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Article

Self-Reported Religious Affiliation and the Prevalence of Psychiatric Disorders in a Cohort of 609 Asymptomatic and Mildly Symptomatic SARS-CoV-2 Positive Pregnant Women

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Abstract

Background: Religious affiliation has traditionally served as a coping strategy during stressful events such as the COVID-19 pandemic. Pregnant women faced heightened stress during the pandemic due to concerns about their health as well as that of their fetus. This study examined the prevalence of self-reported religious affiliation among SARS-CoV-2 positive pregnant women and investigated differences in psychiatric comorbidities and pregnancy outcomes based on religious affiliation. **Methods:** The study included all asymptomatic or mildly symptomatic SARS-CoV-2 positive pregnant women who received care at the Mayo Health System from March 2020 through October 2021 and completed the routine religious affiliation questionnaire. Those selecting “none” were categorized as having no religious affiliation RA-. Those selecting a specific religion were categorized as RA+. **Results:** Among 609 women, 49.6% were RA+ and 50.4% were RA-. RA+ women were more likely to be white, married, college-educated, and have fewer prior abortions. There were no significant differences found in rates of depression, anxiety, psychotropic medication use, drug use, or pregnancy and labor complications between RA+ and RA- groups. **Conclusion:** Half of the women in this cohort reported no religious affiliation. The expected mental health protective effect of religious affiliation was not observed, suggesting shifting societal trends.

Keywords: SARS-CoV-2; Covid; pandemic; pregnancy; religion; religious affiliation

1. Introduction

Identification of religious affiliation has changed over time and during the COVID-19 pandemic in the general public. As of 2019, religiously unaffiliated groups represent 23.1% of the American population, compared with only 2% identifying as having no religious affiliation in 1948 [1, 2]. In one study, it was found that one-third of those who identify as having no religious affiliation identify as “spiritual.” [3] However, their defining feature was consistent with having no religious affiliation. There is significant literature demonstrating the effects of religion and spirituality on mental health

and well-being. [4-6] However, little has been written about the psychiatric comorbidities of the non-religiously affiliated despite their growing segment of the population.

Religious beliefs and practices have been shown to help people cope with the stressors associated with physical illness [7]. The perinatal period is a time when females are more susceptible to experiencing a mood or anxiety disorder [8]. The prevalence of anxiety and depression during pregnancy and the postpartum period has been demonstrated to be as high as 17.1% and 4.8%, respectively [9]. If symptoms are left untreated, a constellation of psychosocial complications can arise, including disrupted mother-infant attachments, interpersonal conflicts, and sustained negative physical and mental health consequences. Improved perinatal social and health-related outcomes have been shown to be related to engagement with religion and spirituality [10]. Pregnancy complications, including physical health comorbidities, can contribute to high perceived stress [11].

With the onset of the Coronavirus 2019 (COVID-19) pandemic caused by Severe Acute Respiratory Syndrome Coronavirus type 2 (SARS-CoV-2), hundreds of millions of individuals, including pregnant women, were infected worldwide, the prevalence of depression and anxiety was higher among COVID-19 patients [12]. For those with mild symptoms or who were asymptomatic, testing positive for SARS-CoV-2 may have been an additional source of stress and anxiety. There have been several studies exploring the impact of SARS-CoV-2 infection on maternal mental health [13]. However, no previous study has examined the impact of religious affiliation on the prevalence of psychiatric comorbidities in this at-risk population. The aim of this study is to further our understanding of the effects of religious affiliation on psychiatric comorbidities, pregnancy course, and outcomes in pregnant women testing positive for SARS-CoV-2.

2. Methods

2.1. Patients and Data Collection

This study was approved by the Institutional Review Board of the Mayo Clinic (ID: 21-010940). It included all pregnant women with confirmed positive SARS-CoV-2 by reverse-transcriptase polymerase chain reaction (RT-PCR) test (nasopharyngeal/oropharyngeal swab specimen) who received medical care at Mayo Clinic Health System from March 1, 2020, through October 1, 2021. The last delivery date was on March 9, 2022. Patient data included demographics, religious affiliation (RA), COVID-19 symptom check list, date of SARS-CoV-2 positive test, date of delivery, fetal gestational age at time of delivery, delivery method, medical comorbidities during pregnancy or labor, psychiatric diagnoses (depression, anxiety, substance use) before or during pregnancy and any psychotropic medications during pregnancy. Neonatal outcomes (birth head circumference, weight, and Apgar scores at 1 and 5 minutes).

2.2. Sample Identification

Data for 799 subjects were identified based on SARS-CoV-2 positive RT-PCR, pregnancy status and RA. A total of 190 records were excluded for leaving the RA question unanswered. The final cohort consisted of 609 subjects, 302 identifying as having a religious affiliation (RA+) and 307 identifying as having no religious affiliation (RA-). Psychiatric comorbidities were identified as the presence of any documented psychiatric diagnosis, including substance use, prior to or during pregnancy.

2.3. Statistical Analysis

The normality of continuous variables was assessed using the Kolmogorov-Smirnov test. Data were presented as mean $\pm$ standard deviation (SD) if normally distributed or as a median, interquartile range (IQR), if not normally distributed. Categorical variables were summarized as frequencies and percentages. Individual student t-tests were used to compare the means of continuous variables for normally distributed data and the Mann-Whitney U test for non-parametric

data. Fisher’s exact test was used to compare frequencies of categorical variables between the two study groups. Analyses were performed with PRISM GraphPad 9 (San Diego, CA) and SPSS V27 software (Armonk, NY: IBM Corp). Results are considered significant at $P < 0.05$.

3. Results

3.1. Demographics

There was no difference between the two groups in mean age at time of delivery (RA+ vs RA-: 30.7±5.4 vs. 30.1±5.4, $P=0.13$) or employment status (75.8% vs. 74.3%, $P=0.7$). RA+ women were more likely to be Caucasian (86.4% vs 79.2%, $p=0.02$), non-Hispanic (91.0% vs. 81.8%, $P=0.0009$), married (73.8% vs. 60.9%, $P<0.0007$), and to have an associate or bachelor degree (RA+ vs RA-: 56.6% vs. 44%, $P=0.002$). (Table 1).

Table 1. Demographics.

Demographics		RA+ (n=302)	RA- (n=307)	P-Value
Maternal age groups (years) at time of delivery	<25	47 (15.6%)	61 (19.9%)	0.17
	25-35	195 (64.6%)	195 (63.5%)	0.08
	>35	60 (19.9%)	51 (16.6%)	0.34
Race	White	261 (86.4%)	243 (79.2%)	0.02
	African Americans	23 (7.6%)	11 (3.6%)	0.03
	Others or missing	18 (6.0%)	53 (17.3%)	<0.001
Ethnicity	Hispanic	24 (7.9%)	49 (16.0%)	0.003
	Non-Hispanic	275 (91.1%)	251 (81.8%)	<0.001
	Missing	3 (1.0%)	7 (2.3%)	0.34
Marital status	Single	65 (21.5%)	117 (38.1%)	<0.001
	Married	223 (73.8%)	187 (60.9%)	<0.001
	Others or missing	14 (4.6%)	3 (1.0%)	0.01
Educational level	≤ high school	73 (24.2%)	95 (30.9%)	0.07
	Associate's or Bachelor's degrees	171 (56.6%)	135 (44.0%)	0.002
	Higher education	25 (8.3%)	26 (8.5%)	1
Employment status	Missing	33 (10.9%)	51 (16.6%)	0.05
	Unemployed	62 (20.5%)	70 (22.8%)	0.56
	Employed (full time, or part time)	229 (75.8%)	228 (74.3%)	0.71
	Student	7 (2.3%)	6 (2.0%)	0.79
	Missing	4 (1.3%)	3 (1.0%)	0.72

3.2. Comorbid Psychiatric Conditions

Among patients with religious affiliation, comorbid psychiatric conditions accounted for 54% (n=165), 26% (n=80) had depression or other mood disorder, and 28% (n=85) reported having anxiety during pregnancy. Among patients with no religious affiliation, comorbid psychiatric conditions accounted for 48.6% (n=147), 23.8% (n=72) had depression or other mood disorder, and 24.8% (n=75) reported having anxiety during pregnancy. Fifteen percent of pregnant women with religious affiliation and comorbid psychiatric conditions (n=44) received a psychotropic medication during pregnancy. Eleven percent of pregnant women without religious affiliation and comorbid psychiatric conditions (n=34) received a psychotropic medication during pregnancy ($P=0.2$). The most commonly prescribed antidepressant/ antianxiety was Sertraline in the religious group, 7% (n=21), and the non-religious affiliated group, 5.3% (n=16) of patients ($P=0.3$). In addition, 6% (n=18) of religiously affiliated pregnant women with psychiatric comorbidity had a documented drug use during pregnancy compared to 7.6% (n=23) of non-religiously affiliated pregnant women with psychiatric comorbidity ($P=0.5$). Most common drugs were nicotine use in 2.0% (n=5) of the religious group and 2.6% (n=8) of the non-religious group. In the the religious cohort (1%, n=2) reported cannabis use

compared to the non-religious cohort with 1.7% (n=5). Other sychiatric comorbidities and pharmacotherapies are listed in Table 2.

Table 2. Psychiatric Comorbidities.

Comorbid psychiatric conditions		RA+ (n=302)	RA- (n=307)	P-Value
Prescribed antidepressant medications during pregnancy	Any	165 (54%)	147 (48.6%)	0.1
	Depression or other mood disorders	80 (26%)	72 (23.8%)	0.4
	Anxiety disorders	85 (28%)	75 (24.8%)	0.31
	Any medications	44 (15%)	34 (11.2%)	0.23
	Sertraline	21 (7%)	16 (5.3%)	0.4
	Escitalopram	6 (2%)	7 (2.3%)	>0.9
	Citalopram	3 (1%)	4 (1.3%)	>0.9
	Fluoxetine	4 (1%)	2 (0.7%)	0.45
	Duloxetine	3 (1%)	2 (0.7%)	0.68
	Buspirone	5 (2%)	4 (1.3%)	0.75
	Bupropion or Bupropion XL	4 (1%)	2 (0.7%)	0.45
	Venlafaxine or desvenlafaxine	2 (1%)	2 (0.7%)	>0.9
	Paroxetine	1 (0%)	0 (0%)	0.5
	Alprazolam	4 (1%)	0 (0%)	0.06
	Not mentioned	8 (3%)	3 (1.0%)	0.14
	Any	18 (6%)	23 (7.6%)	0.52
	Nicotine	5 (2%)	8 (2.6%)	0.58
	Cannabis	2 (1%)	5 (1.7%)	0.45
	Cannabis + Nicotine	2 (1%)	0 (0.0%)	0.25
	Cannabis + Methamphetamine	1 (0%)	1 (0.3%)	>0.9
	Cannabis + Ketamine	1 (0%)	0 (0%)	0.5
	Alcohol	1 (0%)	3 (1.0%)	0.62
	Methamphetamine	1 (0%)	1 (0.3%)	>0.9
	Stimulant + Synthetic marijuana	1 (0%)	0 (0%)	0.5
	Opioid	1 (0%)	0 (0%)	0.5
	Not mentioned	3 (1%)	0 (0%)	0.12

3.3. COVID-19 Symptoms

Thirty-three percent had COVID-19 symptoms. The most commonly reported symptoms were new or worse cough or shortness of breath, loss of smell and muscle aches. No significant differences were observed between the two groups except for a slightly but significantly higher percentage of women in the religious affiliation group reporting diarrhea (Table 3).

Table 3. Covid-19 Symptoms.

COVID-19 symptoms	RA+ (n=302)	RA- (n=307)	P-Value
New or worse cough or Shortness of breath	17 (5.6%)	13 (4.2%)	0.46
Loss of smell	15 (5.0%)	11 (3.6%)	0.43
Diarrhea	13 (4.3%)	4 (1.3%)	0.03
Muscle aches	13 (4.3%)	7 (2.3%)	0.18
Fever	11 (3.6%)	7 (2.3%)	0.35
Loss or change of taste	11 (3.6%)	8 (2.6%)	0.49
Chills	9 (3.0%)	3 (1.0%)	0.09
Sore throat	7 (2.3%)	6 (2.0%)	0.79
Respiratory distress	5 (1.7%)	1 (0.3%)	0.12

3.4. Obstetrical History

The mean age at delivery was 30.5 years for the religious group and 29.7 years for the non-religiously affiliated group. Multigravid patients accounted for 57.3% of patients in the religiously affiliated group compared to 59.9% of patients in the non-religiously affiliated groups (P=0.5). Primigravid patients accounted for approximately a quarter in both groups, and grand multigravid patients (≥ 5 pregnancies) accounted for approximately 15% of patients in both groups. There were no statistically significant differences in the number of full-term births between groups. A history of one previous abortion was reported in 26.1% of the non-religiously affiliated group (n=80) compared to 6.6% (n=20) in the religiously affiliated group (p<0.00001). Habitual (≥ 3) abortions were reported in 3.6% (n=11) of the non-religiously affiliated group compared to 0.3% of the religiously affiliated group(P=0.01). The percentage of patients with one living child was 31.8% and 29.6% in the religiously affiliated group and non-religiously affiliated group, respectively (p=0.6). The groups did not differ in respect to greater numbers of living children. There were no statistical differences in medical comorbidities of the non-religiously affiliated and religiously affiliated groups. Comparing medical comorbidities among the non-religiously affiliated and religiously affiliated groups, morbid obesity (>40 Kg/m²) was documented in 13.2% and 16.3% of the groups, respectively (p=0.3). Gestational diabetes was reported in 10.9% and 17.6%(p=0.2), gestational hypertension in 13.2% and 12.1% (p=0.7), preeclampsia in 3.0% and 6.5% (p=0.06), hypothyroidism in 6% and 6.2% (p>0.9), anemia in 9.6 and 10.1% (P=0.9), asthma in 9.6% and 7.2% (P=0.3) and Group β Streptococcal infection in 15.2% and 15.0% (P>0.9, respectively (Table 4).

3.5. Labor and Delivery

The mean gestational age (in weeks) at delivery was 38.0 for the religiously affiliated group and 38.4 for the non-religiously affiliated group. The two groups did not differ significantly in terms of their labor history. Preterm labor (birth before 37 weeks of gestation) occurred in 8.9% of the religious-affiliated group compared to 11.1% of the non-religious-affiliated group(P=0.42). A non-significant trend for higher rates of Labor induction in the religious vs non-religious [49.2% (n=148) vs 41.7% (n=128), P=0.07]), while epidural anesthesia was applied in 61.8% and 57.7% (p=0.36) in the two groups, respectively. Normal vaginal delivery occurred in 64.1% and 63.2% (p=0.8), and 3.0% and 2.6% (P=0.8) had instrumental delivery, respectively. Cesarean delivery was performed in 28.2% and 29.6% (P=0.7) of the two groups, respectively. The most common maternal complication during labor was fetal heart rate abnormalities occurring in 12% of the religiously affiliated group and 9.8% of the non-religiously affiliated group (P=0.4). See Table 4 for more details.

Table 4. Maternal Data.

Maternal and fetal data		RA+ (n=302)	RA- (n=307)	P-Value
Number of pregnancies	Maternal age at time of delivery	30.7±5.4	30.1±5.4	0.13
	Primigravida (1st pregnancy)	67 (22.2%)	68 (22.1%)	0.99
	Multigravida (2-4 pregnancies)	173 (57.3%)	184 (59.9%)	0.51
	grand multigravida (≥ 5 pregnancies)	46 (15.2%)	47 (15.3%)	0.99
	Missing data	15 (5.0%)	8 (2.6%)	0.14
Number of full-term birth(s)	0	65 (21.5%)	72 (23.5%)	0.63
	1	103 (34.1%)	95 (30.9%)	0.44
	2	67 (22.2%)	73 (23.8%)	0.7
	≥ 3	51 (16.9%)	59 (19.2%)	0.46
History of preterm labor	Missing data	15 (5.0%)	8 (2.6%)	0.14
		27 (8.9%)	34 (11.1%)	0.42

Number of previous abortion(s)	0	259 (85.8%)	183 (59.6%)	<0.0001
	1	20 (6.6%)	80 (26.1%)	<0.0001
	2	6 (2.0%)	25 (8.1%)	<0.001
	≥ 3	1 (0.3%)	11 (3.6%)	0.01
	Missing data	15 (5.0%)	8 (2.6%)	0.14
Number of living children	0	61 (20.2%)	68 (22.1%)	0.62
	1	96 (31.8%)	91 (29.6%)	0.6
	2	70 (23.2%)	74 (24.1%)	0.85
	≥ 3	59 (19.5%)	66 (21.5%)	0.62
	Missing data	15 (5.0%)	8 (2.6%)	0.14
Medical history	BMI < 30 Kg/m ²	118 (39.1%)	110 (35.8%)	0.45
	BMI 30-40 Kg/m ²	143 (47.4%)	145 (47.2%)	0.99
	BMI >40 Kg/m ²	40 (13.2%)	50 (16.3%)	0.31
	Gestational diabetes	33 (10.9%)	54 (17.6%)	0.21
	Hypothyroidism	18 (6.0%)	19 (6.2%)	0.99
	Hypertension	40 (13.2%)	37 (12.1%)	0.72
	Preeclampsia	9 (3.0%)	20 (6.5%)	0.06
	Anemia	29 (9.6%)	31 (10.1%)	0.89
	Asthma	29 (9.6%)	22 (7.2%)	0.31
	Group β Streptococcal infection	46 (15.2%)	46 (15.0%)	0.99
	Gestational age at time of delivery (weeks)	38 (12.6%)	38.4 (12.5%)	0.98
	Preterm labor (<37 weeks)	24 (8.0%)	21 (6.8%)	0.64
	Induced labor	148 (49.2%)	128 (41.7%)	0.07
Labor quantitative data	Epidural anesthesia	186 (61.8%)	177 (57.7%)	0.36
	Normal vaginal delivery	193 (64.1%)	194 (63.2%)	0.87
	Instrumental delivery	9 (3.0%)	8 (2.6%)	0.81
	Cesarean delivery (All)	85 (28.2%)	91 (29.6%)	0.72
	Cesarean delivery For fetal indication	34 (11.3%)	28 (9.1%)	0.42
	Premature rupture of membrane	6 (2.0%)	4 (1.3%)	0.54
Maternal complications during labor	Group β Streptococcal infection chorioamnionitis	5 (1.7%)	4 (1.3%)	0.75
		2 (0.7%)	4 (1.3%)	0.69
	Cord prolapse or nuchal cord	12 (4.0%)	19 (6.2%)	0.27
	Obstructed/ failure to progress	15 (5.0%)	16 (5.2%)	0.99
	Precipitous labor (< 3hours)	13 (4.3%)	10 (3.3%)	0.53
	Prolonged labor (> 20 hr)	3 (1.0%)	4 (1.3%)	0.99
	Placenta retained/ manual extraction	5 (1.7%)	7 (2.3%)	0.77
	Fetal heart rate abnormalities	36 (12.0%)	30 (9.8%)	0.44
	Meconium	5 (1.7%)	8 (2.6%)	0.58
	Vaginal laceration	21 (7.0%)	23 (7.5%)	0.88
Apgar Score ≤3	Bleeding	11 (3.7%)	14 (4.6%)	0.68
	at 1 minute	9 (3.0%)	7 (2.3%)	0.62
	at 5 minutes	2 (0.7%)	4 (1.3%)	0.69

4. Discussion

The results of this study showed high rates of religious non-affiliation in young pregnant women exposed to SARS-CoV-2. Both religious and non-religious groups had high rates of depression, anxiety and antidepressant treatment, significantly higher than the national averages. Contrary to the prevailing concept, we did not find significant differences in these parameters based on religious affiliation. However, as expected, we observed significantly more women in the religious group were married, had more years of education, and had fewer previous abortions. Taken together, our study suggests increasing trends of non-religiosity in young pregnant women and a decreasing protective effect of religious affiliation in this cohort. Having a religious affiliation is associated with marriage and fewer abortions. To the best of our knowledge, this is the first study examining the religious affiliation of pregnant mothers infected with SARS-CoV-2.

In the United States, the number of individuals self-identifying as having no religious affiliation is increasing [14]. From the 1970s through the 1990s, according to various national surveys, the proportion of U.S. adults identifying as having no religion was estimated to be 7% [15]. This proportion has steadily increased since that time period. In 2010, according to the General Social Survey, the proportion of U.S. adults identifying as having no religion was estimated to be 18% [15]. By 2021, various estimates suggest between 20% to 26% of U.S. adults identify as non-religiously affiliated [14, 16]. As noted above, about half of the pregnant women in this cohort reported no religious affiliation. This is almost double the national average of non-religious prevalence [17] and may be explained by irreligiosity being under-reported in U.S. surveys [18]. Also, the mean age of the non-religious affiliated group was 29.4, which may reflect a younger demographic than those represented in national surveys.

Religious nonaffiliates represent a diverse group of various sexes, age ranges, ethnicities, and socioeconomic status variations [19, 20]. In contrast, religious affiliation is associated with several demographic variables including a higher marriage rate [21]. Forty-four percent of Americans identify as White Christian, and 26% of Americans identify as Christians of color [22]. Non-Christian religious groups in the U.S. represent 4% of Americans [22]. In our study, pregnant women with religious affiliation were more likely to be non-Hispanic Caucasians and African-Americans. This finding is consistent with other research studies [23].

Religious affiliation has a strong association with women's attitudes about abortion [24]. In the U.S., religion is one of the strongest predictors of a woman's view on abortion [25]. Despite a clear relationship between these variables, there are more complex factors involved. Religiously affiliated women may be less likely to have premarital sex [26], have sex later in life than non-religiously affiliated women [27], and have fewer lifetime sex partners [26, 28]. The findings of our study are consistent with previous findings and reveal lower abortion rates among religiously affiliated pregnant women.

Religiosity can be protective against depression in pregnant women [29]. Religious and spiritual coping is associated with better psychological quality of life, while the absence of religiosity and spiritual coping are associated with higher levels of depressive, anxious, and stress symptoms in pregnant women [30]. Religiously affiliated pregnant women have lower rates of mood and anxiety disorders [31]. In one study, results were varied, showing that as the use of religious practices increased, anxiety of pregnant women decreased; however, as negative and passive religious coping increased, anxiety increased as well [32]. Negative religious coping includes strategies and beliefs that hinder psychological well-being.

Our study revealed no clinically significant difference in the prevalence of comorbid psychiatric conditions or antidepressant treatment. Both groups had high rates of depression, anxiety and substance use. These findings are in contrast to previous studies demonstrating that pregnant women showing more depressive and anxiety symptoms have negative religious coping skills [33]. In addition to traditionally higher rates of mood and anxiety disorders in expectant mothers, the external stressor of the COVID-19 pandemic has contributed significantly to increased rates of mood and anxiety disorders [34]. The rates of antenatal depression and anxiety disorders have been shown

to be higher during the COVID-19 pandemic [35]. In a study by Bin-Nun et al, it was concluded that the COVID-19 pandemic harmed the psychosocial well-being of mothers and that religious practices were not protective against stress [36]. The protective effects of religious affiliation in previously studied cohorts may reflect coping under less distressing environmental conditions. Each of the women in this study faced the potentially life-threatening effects of COVID-19 infection, along with that of their fetus. In addition to the direct medical effects of the infection, many dealt with social isolation and constant changes to daily societal life [37]. Furthermore, a significant positive correlation was observed between pregnant women's fears of COVID-19 and depression in another study [38].

There were no differences between the groups in the course, delivery method, or outcome of pregnancy. In one study of all pregnancies completed during a COVID-19-associated hospitalization, 2.2% resulted in pregnancy losses [39].

This study has several important strengths and limitations. A key strength is its large sample size of 609 pregnant women during the COVID-19 pandemic. This enabled the examination of the relationship between self-reported religious affiliation and psychiatric comorbidities. The rigorous methodology, including clearly defined inclusion criteria and comprehensive statistical analysis, is a strength of this study. The use of an empirical clinical cohort from a major academic healthcare system adds to the study's ecological validity. However, this study has some limitations. First, reporting bias may have been introduced with the reliance on self-reported religious affiliation and psychiatric diagnoses. The exclusion of 190 women who did not respond to the religious affiliation question may have led to selection bias and limits the generalizability of the study's findings. Additionally, the cohort was drawn from a single healthcare system in the Midwest. This cohort may not represent broader demographic or geographic populations. Finally, the study's cross-sectional design prevents the determination of causality between religious affiliation and mental health outcomes. Despite these limitations, the study raises important questions about the evolving role of religiosity in mental health during times of crisis.

The findings of this study suggest the increasing prevalence of non-religious affiliation amongst young mid-western pregnant women who tested positive for SARS-CoV-2, and also suggest that depression, anxiety and drug use rates were similar between the religious and non-religious affiliation groups. Further research on larger and more demographically diverse groups is needed to explore these relationships further.

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Informed Consent Statement: Patient consent was waived due to the retrospective nature of the study and the use of limited identifiers from electronic medical records.

Data Availability Statement: The data that support the findings of this study contain identifiable patient information, including names and medical record numbers, and cannot be shared publicly due to ethical and legal restrictions related to patient confidentiality. The data are protected under institutional policies and data protection laws. De-identified data may be made available upon reasonable request and pending appropriate

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References

1. J, J., "Nones" now as big as evangelicals, Catholics in the US Religion News Service, 2019.
2. F, N., In U.S., increasing number have no religious identity, in Gallup. 2010.
3. E, D., Does record number of religious "Nones" mean decline of Religiosity?, in Religion Dispatches. 2012.
4. Koenig, H.G., Religion, spirituality, and health: a review and update. Adv Mind Body Med, 2015. **29**(3): p. 19-26.
5. Balboni, T.A., et al., Spirituality in Serious Illness and Health. Jama, 2022. **328**(2): p. 184-197.
6. Unterrainer, H.F., A.J. Lewis, and A. Fink, Religious/Spiritual Well-being, personality and mental health: a review of results and conceptual issues. J Relig Health, 2014. **53**(2): p. 382-92.
7. Koenig, H.G., D.B. Larson, and S.S. Larson, Religion and coping with serious medical illness. Ann Pharmacother, 2001. **35**(3): p. 352-9.
8. Byrnes, L., Perinatal Mood and Anxiety Disorders. The Journal for Nurse Practitioners, 2018. **14**(7): p. 507-513.
9. Fairbrother, N., et al., Perinatal anxiety disorder prevalence and incidence. J Affect Disord, 2016. **200**: p. 148-55.
10. Cheadle, A.C.D. and C. Dunkel Schetter, Mastery, self-esteem, and optimism mediate the link between religiousness and spirituality and postpartum depression. J Behav Med, 2018. **41**(5): p. 711-721.
11. Biaggi, A., et al., Identifying the women at risk of antenatal anxiety and depression: A systematic review. J Affect Disord, 2016. **191**: p. 62-77.
12. Deng, J., et al., The prevalence of depression, anxiety, and sleep disturbances in COVID-19 patients: a meta-analysis. Ann N Y Acad Sci, 2021. **1486**(1): p. 90-111.
13. Wastnedge, E.A.N., et al., Pregnancy and COVID-19. Physiol Rev, 2021. **101**(1): p. 303-318.
14. Gervais, W.M. and M.B. Najle, How Many Atheists Are There? Social Psychological and Personality Science, 2018. **9**(1): p. 3-10.
15. Merino, S.M., Irreligious Socialization? The Adult Religious Preferences of Individuals Raised with No Religion. Secularism and Nonreligion, 2012. **1**: p. p.1-16.
16. Knight, D., D.V. Dudenkov, and W.P. Cheshire, Religion in the US during the time of a Pandemic: A Medical Perspective. J Relig Health, 2021. **60**(5): p. 3177-3192.
17. Smith, G.A. About Three-in-Ten U.S. Adults Are Now Religiously Unaffiliated. Pew Research Center's Religion & Public Life Project.
18. Keysar, B.A.K.a.A., American Religious Identification Survey [ARIS 2008]. March 2009, Trinity College.
19. "Nones" on the Rise: One-in-Five Adults Have No Religious Affiliation, in The Pew Forum on Religion and Public Life. 2012, Pew Research Center.
20. Saunders, D., et al., Varieties of Religious (Non)Affiliation: A Primer for Mental Health Practitioners on the "Spiritual but Not Religious" and the "Nones". J Nerv Ment Dis, 2020. **208**(5): p. 424-430.
21. Weaver, A.J., et al., A Systematic Review of Research on Religion in Six Primary Marriage and Family Journals: 1995-1999. The American Journal of Family Therapy, 2002. **30**(4): p. 293-309.
22. PRRI Releases Groundbreaking 2020 Census of American Religion, in The American Religious Landscape in 2020, PRRI, Editor. July 8th 2021, PRRI.
23. Cohen, D., et al., Examining Cultural, Ethnic, and Religious Differences with the Brief Multidimensional Measure of Religiousness and Spirituality in the U.S. and India. Journal of Religion and Health, 2022. **61**(4): p. 3492-3506.
24. Adamczyk, A., The effects of religious contextual norms, structural constraints, and personal religiosity on abortion decisions. Social Science Research, 2008. **37**(2): p. 657-672.
25. Jelen, T.G. and C. Wilcox, Causes and consequences of public attitudes toward abortion: A review and research agenda. Political Research Quarterly, 2003. **56**(4): p. 489-500.
26. Rostosky, S.S., et al., The impact of religiosity on adolescent sexual behavior: A review of the evidence. Journal of adolescent research, 2004. **19**(6): p. 677-697.

27. Billy, J.O., K.L. Brewster, and W.R. Grady, *Contextual effects on the sexual behavior of adolescent women*. Journal of Marriage and the Family, 1994: p. 387-404.
28. Davidson, J.K., N.B. Moore, and K.M. Ullstrup, *Religiosity and sexual responsibility: Relationships of choice*. American Journal of Health Behavior, 2004. **28**(4): p. 335-346.
29. Mann, J.R., et al., *Religiosity, spirituality, and depressive symptoms in pregnant women*. Int J Psychiatry Med, 2007. **37**(3): p. 301-13.
30. Piccinini, C.R.P., et al., *Religiosity/Spirituality and Mental Health and Quality of Life of Early Pregnant Women*. Journal of Religion and Health, 2021. **60**(3): p. 1908-1923.
31. Silva, C.S., et al., *Relationship between religious practice, alcohol use, and psychiatric disorders among pregnant women*. Archives of Clinical Psychiatry (São Paulo), 2010. **37**: p. 152-156.
32. Mirzaee, F., S.B. Hasanpoor-Azghady, and L. Amiri-Farahani, *Correlation between religious coping, demographic and fertility factors, and pregnancy anxiety of Iranian primiparous women: a cross-sectional study*. BMC Psychiatry, 2022. **22**(1): p. 298.
33. Bakır, N., P. Irmak Vural, and C. Demir, *Relationship of Depression, Anxiety and Stress Levels with Religious Coping Strategies Among Turkish Pregnant Women During the COVID-19 Pandemic*. J Relig Health, 2021. **60**(5): p. 3379-3393.
34. Traylor, C.S., et al., *Effects of psychological stress on adverse pregnancy outcomes and nonpharmacologic approaches for reduction: an expert review*. Am J Obstet Gynecol MFM, 2020. **2**(4): p. 100229.
35. Tomfohr-Madsen, L.M., et al., *Depression and anxiety in pregnancy during COVID-19: A rapid review and meta-analysis*. Psychiatry research, 2021. **300**: p. 113912.
36. Bin-Nun, A., et al., *Infant delivery and maternal stress during the COVID-19 pandemic: a comparison of the well-baby versus neonatal intensive care environments*. Journal of Perinatology, 2021. **41**(11): p. 2614-2620.
37. Bakır, N., P. Irmak Vural, and C. Demir, *Relationship of depression, anxiety and stress levels with religious coping strategies among Turkish pregnant women during the COVID-19 pandemic*. Journal of religion and health, 2021. **60**(5): p. 3379-3393.
38. Durmuş, M., et al., *The Relationship between the fear of COVID-19, depression, and spiritual well-being in pregnant women*. Journal of religion and health, 2022. **61**(1): p. 798-810.
39. Delahoy, M.J., et al., *Characteristics and Maternal and Birth Outcomes of Hospitalized Pregnant Women with Laboratory-Confirmed COVID-19 - COVID-NET, 13 States, March 1-August 22, 2020*. MMWR Morb Mortal Wkly Rep, 2020. **69**(38): p. 1347-1354.

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