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Religious Service Attendance and the Perceived Necessity of Hand Washing, Mask Wearing, and Vaccinations during the COVID-19 Pandemic

By

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Master of Public Health

Epidemiology

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An abstract of
A thesis submitted to the Faculty of the
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Abstract

Religious Service Attendance and the Perceived Necessity of Hand Washing, Mask Wearing, and Vaccinations during the COVID-19 Pandemic

By Marija I. Pritchard

The COVID-19 pandemic impacted all aspects of daily life. The social determinants of health affected how people responded to the pandemic and what preventative behaviors they were willing to perform. Religion, one of the social determinants of health, has been a significant topic throughout the pandemic, with outbreaks associated with religious gatherings, collaboration and sometimes conflict between public health and faith-based organizations, and religious leaders' support of preventative behaviors and virtual religious services. With these competing narratives about religion and COVID-19, the association between religion and preventative behaviors by individuals has not been studied. Wave 31 of *Understanding America Study Coronavirus Tracking Survey* administered by the Center for Economic and Social Research (CESR) at the University of Southern California was analyzed to investigate how in-person religious service is associated with the belief in the necessity of handwashing, mask wearing, and vaccination to prevent the spread of COVID-19. Bivariate analysis and adjusted logistic regression of the exposure of religious service attendance and the outcomes of hand washing, mask wearing, and vaccinations were performed, with separate models for each preventative behavior. The bivariate analysis revealed that people who attended in-person religious services in the last 7 days were significantly less likely to believe in the necessity of each preventative behavior than those who had not attended in-person services. The adjusted logistic regression models found that people who attend religious service were less likely to believe in the necessity of each handwashing (AOR: 0.71), mask wearing (AOR: 0.35), and vaccinations (AOR: 0.38). These findings are compatible with the narrative that religion is negatively impacting the response to the COVID-19 pandemic. These findings may, in part, be because at this time, most people were participating in remote, not in-person worship. People who wanted to attend in-person religious service may have been more likely to choose houses of worship that did not require preventative measures and made it seem like not practicing preventative behaviors was socially acceptable. Understanding the factors associated with preventative behaviors helps inform promotion and communication and which sectors of the population need more health promotion for COVID-19 response and prevention.

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Introduction

The COVID-19 pandemic has greatly impacted all aspects of life over the past two years. It is one of the biggest public health concerns in the last 50 years and will continue to have impacts in the future. Epidemiologists and other public health professionals seek to investigate how social determinants of health (SDOH) like structural racism, socioeconomic status, and education impact how COVID-19 is spread and what sort of preventative behaviors people are willing to use. One SDOH that is often neglected is religion. Religion has positive and negative health outcomes that improve or damage public health (E. L. Idler 2014). Current research on the impact of religion as a social determinant of health on the COVID-19 pandemic has focused on religion as a source of reliance, opportunities and suggestions of how public health agencies and professionals can work with faith-based organizations to mitigate and respond to the COVID-19 pandemic, and the positive and negative social narratives about religion and the HIV pandemic (Kimhi et al. 2021; Barmania and Reiss 2021; M. Lee et al. 2022; Levin, Idler, and VanderWeele 2022; E. Idler, Bernau, and Zaras 2022)

Identifying oneself as a religious person has been associated with higher levels of mental resilience in people's response to the COVID-19 pandemic (Kimhi et al. 2021). Religious and spiritual beliefs were also associated with better mental health outcomes in Brazil. The study found that lower levels of worry and fear were associated with greater private religious activities and spiritual growth and spiritual growth was associated with lower levels of sadness (Lucchetti et al. 2021).

In addition to individual health benefits associated with religious practices, the role of faith-based organizations in past pandemic responses and the COVID-19 pandemic has been discussed. In 2009, faith-based organizations like churches, charities, and relief organizations

were integral in the public health response to the H1N1 epidemic. They were able to support prevention, vaccination, and outbreak containment in hard to reach and vulnerable populations (Kiser and Lovelace 2019; Kiser and Santibañez 2014). Faith-Based organizations also intervened to contain outbreaks of Ebola and HIV (Morabia 2019). Building off these past examples, multiple scholars have suggested that public health organizations should partner with faith-based organizations to promote COVID-19 vaccination (Barmania and Reiss 2021; Levin, Idler, and VanderWeele 2022). Williams, Miller, and Nussbaum describe how faith communities can help combat the COVID-19 pandemic and other health disparities though policies and guidelines that are constant with public health policies, vaccination polices in religious schools, and connection to and support of other faith based organizations working to address the pandemic (Williams, Miller, and Nussbaum 2021).

While advantages and potential partnerships with faith-based organizations have been described by various scholars and public health professions, the role religious communities have played in the COVID-19 pandemic focus on transmission, mitigation, and adaptation. A systematic review by Lee et al in published in 2022 found 58 articles about religious communities and COVID-19. They found 18 studies that described religion as the mode of transmission in COVID-19 outbreaks through religious gatherings and vising religious shrines. 26 studies focused on mitigating the COVID-19 pandemic through canceling religious services and collaboration with local governments and public health agencies. 20 articles described the new adaptions religious communities were using to perform religious practices mainly through virtual services and broadcasting religious ceremonies to prevent the spread of COVID-19 (M. Lee et al. 2022). Lee et al's systematic review points to the societal narratives surrounding the pandemic.

The negative narratives surrounding religion and COVID-19 focus on how religion has played a prominent role in the COVID-19 pandemic with several outbreaks being associated with in-person religious services (Wildman et al. 2020). Both academic and newspaper articles describe how COVID-19 outbreaks have originated from religious services and activities that are refusing to comply with preventative measures. For example, in March 2020 a COVID-19 outbreak in Daegu, South Korean that spread to 5,214 people by August 2020 originated from a person attending a religious at the Shincheonji Church that refused stop in-person worship or require mask and social distancing ("South Korea: Shincheonji Church Related COVID-19 Cases 2020" 2022; Wildman et al. 2020). In the United States, some religious leaders refused to adhere to CDC and state guidelines at the beginning of the pandemic. Conservative Christians have received the most media attention for their outspoken criticism of COVID-19 preventative rules and guideline and is some cases defied local or state law. For example. Rev. Rodney Howard-Browne, pastor of the River at Tampa Bay Church was arrested in March 2020 because of his refusal to stop in-person worship (Kaleem 2020). Rev. Tony Spell of the Life Tabernacle Church in Baton Rouge, Louisiana also refused to stop in-person gatherings, directly defining Louisiana's restrictions on in-person gatherings (Wuthnow 2021). While resistance to preventative measures have been documented in conservative Christian communities, resistance is also reported in Hasidic Jewish communities. In April 2020, Mayor Bill de Blasio criticized the Hasidic residents of Williamsburg for gathering to mourn a Rabbi who from COVID-19. The gathering of hundreds of people was broken up New York City police officers (Stack 2020).

Along with cases of noncompliance, early reports also described religious gatherings as a potential risk factor for spreading COVID-19. In March 2020, an outbreak originating from a Skagit Valley Chorale rehearsal in at the Mount Vernon Presbyterian Church, in Mount Vernon,

Washington resulted in 45 cases of COVID-19 and 2 deaths from COVID-19 (Waldrop, Toropin, and Sutton 2020). The choir members were unaware of their COVID-19 exposure and believed they were following state guidelines by keeping the gathering to under 250 people (Waldrop, Toropin, and Sutton 2020). Another case of accidental COVID-19 exposure was reported to the Arkansas Department of Health on March 16th, 2020. A rural pastor and his wife were identified as COVID-19 cases and before the pastor's symptoms developed, he attended a bible study that lead to 35 confirmed COVID-19 cases and three deaths among people who attended events at the church (James 2020). This outbreak highlighted the potential for COVID-19 transmission among church and other community events before social distancing guidelines were released and adhered to.

While these cases of COVID-19 transmission gained notoriety and captured the media's attention, the majority of religious groups and religious leaders have been compliant with public health recommendations throughout the pandemic. The preliminary findings from the Religious Leaders' Perspective on Corona Study at the Humboldt University of Berlin found religious leaders supported the preventative measures instituted by their governments and encouraged their community members to adhere to the guidelines even as they recognized the economic hardships adherence to the guidelines can cause (Ekkardt, Frost, and Öhlmann 2020). Support for preventative measures by religious communities is reiterated in a narrative text analysis of three sources: New York Times articles on religions and COVID; guidance for religious institutions by the World Health Organization and the CDC; and COVID-19 recommendations by faith-based organizations themselves (E. Idler, Bernau, and Zaras 2022). Idler et al. found that the CDC and WHO public health messaging was positively received and perpetuated by faith-based organizations and that the organizations focused on reducing the risk of COVID-19 transmission

during worship and promoting religious support for those affected by the pandemic. A 2020 PEW research study found that in 94 countries, 47 percent of the countries surveyed, religious leaders and groups supported and encouraged their congregants to practice preventative behaviors like social distancing, staying home, wearing a mask, and washing hands to combat the spread of COVID-19 (Nadeem 2022).

In addition to religious organizations and leaders support of public health messaging about the COVID-19 pandemic, the American public in general is in favor of preventative measures. A University of Chicago Divinity School and AP-NORC Poll conducted from April 30th to May 4th, 2020 found that only 9 percent of people surveyed believe that religious services should be allowed without any restrictions. In addition, 45 percent of respondents with a religious affiliation believe that in-person religious services should not be allowed compared to 57 percent of respondents without a religious affiliation ("Religious Practice in the Time of Coronavirus - AP-NORC" 2020). The PEW research center also found that 79 percent of Americans think that religious organizations should follow the same rules and guidelines about in-person gatherings as other organization in their communities compared to 19 percent who think that religious groups should have more flexibility than other groups (Mitchell 2020). In addition, the same study found that only 6 percent of respondents reported that their house of worship is open in the same way as it was before the pandemic, 55 percent say that service has been modified, and 31 percent reported that the congregation is closed (Mitchell 2020).

With these competing narratives that exemplify how religious communities are both a hindrance and asset to the public health response to COVID-19, it has yet to be researched how religious attendance is affecting people's perception of the necessity of preventative behaviors to combat the spread of COVID-19. As the pandemic progressed and religious organization

changed their policies based on changing recommendations, epidemiological research has yet to investigate how religiosity as measured by recent in-person religious service attendance impacts people's belief in the necessity of preventative behaviors like handwashing, mask-wearing, and vaccines. To investigate the association between religiosity and preventative behaviors, I ask how in-person religious service attendance in the last 7 days is associated with the respondent's perception of the necessity of hand washing, mask wearing, and vaccination as COVID-19 preventative behaviors in wave 31 of the *Understanding America Study Coronavirus Tracking Survey* administered by the Center for Economic and Social research (CESR) at the University of Southern California.

Methods

Data

We analyzed data from wave 31 of the Understanding America Study (UAS) titled "UAS351: Coronavirus tracking survey long form wave 31" that was fielded from February 1, 2022 to March 30 2022. The UAS is maintained by the Center for Economic and Social Research at the University of Southern California and complies with the American Association for Public Opinion Research (AAPOR) reporting guidelines for survey studies. The UAS survey is a nationally representative sample of the United States and one of the only longitudinal data sources that collects information on household, work, and social behavioral context during the pandemic. The UAS is an internet panel survey of adult United States residents that were recruited using address-based sampling. The first wave of the survey was conducted in March 2020 and waves 2 through 25 were conducted on a bi-weekly basis from April 2020 through February 2021. In March 2021 until July 2021, the survey was conducted monthly (waves 25-29)

and then subsequent waves were conducted on a quarterly bases, including wave 31 that is the subject of this thesis. The sample weights for wave 31 follow the general survey procedure described in the CESR's methodology documentation. A detailed description of the sample weights can be here (Kapteyn et al. 2022).

Wave 31 of the UAS was distributed to 9,208 participants. 6908 respondents completed the survey, 128 started but did not complete the survey, and 2,172 did not start the survey. The response rate for the survey was 72.02 % and the survey took the respondents an average of 19 minutes to complete.

Measures

My study created three different model based on three outcome variables that are preventative behaviors stopping the spread of COVID-19. The outcome variables for this study were the necessity of handwashing, mask wearing, and vaccines as measured by the question "How necessary are the following actions to keep someone safe from coronavirus: handwashing or using hand sanitizer, wearing a mask of face covering, getting vaccinated?" The respondent could answer extremely necessary, somewhat necessary, somewhat unnecessary, extremely unnecessary to each of the preventative behaviors. For the statistical analysis, respondents who answered extremely necessary and somewhat necessary were grouped into one necessary category for each preventative behaviors and respondents who answered somewhat unnecessary and extremely unnecessary who group into one unnecessary category.

The independent variable for each of these models was religiosity as measured by in-person religious service attendance in the last seven days. The respondents were asked "In the last 7 days have you attended an in-person religious service?". The options for responses were

yes, no, and unsure. The respondents who responded unsure who excluded from the bivariate analysis and logistic regression.

Each of the logistic regression models controlled for potential confounding variables, mainly other social determinants of health including age, sex, self-identified race, education level, and marital status. The relationship between these variables and the outcome and independent variable of interest are represented by directed acyclic graphs in figures 1, 2, and 3 created using the daggity R package. All of these potential confounders have been previously associated with COVID-19 preventative behavior, specifically vaccination, and/or COVID-19 infection in previous waves of the Understanding America Coronavirus Study or other similar cross sectional studies (Allen et al. 2021; Ferrín 2022; Kim and Jeong 2022; H. Lee et al. 2022; Wang, Silver, and Pagán 2022). Age was reported as a discrete, numeric variable. Sex was grouped into two categories: male and female. Self-reported race was grouped into six categories: White, Black, American Indian/Alaskan Native, Asian, Hawaiian/pacific Islander, and Mixed. Education level was groups into four categories: less than a high school education, high school degree or equivalent degree, some college or associate degree, and bachelor's degree or higher. Marital status was grouped into two categories: single or married.

Figure 1. DAG for Religious Service Attendance and Handwashing

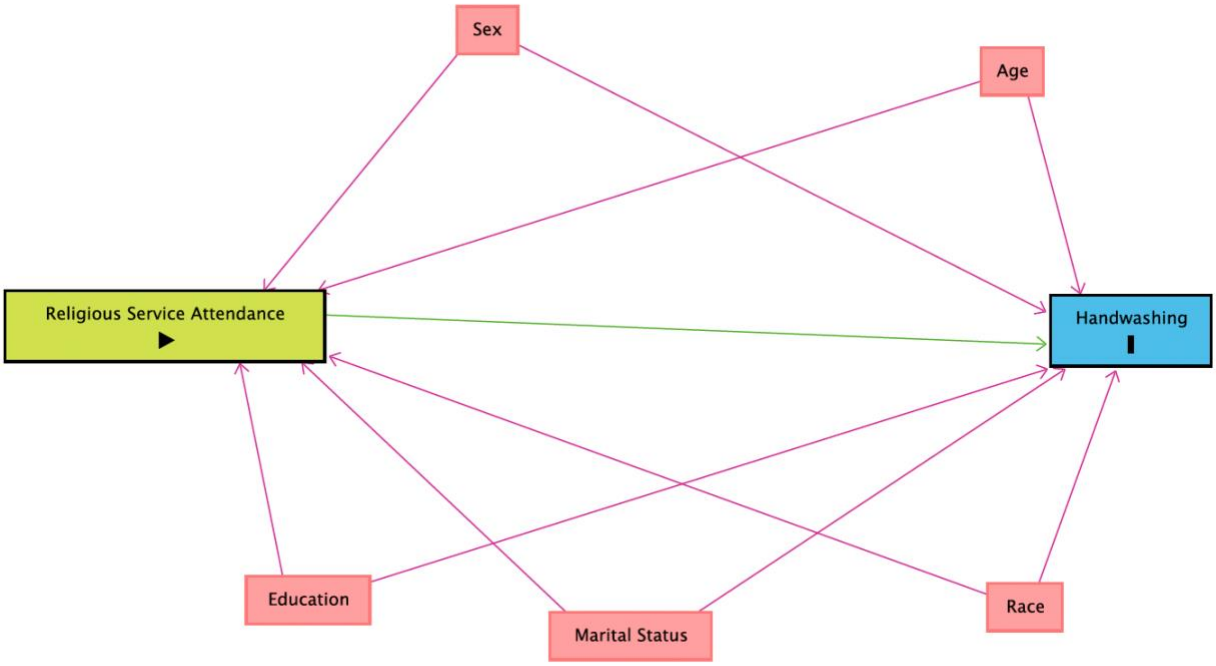


Figure 2. DAG for Religious Service Attendance and Masks

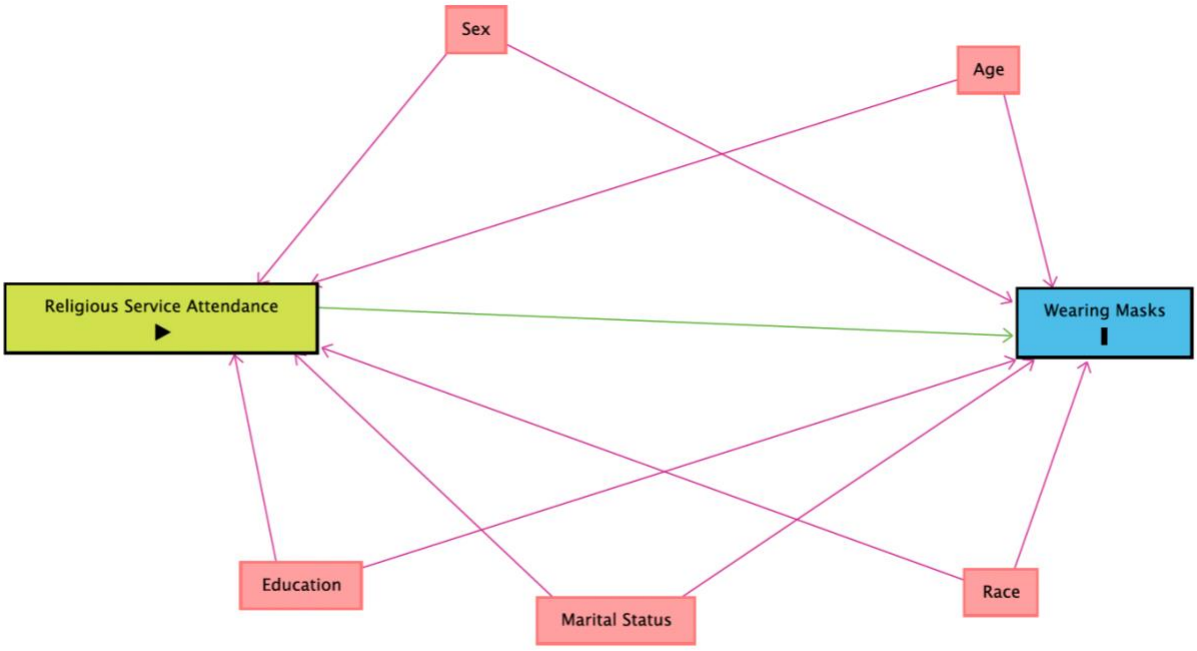
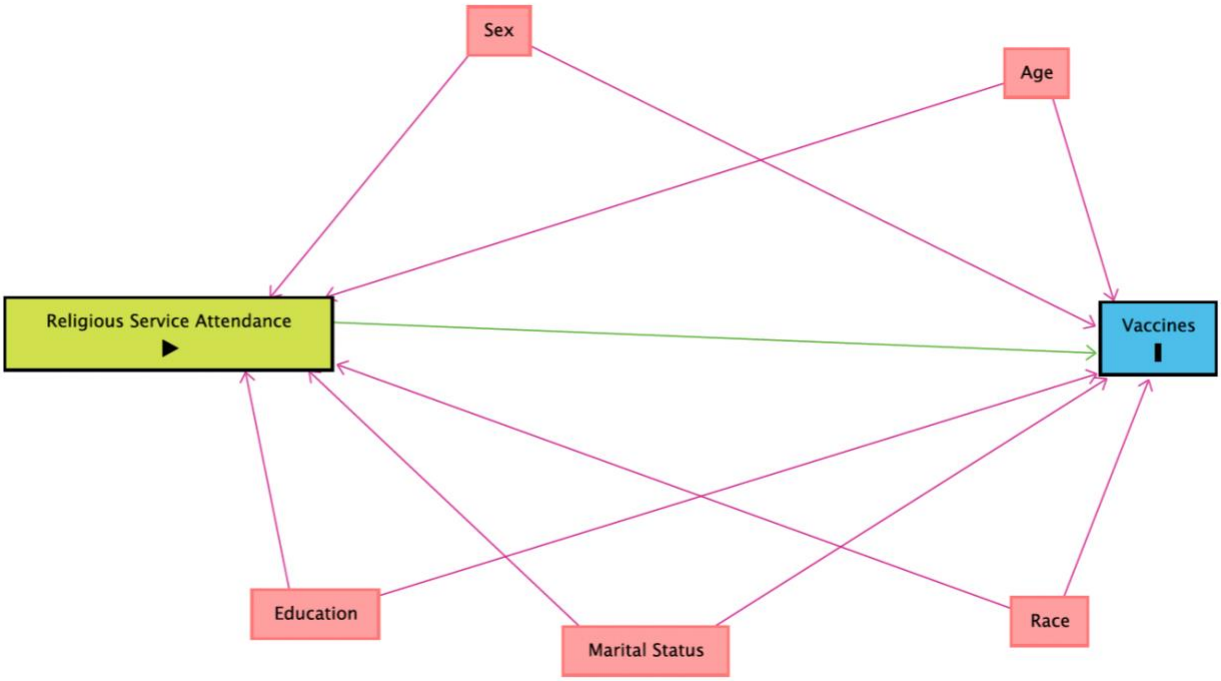


Figure 3. DAG for Religious Service Attendance and Vaccines



Statistical Analysis

Descriptive statistics were produced for all respondents in the sample. The bivariate analysis encompassed chi-squared tests to assess the crude association between the respondent's belief in the necessity of handwashing, wearing a mask, and vaccination to keep one safe from COVID-19 and in-person religious service attendance in the last 7 days and the other social determinants of health (age, sex, self-reported race, education level, and marital status) and in-person religious service attendance in the last 7 days. Statistical significance was considered at the p-value of < 0.05 level.

Three unadjusted logistic regression models were run with each of the behavioral prevention variables as the outcome variables and in-person religious service attendance as the main exposure variable. Then adjusted logistic regression models were run to assess the relationship between the preventative behavior and in-person religious service attendance adjusted for the selected social determinants of health. Model 1 assessed the relationship between the belief in the necessity of handwashing and in-person religious service attendance in the last seven days adjusted for age, sex, self-reported race, education level, and marital status. Model 2 assessed the relationship between the belief in the necessity of wearing a mask and in-person religious service attendance in the last seven days adjusted for age, sex, self-reported race, education level, and marital status. Model 3 assessed the relationship between the belief in the necessity of vaccines and in-person religious service attendance in the last seven days adjusted for age, sex, self-reported race, education level, and marital status. Three separate models were created to address each prevention behavior individually as well as to identify any differences in the perceived necessity of the preventative behaviors. SAS Version 9.4 for windows was used for all data cleaning and statistical tests.

Results

Characteristics of Study Sample

In total, 7,036 people responded to at least some part of wave 31 of the survey. The mean age for sample was 52.1 years (standard deviation of ± 16.1 years) and a majority of the sample was female (59.5 %). 78.2 percent of the sample identified as White, 8.5 % identified as Black, 2.1 percent as American Indian/Alaskan Native, 5.5 % identified as Asian, 0.6 percent identified as Hawaiian/Pacific Islander, and 5.2 percent identified as mixed race. A minority of respondents had less than a high school education (4.4 %), 16.1 % had a high school degree, 35.8 % had some college or an associate's degree, and 43.6 % had a bachelor's degree or higher. A majority of the sample were married (55.6 %) compared to single (44.4 %). Most respondents did not attend in-person an in-person religious service in the last 7 days (82.4 %), believed that handwashing is necessary to keep someone safe from coronavirus (95.3 %), believed that wearing a mask is necessary to keep someone safe from coronavirus (78.5 %), and believed that getting vaccinated is necessary to keep someone safe from coronavirus (81.1 %). (Table 1)

Table 1. Demographics for Participants in Understanding American Study Coronavirus Tracking Survey Wave 31(n = 7,036)		
	Mean ± SD	
Age (years)	52.1 ± 16.1	
	Frequency (n)	**Percent** (%)
Sex		
Male	2,849.0	40.5
Female	4,187.0	59.5
Race		
White	5,463.0	78.2
Black	592.0	8.5
American Indian/Alaskan Native	144.0	2.1
Asian	386.0	5.5
Hawaiian/Pacific Islander	44.0	0.6
Mixed	360.0	5.2
Education Level		
Less than a High School Education	312.0	4.4
High School Degree	1,133.0	16.1
Some College or Associate Degree	2,521.0	35.8
Bachelor's Degree or Higher	3,068.0	43.6
Marital Status		
Single	3,120.0	44.4
Married	3,913.0	55.6
In-Person Religious Service Attendance in the Last 7 Days		
No	5,737.0	82.4
Yes	1,225.0	17.6
How necessary is handwashing to keep someone safe from coronavirus?		
Necessary	6,638.0	95.3
Unnecessary	327.0	4.7
How necessary is wearing a mask to keep someone safe from coronavirus?		
Necessary	5,464.0	78.5
Unnecessary	1,500.0	21.5
How necessary is getting vaccinated to keep someone safe from coronavirus?		
Necessary	5,650.0	81.1
Unnecessary	1,315.0	18.9

*Fielded February 1, 2022 – March 30, 2022

Bivariate Results

The bivariate analysis revealed that there was a significant difference between people who did attend in-person religious service in the last 7 days and people who did not attend religious service in the last 7 days and the necessity of each of the preventative behaviors in this study. Table 2 presents the chi-square analysis of the in-person religious service attendance in the last 7 days and the necessity of handwashing. With a p-value of 0.015 we can conclude that there is a significant difference between people who did and did not attend religious service and their belief in the necessity of handwashing. The biggest impact on this analysis was the number of people who attended religious service and believed handwashing is unnecessary. We expected 55.8 people to fall into this category and found that 72 people who attended religious service also believed that handwashing was unnecessary to keep people safe from COVID-19. When comparing religious service attendance to the belief in the necessity of wearing masks, there was a significant difference in religious service attendance and the necessity of handwashing (Table 3), p-value of < 0.001. The biggest impact on this test of association was again found among people who attended religious service and did not believe in the preventative behavior was necessary. If there was no significant difference, we expected 262.95 people to attend religious service and believe that wearing masks are unnecessary to be safe from COVID-19, but we found that 465 people believed this. The final bivariate analysis found that there was a significant difference between religious service attendance and the necessity of vaccines, p-value < 0.001 (Table 4). Again, the biggest impact came from people who attended religious service and believed that vaccines were unnecessary to keep them safe from COVID-19. If there was not a statistical difference between the people who did and did not attend religious service, we would

expect 228.77 people to attend and believe that vaccines were unnecessary. We found that 366 people attended religious service and believed that vaccines were unnecessary.

Table 2. Bivariate Analysis of In-Person Religious Service Attendance and the Necessity of Handwashing

Religious Service Attendance	**Necessity of Handwashing**			**Chi-Square**	**P-value**
	Necessary	Unnecessary	Total	5.963	0.015
No	5,463 (78.85 %)	245 (3.54 %)	5,708 (82.39 %)		
Yes	1,148 (16.57 %)	72 (1.04 %)	1,220 (17.61 %)		
Total	6,611 (95.42 %)	317 (4.58 %)	6,928 (100.0 %)		

Table 3. Bivariate Analysis of In-Person Religious Service Attendance and the Necessity of Wearing Masks

Religious Service Attendance	**Necessity of Wearing Masks**			**Chi-Square**	**P-value**
	Necessary	Unnecessary	Total	240.217	< 0.001
No	4,679 (67.55 %)	1,028 (14.84 %)	5,707 (82.39 %)		
Yes	755 (10.90 %)	465 (6.71 %)	1,220 (17.61 %)		
Total	5,434 (78.45 %)	1,493 (21.55 %)	6,927 (100.0 %)		

Table 4. Bivariate Analysis of In-Person Religious Service Attendance and the Necessity of Vaccines

Religious Service Attendance	**Necessity of Handwashing**			**Chi-Square**	**P-value**
	Necessary	Unnecessary	Total	122.975	< 0.001
No	4,774 (68.92 %)	934 (13.48 %)	5,708 (82.40 %)		
Yes	853 (12.31 %)	366 (5.28 %)	1,219 (17.60 %)		
Total	5,627 (81.23 %)	1,300 (18.77 %)	6,927 (100.0 %)		

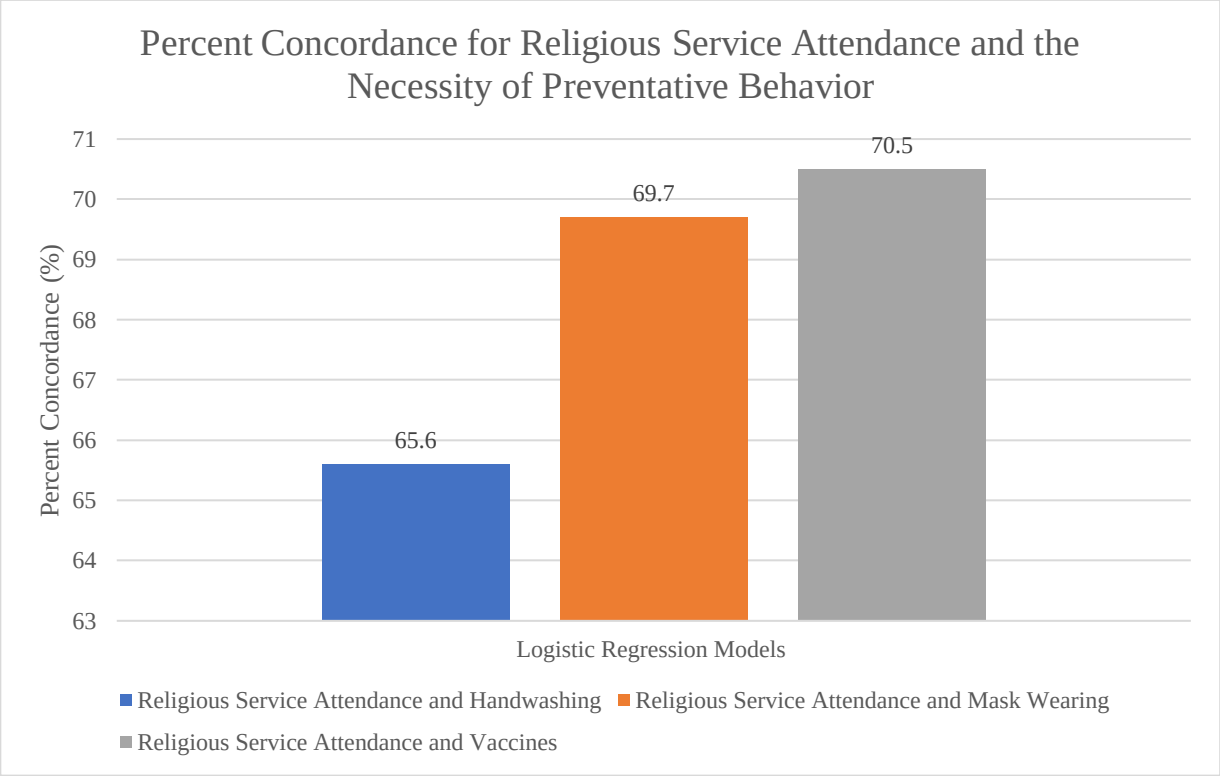
Multivariate Results

Table 5 reports the results of the three logistic regression models for each of the preventative behaviors adjusted for age, sex, race, education level, and marital status. All three models found that people who attended in-person religious service in the past 7 days were less likely to believe in the necessity of each of the preventative behavior to keep them safe from COVID-19 than people who did not attend religious service in the past 7 days. Model 1 for in-person religious service attendance and handwashing found that people who attended religious service were less likely to report that they believed handwashing was necessary to prevent COVID-19 than people who did not attend religious service in the past 7 days (Adjusted Odds Ratio [AOR]: 0.71, 95 % confidence interval [CI]: 0.54, 0.94). Model 2, in-person religious service attendance and the necessity of mask wearing, found that people who attended religious service were less likely to believe in the necessity of mask wearing to keep them safe from COVID-19 when compared to people who did not attend religious service in the past 7 days (AOR: 0.35, CI; 0.31, 0.41). While all three models found statistically significant results, people who attended religious service were the least likely to report that they believed wearing masks was necessary compared to the other preventative behaviors. Model 3, in-person religious service attendance and the necessity of vaccines, found that people who attended in-person religious service in the last 7 days were less likely to believe that vaccines were necessary to keep them safe from COVID-19 (AOR: 0.38, CI: 0.33, 0.45). Model 3 had the best model with the highest concordance ratio of 70.5 compared to a concordance ratio of 69.7 for model 2 and 65.6 for model 1.

Table 5. Adjusted logistic regressions for the odds of preventative behavior				
	OR	95 % CI	Wald Chi Square* (df)	p-value*
Model 1: In-person Attendance and Handwashing n= 6,876				
Religious Service Attendance	0.71	0.54-0.94	5.84 (1)	0.016
Age	1.01	1.00-1.02	4.56 (1)	0.033
Female	2.47	1.95-3.13	56.39 (1)	<0.001
Black	1.55	0.93-2.57	0.50 (1)	0.481
American Indian/Alaskan Native	1.75	0.64-4.81	0.46 (1)	0.498
Asian	3.78	1.66-8.61	8.29 (1)	0.004
Hawaiian/Pacific Islander	0.52	0.18-1.49	3.92 (1)	0.048
Mixed	0.88	0.55-1.42	2.46 (1)	0.116
Less Than a High School Education	1.16	0.66-2.04	0.03 (1)	0.867
High School Degree	1.34	0.95-1.89	0.63 (1)	0.428
Some College or Associate Degree	1.34	1.03-1.74	0.89 (1)	0.345
Married	1.22	0.96-1.55	2.60 (1)	0.107
Model 2: In-person Attendance and Mask Wearing n= 6,874				
Religious Service Attendance	0.35	0.31-0.41	206.11 (1)	<0.001
Age	1.02	1.01-1.02	53.53 (1)	<0.001
Female	1.67	1.48-1.89	67.00 (1)	<0.001
Black	6.38	4.29-9.49	18.12 (1)	<0.001
American Indian/Alaskan Native	1.83	1.14-2.92	2.86 (1)	0.091
Asian	6.10	3.81-9.79	12.73 (1)	0.001
Hawaiian/Pacific Islander	4.91	1.50-16.14	1.41 (1)	0.235
Mixed	1.07	0.82-1.39	32.30 (1)	<0.001
Less Than a High School Education	0.89	0.64-1.23	1.52 (1)	0.218
High School Degree	0.60	0.50-0.71	13.21 (1)	<0.001
Some College or Associate Degree	0.65	0.57-0.75	7.78 (1)	0.005
Married	0.77	0.67-0.87	16.80 (1)	<0.001
Model 3: In-person Attendance and Vaccines n= 6,874				
Religious Service Attendance	0.38	0.33-0.45	152.03 (1)	<0.001
Age	1.03	1.03-1.04	197.28 (1)	<0.001
Female	1.09	0.96-1.24	1.69 (1)	0.194
Black	2.01	1.54-2.62	3.08 (1)	0.079
American Indian/Alaskan Native	1.50	0.96-2.34	0.06 (1)	0.805
Asian	4.35	2.73-6.93	23.03 (1)	<0.001

Hawaiian/Pacific Islander	1.33	0.62-2.84	0.28 (1)	0.596
Mixed	0.89	0.68-1.16	17.06 (1)	<0.001
Less Than a High School Education	0.51	0.37-0.70	0.10 (1)	0.754
High School Degree	0.34	0.29-0.40	44.43 (1)	<0.001
Some College or Associate Degree	0.45	0.39-0.52	7.44 (1)	0.006
Married	0.86	0.75-0.99	4.73 (1)	0.030

Figure 2. Percent Concordance for Religious Service Attendance in the Last 7 Day and the Necessity of Preventative Behavior



Discussion

This study found that people who attended in-person religious service in the last seven days were less likely to believe in the necessity of handwashing, wearing a mask, and getting vaccinated to protect them from COVID-19. I found that respondents who attended an in-person religious service in the last 7 days were the more likely to believe that wearing a mask was unnecessary to keep them safe from COVID-19, respondents who attended an in-person religious service in the last 7 days were more likely to believe that washing their hands was unnecessary to keep them safe from COVID-19, and respondents who attended an in-person religious service in the last 7 days were more likely to believe that getting vaccinated was unnecessary to keep them safe from COVID-19. These findings are somewhat different than expected based on the church's rhetoric being compatible with public health messaging and narratives (E. Idler, Bernau, and Zaras 2022). It is more compatible with the narrative that identifies churches and other houses of worship as sites for COVID-19 transmission, but these findings may in part be because at the time of this survey many people were still participating in remote worship. In the spring of 2022, the PEW research center found that in-person religious attendance was lower than pre-pandemic levels, even though most houses of worship began to offer some sort of in-person worship. Before the pandemic, 33 % of Americans said they never attended a religious service as opposed to 25 % before the pandemic, but they also found that of adults who attended religious services at least monthly, 21 % watched the service online instead attending in person (Nortey 2022).

This trend could also be impacted by "pockets of homogeneity" that allows people with similar views about preventative behaviors such as not vaccinating children to escape criticism from other people in their social circles (Estep and Greenberg 2020). Estep and Greenberg found

that some parents self-select school and residential areas that create enclaves that are homogeneous and this have a reduced likelihood of criticism for refusing to vaccinate their children and reducing the perceived risk of contracting the disease (Estep and Greenberg 2020). This idea could be applied to church selection where people who want to attend in-person religious services are more likely to choose houses of worship that do not require preventative measures. Having like-minded people in a congregation may make it seem like not practicing preventative behaviors is socially acceptable and the risk of contracting COVID-19 is low.

Limitations and Suggestions for Future Research

This study has several limitations that need to be discussed. The *Understanding America Survey* wave 31 is a cross-sectional survey and the analysis can only assess association not causality. The survey results were also self-reported, and thus allows misreporting and information bias to enter the study. In addition to the potential limits because of the nature of cross-sectional surveys, the measures they chose for religious service attendance could have been better. This study did not include people who were watching services online or people who have a pattern of attendance but did not attend in the past 7 days. Because most of the houses of worship still offered online service at this time and people were still participating in online worship at high levels, in-person attendance was somewhat deviant and against the general guidelines at the time. A better measure of religious service attendance that would provide clearer, more nuanced picture of the relationship between attendance and the necessity of preventative behaviors would ask about religious service attendance in the month or frequency of religious service attendance in the last year.

In addition to changing how religious service attendance was measured, it would have been helpful to include questions that would help investigate this relationship further. The survey also did not ask what denomination or faith people belonged to or participated in. There was no opportunity to see if the trend identified in this study differs based on religious tradition. It would also be interesting to have a question about political identity or affiliation. Some conservative people may be more likely to identify as religious and participate in in-person religious services as well as oppose preventative behaviors like mask and vaccines.

More analysis should be done across future waves of the *Understanding America Study* to see if this association continues as more people return to in-person worship and the United States recovers from the COVID-19 pandemic. Future research should also include different measures of religiosity, more faith communities besides Christians, the ability to stratify based on denomination, and political identity. This will provide a better understanding of the relationship between religious participation and preventative behavior, the impact of religion as a social determinant of health, and people's response to the COVID-19 pandemic. By studying factors associated with preventative behaviors, we can better understand how to promote and communicate about preventative behaviors and which sectors of the population need more health promotion for COVID-19 and future epidemics.

Disclaimer

The project described in this paper relies on data from the survey administered by the *Understanding America Study*, which is maintained by the Center for Economic and Social Research (CESR) at the University of Southern California and follows the American Association for Public Opinion Research (AAPOR) reporting guidelines for survey studies. The content of

this paper is solely the responsibility of the author and does not necessarily represent the official views of USC or UAS.

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