143	-0.0183*	-0.0136	-0.0146
				(0.0111)	(0.0119)	(0.0119)	(0.0111)	(0.0119)	(0.0119)
Postgraduate				0.0702***	0.0740***	0.0732***	0.0702***	0.0740***	0.0732***
				(0.00783)	(0.00858)	(0.00862)	(0.00784)	(0.00860)	(0.00864)
Upper Income				0.0330***	0.0332***	0.0329***	0.0327***	0.0327***	0.0325***
				(0.00710)	(0.00785)	(0.00786)	(0.00711)	(0.00786)	(0.00787)
Lower Income				-0.0271***	-0.0270**	-0.0278***	-0.0272***	-0.0270**	-0.0278***
				(0.00989)	(0.0108)	(0.0108)	(0.00989)	(0.0108)	(0.0108)
Old age				0.0932***	0.101***	0.101***	0.0928***	0.101***	0.101***
				(0.00771)	(0.00850)	(0.00852)	(0.00770)	(0.00849)	(0.00852)
Young				0.0197	0.0258*	0.0268*	0.0190	0.0253*	0.0263*

				(0.0126)	(0.0138)	(0.0138)	(0.0126)	(0.0139)	(0.0138)
Male				0.0261***	0.0254***	0.0253***	0.0262***	0.0256***	0.0255***
				(0.00661)	(0.00727)	(0.00728)	(0.00661)	(0.00728)	(0.00729)
White				0.0595***	0.0794***	0.0779***	0.0599***	0.0801***	0.0786***
				(0.0197)	(0.0225)	(0.0226)	(0.0197)	(0.0226)	(0.0226)
Black				0.0700***	0.0884***	0.0890***	0.0698***	0.0885***	0.0891***
				(0.0219)	(0.0247)	(0.0248)	(0.0219)	(0.0247)	(0.0248)
Asian				0.116***	0.140***	0.138***	0.117***	0.141***	0.139***
				(0.0234)	(0.0281)	(0.0282)	(0.0234)	(0.0281)	(0.0282)
Hispanic				0.0694***	0.0880***	0.0857***	0.0697***	0.0885***	0.0863***
				(0.0214)	(0.0248)	(0.0249)	(0.0215)	(0.0249)	(0.0250)
Urban				-0.00464	-0.00614	-0.00729	-0.00440	-0.00577	-0.00692
				(0.00793)	(0.00894)	(0.00899)	(0.00792)	(0.00894)	(0.00898)
Rural				-0.0401***	-0.0363***	-0.0355***	-0.0398***	-0.0360***	-0.0351***
				(0.00924)	(0.00989)	(0.00990)	(0.00925)	(0.00990)	(0.00991)
Protestants born again*often attend service							-0.0210	-0.0278	-0.0282
							(0.0366)	(0.0397)	(0.0400)
Protestants not born again*often attend service							-0.000145	-0.00278	-0.00321
							(0.0364)	(0.0393)	(0.0396)
Catholic* often attend service							-0.0255	-0.0350	-0.0337
							(0.0356)	(0.0389)	(0.0392)
Other Christians*often attend service							-0.0798	-0.0908	-0.0925
							(0.0541)	(0.0590)	(0.0593)
Jewish*often attend service							-0.0759	-0.0966	-0.0981
							(0.0680)	(0.0700)	(0.0699)
Muslim*often attend service							-0.0430	-0.0551	-0.0581
							(0.0747)	(0.0858)	(0.0852)
Other religion* often attend service							-0.112	-0.103	-0.107
							(0.0992)	(0.121)	(0.120)
Constant	0.858***	0.890***	0.907***	0.681***	0.678***	0.692***	0.680***	0.676***	0.691***
	(0.0105)	(0.0167)	(0.0167)	(0.0236)	(0.0287)	(0.0289)	(0.0239)	(0.0289)	(0.0292)
Observations	10,731	9,241	9,241	10,731	9,241	9,241	10,731	9,241	9,241
R-squared	0.014	0.018	0.020	0.099	0.102	0.105	0.100	0.103	0.105
wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
census division Fixed Effect	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
wave*census division Fixed Effect	No	No	Yes	No	No	Yes	No	No	Yes
adj.R^2	0.0130	0.0155	0.0152	0.0967	0.0986	0.0982	0.0966	0.0985	0.0981

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Religiosity and Testing Positive for Covid-19

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Tested positive for COVID								
Protestant born again	0.0349***	0.0304***	0.0302***	0.0271***	0.0265***	0.0265***	0.0131	0.00781	0.00763
	(0.00872)	(0.00941)	(0.00943)	(0.00908)	(0.00977)	(0.00979)	(0.0111)	(0.0119)	(0.0119)
Protestants not born again	-0.00191	-0.00468	-0.00464	0.00986	0.00817	0.00855	0.00841	0.00835	0.00875
	(0.00826)	(0.00897)	(0.00900)	(0.00840)	(0.00916)	(0.00919)	(0.00915)	(0.01000)	(0.0100)
Catholic	0.0134	0.00950	0.01000	0.0118	0.0106	0.0110	0.0164*	0.0144	0.0150
	(0.00827)	(0.00902)	(0.00904)	(0.00860)	(0.00942)	(0.00943)	(0.00954)	(0.0105)	(0.0105)
Other Christians	0.0292	0.0339	0.0336	0.0235	0.0316	0.0316	0.0362	0.0418	0.0415
	(0.0196)	(0.0221)	(0.0221)	(0.0192)	(0.0217)	(0.0217)	(0.0303)	(0.0324)	(0.0324)
Jewish	-0.0200	-0.0260	-0.0258	0.0153	0.00781	0.00815	-0.00253	-0.00944	-0.00890
	(0.0165)	(0.0182)	(0.0182)	(0.0164)	(0.0181)	(0.0181)	(0.0166)	(0.0184)	(0.0184)
Muslim	-0.0350	-0.0260	-0.0302	-0.0381	-0.0268	-0.0314	-0.0331	-0.0156	-0.0208
	(0.0293)	(0.0341)	(0.0345)	(0.0295)	(0.0344)	(0.0347)	(0.0391)	(0.0472)	(0.0479)
Other Religion	0.00596	0.00332	0.00406	0.0228	0.0249	0.0257	0.0134	0.0159	0.0170
	(0.0247)	(0.0301)	(0.0300)	(0.0259)	(0.0316)	(0.0315)	(0.0271)	(0.0336)	(0.0334)
Often attend service	-0.0248***	-0.0251***	-0.0242***	-0.0111	-0.0116	-0.0107	-0.0538**	-0.0681***	-0.0664***
	(0.00807)	(0.00860)	(0.00861)	(0.00804)	(0.00858)	(0.00859)	(0.0221)	(0.0229)	(0.0230)
Seldom or never attend service	-0.0159**	-0.0130	-0.0126	-0.00777	-0.00526	-0.00486	-0.00923	-0.00741	-0.00701
	(0.00750)	(0.00807)	(0.00809)	(0.00746)	(0.00805)	(0.00806)	(0.00752)	(0.00811)	(0.00813)
Democrat				-0.0163***	-0.0123*	-0.0126*	-0.0160**	-0.0120*	-0.0122*
				(0.00625)	(0.00688)	(0.00689)	(0.00626)	(0.00687)	(0.00689)
Republican				0.0211***	0.0220***	0.0215***	0.0209***	0.0215***	0.0210***
				(0.00752)	(0.00810)	(0.00812)	(0.00752)	(0.00811)	(0.00812)
High school				0.00381	0.00584	0.00448	0.00396	0.00603	0.00465
				(0.00859)	(0.00917)	(0.00918)	(0.00858)	(0.00916)	(0.00917)
Postgraduate				-0.0271***	-0.0237***	-0.0233***	-0.0275***	-0.0243***	-0.0240***
				(0.00654)	(0.00713)	(0.00714)	(0.00654)	(0.00713)	(0.00714)
Upper Income				0.00108	0.00289	0.00243	0.00125	0.00315	0.00269
				(0.00649)	(0.00717)	(0.00718)	(0.00650)	(0.00718)	(0.00719)
Lower Income				0.0103	0.0102	0.0112	0.0107	0.0108	0.0118
				(0.00766)	(0.00832)	(0.00833)	(0.00766)	(0.00832)	(0.00833)
Old age				-0.0626***	-0.0605***	-0.0600***	-0.0621***	-0.0599***	-0.0594***
				(0.00620)	(0.00677)	(0.00679)	(0.00619)	(0.00676)	(0.00679)
Young				0.0137	0.0148	0.0152	0.0135	0.0145	0.0149
				(0.0103)	(0.0112)	(0.0112)	(0.0103)	(0.0112)	(0.0112)

Male				0.0205***	0.0222***	0.0226***	0.0205***	0.0221***	0.0226***
				(0.00549)	(0.00602)	(0.00603)	(0.00549)	(0.00602)	(0.00603)
White				-0.0117	-0.0190	-0.0193	-0.0125	-0.0204	-0.0207
				(0.0131)	(0.0149)	(0.0149)	(0.0131)	(0.0149)	(0.0149)
Black				0.0210	0.0186	0.0187	0.0206	0.0178	0.0179
				(0.0154)	(0.0171)	(0.0171)	(0.0154)	(0.0171)	(0.0171)
Asian				-0.0367*	-0.0573**	-0.0580**	-0.0375*	-0.0589**	-0.0596**
				(0.0192)	(0.0239)	(0.0238)	(0.0192)	(0.0239)	(0.0239)
Hispanic				0.0240	0.0219	0.0232	0.0221	0.0193	0.0206
				(0.0152)	(0.0172)	(0.0172)	(0.0152)	(0.0173)	(0.0173)
Urban				0.0266***	0.0264***	0.0270***	0.0262***	0.0261***	0.0267***
				(0.00789)	(0.00875)	(0.00878)	(0.00787)	(0.00873)	(0.00876)
Rural				0.0272***	0.0256***	0.0255***	0.0273***	0.0256***	0.0255***
				(0.00793)	(0.00846)	(0.00849)	(0.00793)	(0.00846)	(0.00849)
Protestants born again*often attend service							0.0614**	0.0812***	0.0807***
							(0.0243)	(0.0253)	(0.0254)
Protestants not born again*often attend service							0.0398	0.0439*	0.0430
							(0.0255)	(0.0265)	(0.0266)
Catholic* often attend service							0.0209	0.0358	0.0344
							(0.0247)	(0.0258)	(0.0258)
Other Christians*often attend service							0.0184	0.0341	0.0337
							(0.0429)	(0.0465)	(0.0465)
Jewish*often attend service							0.151***	0.153**	0.151**
							(0.0581)	(0.0613)	(0.0614)
Muslim*often attend service							0.0235	0.0212	0.0221
							(0.0609)	(0.0695)	(0.0702)
Other religions* often attend service							0.101	0.103	0.0996
							(0.0799)	(0.0885)	(0.0885)
Constant	0.161***	0.143***	0.137***	0.186***	0.178***	0.171***	0.190***	0.182***	0.174***
	(0.00823)	(0.0144)	(0.0157)	(0.0159)	(0.0208)	(0.0217)	(0.0161)	(0.0210)	(0.0219)
Observations	15,831	13,537	13,537	15,831	13,537	13,537	15,831	13,537	13,537
R-squared	0.031	0.034	0.036	0.049	0.051	0.053	0.050	0.052	0.054
wave Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
census division Fixed Effect	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
wave*census division Fixed Effect	No	No	Yes	No	No	Yes	No	No	Yes
adj.R^2	0.0301	0.0323	0.0325	0.0474	0.0482	0.0485	0.0479	0.0488	0.0490

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

7. CONCLUSION

This study investigated the impact of religion on preventative health behaviours during the COVID-19 pandemic, specifically regarding mask usage, vaccination administration, booster doses, and the probability of testing positive for the virus. Using an extensive dataset from 2020 to 2022, it emphasised significant distinctions among religious groupings, particularly differentiating between born-again and non-born-again Protestants. The results indicate that born-again Protestants exhibit a lower propensity to comply with public health measures and, consequently, a higher likelihood of testing positive for COVID-19. Simultaneously, non-born-again Protestants and Catholics demonstrate greater adherence to preventive behaviours.

These findings highlight the necessity for public health initiatives that consider the diversity of religious beliefs and practices. Comprehending the impact of religious identity on health behaviour enables the creation of more successful and culturally attuned public health programs, particularly in crises such as the COVID-19 epidemic. This study provides valuable insights into the influence of religion in shaping public health responses, presenting practical recommendations for enhancing the implementation of health initiatives within religious communities.

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Appendix

Table A1: Summary Statistics

Question	Variable	Mean	SD	Min	Max	Obs
In the past month, how often, if ever, have you worn a mask or face covering when in stores or other businesses?	Maskwear	0.7879576	0.4087674	0	1	16143
Have you received a vaccine to prevent covid-19?	vaccine	0.800888	0.3993498	0	1	11486
Have you received a COVID-19 booster shot within the last six months?	Vacccine Booster	0.8579067	0.3491617	0	1	11035
Since February 2020, have YOU done or experienced the following? [NO ITEM a] b. Been pretty sure you have had COVID-19 even though you have not been officially diagnosed c. Tested positive for having COVID-19 NO ITEM d e. Tested positive for having antibodies to COVID-19	Testing Positve for Covid	0.1309546	0.3373611	0	1	16143
What is your present religion, if any? Would you describe yourself as a born-again or evangelical Christian? 1 Yes, born-again or evangelical Christian 2 No, not born-again or evangelical Christian						
	Born again protestant	0.2358917	0.424568	0	1	16143
	Not Born again protesttant	0.1657684	0.3718842	0	1	16143
	catholic	0.1987239	0.3990521	0	1	16143
	Jew	0.0244069	0.1543135	0	1	16143
	Other Christians	0.0232299	0.1506375	0	1	16143
	Muslim	0.005761	0.0756847	0	1	16143
	Other religion	0.0121415	0.1095208	0	1	16143
Aside from weddings and funerals, how often do you attend religious services	No religion	0.2617853	0.43962	0	1	16143
	often	0.2744843	0.4462679	0	1	16143
	infrequent	0.2229449	0.4162346	0	1	16143
	seldom_never	0.4982965	0.5000126	0	1	16143
In politics today, do you consider yourself a…	democrat	0.3826426	0.4860472	0	1	16143

1. Republican 2. Democrat	republican	0.2645729	0.4411192	0	1	16143
3. Independent 4. Something else	party_others	0.3424394	0.4745404	0	1	16143
What is the highest degree or level of school that you have COMPLETED?	highschool	0.1624233	0.3688501	0	1	16143
	college	0.3096079	0.4623463	0	1	16143
	postgrad	0.5256148	0.4993589	0	1	16143
Last year, what was your total family income from all sources, before taxes?	upper income group	0.2593074	0.4382682	0	1	16143
	middle income group	0.4444651	0.4969217	0	1	16143
	lower_income	0.2031221	0.4023351	0	1	16143
AGE-65+	old_age	0.5509509	0.4974126	0	1	16143
Age 30-64	middle_age	0.3320325	0.4709572	0	1	16143
AGE 18-29	young	0.1095212	0.3123016	0	1	16143
Do you describe yourself as a man, a woman or in some other way?	male	0.4336245	0.4955901	0	1	16143
	female	0.5637118	0.4959396	0	1	16143
What is your race or origin?	White	0.6620826	0.4730149	0	1	16143
	black	0.1075389	0.3098067	0	1	16143
	asian	0.0301059	0.1708841	0	1	16143
	hispanic	0.153627	0.360602	0	1	16143
	other	0.0345661	0.1826837	0	1	16143
How would you describe the community where you currently live?	urban	0.1550517	0.3619652	0	1	16143
	suburban	0.3392802	0.4734797	0	1	16143
	rural	0.1530694	0.3600656	0	1	16143