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Sriya Iyer | Shaun Larcom | Po-Wen She

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JEL Codes Z12, Z13, I10, I18

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1 Introduction

Both adherents of religion and those who take a more sceptical view, have long acknowledged its potential to help coping during a crisis and in ameliorating psychological distress (Koenig, Al-Zaben and VanderWeele 2020). Despite the potentially large welfare implications of religion and religiosity, and intense interest from other disciplines such as psychology and sociology, economic analysis of the relationship between religion, crises and psychological distress is sparse (Iyer and Rosso 2022).

In terms of the mechanisms linking religion and religiosity to improved mental health in times of crisis, two main channels have been identified[1]. The first is that religion may foster a sense of 'belonging' leading to the development of social capital and social networks. These can in turn provide support to individuals when they face stressors and difficulties[2]. The second is that religiosity may act as a coping device, for example by providing hope, consolation and meaning when dealing with adversity; and has been advanced by both believers and sceptics alike. Indeed, many prominent thinkers of the past, including Marx, Weber and Freud, have written on the 'palliative' effects of religion (Wolff and Leopold 2021).

More recently, many empirical studies in psychology have identified religion as a 'stress buffer' by allowing people to better cope with shocks and stressful events (Pearlin 1989, Koenig et al. 2014). Such analysis identifies different stressors and shows how religion can help ameliorate them. Of most interest to our study is the role religion and religiosity can play when coping with a negative shock. As noted by Iyer and Rosso (2022, p. 6) 'perceiving one's own stressful experiences through the lens of religiosity might provide solace because of meaning-making and stress-buffering'. For instance, religious people may interpret the negative event as part of a greater plan. Indeed, Upenieks and Schieman (2021) have found that belief in 'divine control' is associated with lower stress levels for similar sized negative shocks and Ellison et al. (2019) find a relationship between religion and sleep quality. Krause and Pargament (2018) find a relationship between reading the Bible and reduced stress, while Pirutinsky et al. (2020) find a correlation between religiosity and lower stress among the American Orthodox Jewish community during the early stages of the COVID-19 pandemic. Giles, Hungerman and Oostrom (2023) also show that increases in the 'deaths of despair' as reflected in higher mortality due to negative behaviours such as alcoholism has been affected by the decline in religious participation in the US.

[1] It may also be possible for religiosity to negatively affect mental health, for example through spiritual struggles or anxiety caused by breaching a religious proscription or obligation (Iyer and Rosso 2022). There is also an important literature showing that religious proscriptions may help with self-regulation and reduce the incidence of risky or self-destructive behaviour (James and Wells 2003, Gruber and Hungerman 2008, Fletcher et al. 2014). Fruehwirth et al. (2019) have shown that religiosity can help adolescents adopt positive behaviour and to be more motivated in their activities, through peer effects.

[2] For instance, Koenig and Larson (2001) found that 19 of the 20 studies they reviewed showed that religious communities fostered social interactions.

In terms of the empirical literature that links religiosity with mental health, much of it is based on cross-sectional datasets that analyse correlations between religion and mental health. From this literature, we know that those who identify as religious tend to have better mental health; however it must be stressed that most of the studies are unable to make a causal claim (Iyer and Rosso 2022). Garssen et al.'s (2021) meta-analysis of longitudinal studies in the United States found religion to have a small positive relationship with mental health. A recent study by Bahal, Iyer, Shastry and Shrivastava (2023) shows that while the incidence of a COVID-19 infection is associated with significantly worse mental health, this negative association is significantly smaller for religious people. Attending online religious services also weakens the association between COVID-19 and worse mental health. In other countries, the results seem more mixed. Hodapp and Zwingmann's (2019) meta-analysis of German-speaking countries found a small statistical relationship between spirituality and mental health. However, they found no evidence of religion as a coping mechanism for stress.

One of the most difficult issue studying the empirical relationship between religion and mental health is the *selection into religion* problem - and the selection bias takes two main forms. The first is that people may select into religion or religiosity as a tool for coping with a negative shock to mental health. There is growing evidence that this is indeed the case. Using an identification strategy pioneered by Angrist (1990), Cesur, Friedman and Sabia (2020) found that soldiers exposed to combat zones were likely to be religious afterwards. Similarly Bentzen (2019) found that religiosity increases in response to those who experience unpredictable natural disasters, such as earthquakes, volcanic eruptions and tsunamis. More recently, Bentzen (2021) has found compelling evidence using Google search data that religiosity increased during the Pandemic. The second potential source of selection bias is that religion or religiosity proxies for difficult to measure attributes, such as family background, innate personal and psychological characteristics that affects mental health - not the impact of religion itself. To date, few studies have been able to adequately deal with the selection into religion problem. One that has is that of Fruehwirth, Iyer and Zhang (2019) who exploit random variation in exposure to religious peers at school in the United States, which is an exogenous predictor of religiosity. They find that an increase in religiosity among adolescents leads to a decrease in the probability of being depressed.

We aim to deal with the selection into religion problem as follows. First we use the pandemic lockdowns as a source of an exogenous mental health shock affecting the whole of society. In this sense, religious and non-religious were treated alike in terms of freedom of movement, health risk, and so forth. Second, we use indicators of religion and religiosity taken before the pandemic commenced. This enables us to deal with the potential of selecting into religion as a way of coping from the shock of the pandemic. Third, due to the longitudinal nature of our dataset, we employ individual fixed effects that enable us to control for non-time varying individual characteristics,

ranging from family background, innate personality traits and other factors that may affect an individual's ability to cope from an adverse event.

While our econometric strategy enables us to deal with the selection into religion problem generated by the pandemic, it does not allow us to deal with potential pre-pandemic selection into religion. Furthermore, while we are able to accurately measure differences in coping between religious and non-religious people during the pandemic, we cannot determine the cause of these differences, which could potentially be generated via a non-religious mechanism. Nonetheless, by measuring both religion and religiosity prior to the pandemic; and including individual fixed effects, time varying controls, and especially lockdown interaction terms, we are able to ameliorate the selection problem and rule out many potential non-religious causes for the differences in coping.

2 The Lockdowns

The pandemic and the associated lockdowns imposed acute psychological pressure on many people in the UK (see Burdett, Davillas, and Etheridge 2021). It is also well known that some groups of people, for instance women, suffered higher degrees of psychological distress than others (Etheridge and Spantig 2022). In addition to the fear and anxiety generated by a largescale public health crisis, UK residents also had their freedom of movement severely curtailed. People were only allowed go outside to buy food, for exercise, and were only able to go to work if they could not work from home, and schools were also closed.

In order to determine the lockdown dates we draw upon the analysis of the Institute of Government: 23 March 2020 to 23 June 2020 and 5 November 2020 to 8 March 2021[3]. Previous empirical evidence suggests that increases in psychological distress were similar during the two national lockdowns (Daly and Robinson 2022). Importantly for our analysis, while churches and places of worship were closed in the first lockdown, they were not in the second. Therefore, we also present results when they were closed for public worship, 23 March 2020 to 4 July 2020[4].

3 Data

We use data from the Understanding Society dataset which is the UK's main household longitudinal survey, administered by the Institute for Social and Economic Research (ISER) at the University of Essex, capturing information on 'people's social and economic circumstances, attitudes, lifestyle,

[3]https://www.instituteforgovernment.org.uk/charts/uk-government-coronavirus-lockdowns
[4]https://lordslibrary.parliament.uk/covid-19-reopening-church-buildings-and-the-financial-impact-of-closure/

health, family relationships and employment'. The dataset is representative of the UK population for a range of demographic and socioeconomic variables (including gender, age, ethnicity, region and income). We use a balanced panel dataset from the four Waves (8 to 11) which covers the period from January 2016 to May 2021[5]. Importantly, a significant portion of Wave 11 (Jan 2019 to May 2021) was collected during the pandemic period, which enables us to extract survey data collected during the lockdowns. We use these lockdown observations, and the those of the three previous waves to create a balanced panel of 3884 individuals.

3.1 Measures of Religion and Religiosity

We utilise data from the Understanding Society dataset on religious affiliation (religion) and whether it makes a difference to one's life (religiosity). This distinction is important, as having a religious affiliation does not necessarily mean that someone is religious, and vice versa.

To measure religious affiliation, we use responses to the following question: 'Which religion do you regard yourself as belonging to?'. Importantly, available responses include 'no religion'. We also use these responses to measure religious affiliation. This question is asked in each wave and we use the latest response *before* the lockdown period (Wave 10, Jan 2018 to May 2020).

To measure religiosity we use the answers to the following question: 'How much difference would you say religious beliefs make to your life? Would you say they make...a great difference (1), some difference (2), a little difference (3), no difference (4)?'. We recode the answers so that 'no difference' = 0, 'a little difference' = 1, 'some difference' = 2, and 'a great difference' = 3. Religiosity questions are not asked in every wave and the last time these questions were asked was during Wave 8 (Jan 2016 to May 2019).

3.2 Measure of Unhappiness or Depression

The Understanding Society survey includes the General Health Questionnaire (GHQ) which includes questions on subjective mental health outcomes. We use responses to the question 'Have you recently been feeling unhappy or depressed?' to measure coping, with the potential responses being: 1. Not at all, 2. No more than usual, 3. Rather more than usual, 4. Much more than

[5]While the dataset is longitudinal, attrition (due to death, drop-outs, migration, etc) from wave to wave is non-trivial. Given our use of a balanced panel, this leads to a trade-off in total number of observations with the number of waves to include, where more waves increase the timespan but reduce the number of people we can use for who provided a response. Prior to estimation we settled in four waves: Wave 8 for Jan 2016 to May 2018, Wave 9 for Jan 2017 to May 2019, Wave 10 for Jan 2018 to May 2020, Wave 11 for Jan 2019 to May 2021.

usual".[6]

4 Econometric Estimation

To measure if religious people coped better during the lockdowns, we estimate the following equation:

$$p_{i,t} = \alpha_i + \beta d_t^{lock} + \gamma\left(d_t^{lock}.\ d_i^{relig}\right) + \Phi'_{i,t} + \lambda_i + \zeta'\left(d_t^{lock}.\ \Phi'_{i,t}\right) + \varepsilon_{i,t} \quad (1)$$

Where $p_{i,t}$ denotes the measure of 'unhappiness or depression' (henceforth depression), where a higher number represents a higher level of depression, for individual i, at time t.

We include individual fixed effects, captured by the term α_i. This captures demographic and innate factors at the individual level that do not change over the observation period. The use of individual fixed effects provides us the average 'within individual' treatment effect. Since we use individual fixed effects in combination with interaction terms, we employ a linear (OLS) probability model[7].

Given that we have a measure for both religious affiliation and religiosity, d_i^{relig} takes two forms, and we estimate the equation using both forms (separately). First, d_i^{relig} is a dummy variable that takes the value of 1 if individual i identifies as belonging to a religion, and 0 otherwise (before the lockdown). Second, d_i^{relig} takes the form of a categorical variable, where 0 = no difference to one's life, 1 = a little difference, 2 = some difference, and 3 = a great difference (again reported before the lockdown).

d_t^{lock} is a dummy variable that takes the value of 1 for all responses during the two main lockdown periods, and 0 otherwise. We also estimate the results for the *first* lockdown period only, when churches and other places of worship were closed. This may enable us to gain insight on the mechanisms for coping, and enable us to separate out, the social/physical aspects, from the more intangible spiritual aspects.

The coefficient γ of the interaction term $\left(d_t^{lock}.\ d_i^{relig}\right)$ is our variable of interest. It measures the difference in depression among religious people during the lockdown periods, relative to the non-religious population (who experienced the same negative shock).

$\Phi'_{i,t}$ represents a vector of time varying individual characteristics (age, cohabitation arrangements,

[6]The GHQ collects 12 Questions broadly related to subjective mental health. We have focused our analysis on 'unhappiness or depression' as this measure is the most targeted on our research aims, and some of the questions would seem to be tangential at best (eg not playing a useful role). Nonetheless, as a check for robustness we include results for the two aggregate measures for psychological distress (GHQ Likert and GHQ Casness). The results can be found below in Table A1. As can be seen, the results are very similar with our main results in Tables 2 and 3.

[7]In using OLS with the presence of categorical dependent variables, we draw on the analysis of Ferrer-i-Carbonell and Frijters (2004).

physical health status and employment status) of individuals. In addition, we also include year fixed effects to any aggregate year specific factors represented by λ_t.

FInally, we also include lockdown interaction terms with our time varying individual characteristics (age, cohabitation arrangements, physical health status and employment status) and gender, represented by $\zeta'\left(d_t^{lock}.\ \Phi'_{i,t}\right)$. We do so to ameliorate for the potential for counfounding relationships between religion and the lockdown, as we know that our religious sample differs from the non-religious sample in some some key demographic characteristics *and* that the lockdown impacted different demographic groups differently. For instance, we know that eligious people are more likely to be female, and we know that females suffered higher degrees of psychological distress during the lockdown (Adams-Prassl et al. 2022).

The term $\varepsilon_{i,t}$ represents the error terms. We adjust the standard errors for clustering at the NUTS 1 level (region/country). Due to the small number of clusters (12), we also apply Rademacher weighted cluster adjusted standard errors (Canay, Santos, and Shaikh 2021).

4.1 By Type of Religion

While most religions share common attributes, they also differ considerably in terms of belief and practice. It may be that certain religious beliefs (or practices associated with a given religion) make it easier or more difficult to cope in times of crisis. Also, the lockdowns (and in particular the closure of places of worship during the first lockdown) may make practice more difficult (or impossible) relative to other religions.

Therefore, we estimate the following equation:

$$p_{i,t} = \alpha_i + \beta d_t^{lock} + \theta\left(d_t^{lock}.\ d_i^{type}\right) + \Phi'_{i,t} + \lambda_t + \zeta'\left(d_t^{lock}.\ \Phi'_{i,t}\right) + \varepsilon_{i,t} \tag{2}$$

Our coefficient of interest is, θ, from the interaction term $\left(d_t^{lock}.\ d_i^{type}\right)$ that captures the change in unhappiness or depression by type of religion, relative to the rest of the sample. We estimate this equation for the UK's main religious groups by size. Due to the limited sample size of our dataset, we restrict our analysis to those religions that make up approximately 5 percent or more of the sample size, leaving us to analyse Christianity, Islam, Hinduism. We also estimate the equation for Anglicanism (Church of England), Catholicism and 'Christian Other' (which consists of Christians who do not belong to the Church of England or the Catholic Church).

4.2 By Type of Religion and Religiosity

In addition to measuring differences by type of religion as above, we also measure differences by type of religion *and* degree of religiosity. This estimate captures the situation where one may identify with a religious group but not be religious (in that the religion makes no difference to one's life). To do this, we interact our measure for religiosity (which takes the form of a categorical variable, where 0 = no difference to one's life, 1 = a little difference, 2 = some difference, and 3 = a great difference (again reported before the lockdown)) with the lockdown dummy and type of religion dummy. To estimate this, we build on Equation 2 and estimate the following equation:

$$p_{i,t} = \alpha_i + \beta d_t^{lock} + \gamma\left(d_t^{lock}.\, d_i^{relig}\right) + \zeta\left(d_t^{lock}.\, d_i^{type}\right) + \theta\left(d_t^{lock}.\, d_i^{relig}.\, d_i^{type}\right) + \Phi'_{i,t} + \lambda_t + \zeta'\left(d_t^{lock}.\, \Phi'_{i,t}\right) + \varepsilon_{i,t} \tag{3}$$

Our coefficient of interest is, θ, from the triple interaction term $\left(d_t^{lock}.\, d_i^{relig}.\, d_i^{type}\right)$ that captures the difference in depression of those who are religious by type of religion, relative to those who are religious from other religions during the lockdowns. That is, it aims to capture differences by religion among those who are religious.

5 Descriptive Statistics

We present the descriptive statistics for before and during the lockdowns and religious and non-religious people from our sample. As can be seen in Table 1 below we have a total sample size of 15536 observations over the four waves, or 3884 individuals.

Feeling depressed was evidently higher during the lockdowns. It can also be seen that those who don't belong to a religion have higher levels of depression, both during and before the lockdown periods. It can also be seen that those who identify as belonging to a religion are approximately 52 percent of the total sample and that they are on average older, more likely to be cohabitating with a spouse, receiving a pension and being female. They are also less likely to have children or be employed, and have lower levels of education. This highlights the fact that those who belong to a religion have different demographic characteristics than those who do not. The different demographic characteristics between the two groups provides justification for our time varying controls and lockdown interaction terms.

Finally, it can also be seen that our two religious measures (religion and religiosity) differ not only conceptually but also in actuality. While there is strong overlap between the two measures, in that the mean value for religiosity is much higher for those who identify as belonging to religion, at 1.83, it is not zero for those who don't identify as belonging to a religion, at 0.34. This indicates that for

some respondents, religious beliefs make a difference to their life without belonging to a religion.

Table 1: Descriptive Statistics

	Total Sample				Pre-Lockdown				During Lockdown				Religion				No Religion			
	Mean	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
Depressed	1.86	0.81	1	4	1.84	0.81	1	4	1.93	0.83	1	4	1.82	0.80	1	4	1.91	0.83	1	4
Religion	0.52	0.50	0	1	0.52	0.50	0	1	0.52	0.50	0	1	1.00	0.00	1	1	0.00	0.00	0	0
Religiosity	1.11	1.19	0	3	1.11	1.19	0	3	1.11	1.19	0	3	1.83	1.12	0	3	0.34	0.68	0	3
Lockdown	0.25	0.43	0	1	0.00	0.00	0	0	1.00	0.00	1	1	0.25	0.44	0	1	0.25	0.43	0	1
Age	51.39	17.2	16	96	50.9	17.19	16	95	52.83	17.16	18	96	54.06	17.47	16	96	48.51	16.45	16	91
Cohabit	0.55	0.50	0	1	0.55	0.50	0	1	0.56	0.50	0	1	0.62	0.49	0	1	0.48	0.50	0	1
Education	2.29	0.72	1	3	2.29	0.72	1	3	2.31	0.72	1	3	2.28	0.75	1	3	2.31	0.70	1	3
Children	0.09	0.29	0	1	0.09	0.29	0	1	0.08	0.27	0	1	0.08	0.28	0	1	0.10	0.30	0	1
Employed	0.57	0.50	0	1	0.58	0.50	0	1	0.552	0.50	0	1	0.51	0.50	0	1	0.63	0.48	0	1
Student	0.04	0.20	0	1	0.05	0.21	0	1	0.03	0.16	0	1	0.04	0.20	0	1	0.04	0.20	0	1
Pension	0.23	0.42	0	1	0.23	0.42	0	1	0.24	0.43	0	1	0.27	0.45	0	1	0.04	0.19	0	1
Female	0.571	0.495	0	1	0.571	0.495	0	1	0.57	0.495	0	1	0.622	0.485	0	1	0.515	0.5	0	1
Physical Health	4.142	1.14	1	5	4.17	1.13	1	5	4.05	1.19	1	5	4.08	1.16	1	5	4.21	1.12	1	5
Christian	0.76	0.43	0	1	0.76	0.43	0	1	0.76	0.43	0	1	0.76	0.43	0	1	·	·	·	·
Islam	0.14	0.35	0	1	0.14	0.35	0	1	0.14	0.34	0	1	0.14	0.35	0	1	·	·	·	·
Hindu	0.04	0.21	0	1	0.04	0.21	0	1	0.04	0.20	0	1	0.04	0.21	0	1	·	·	·	·
Catholic	0.14	0.35	0	1	0.14	0.35	0	1	0.14	0.35	0	1	0.14	0.35	0	1	·	·	·	·
CoE	0.40	0.49	0	1	0.40	0.49	0	1	0.40	0.49	0	1	0.40	0.49	0	1	·	·	·	·
Christ Other	0.22	0.42	0	1	0.22	0.42	0	1	0.22	0.42	0	1	0.22	0.42	0	1	·	·	·	·
Observations	15536				11615				3921				8008				7528			

We next present the mean values for depression over the 4 waves graphically, by both religion (belonging to a religion, or not) and religiosity (whether religious beliefs make a difference to one's life, or not). As can be seen, on the whole, there has been an increase in depression over the sample period and that this increase pre-dated the pandemic. Nonetheless, it is also quite evident that there was a sharper increase during the pandemic.

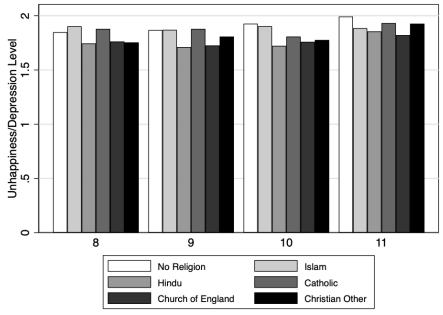
As can be seen from Figure 1, both those who belong to a religion and those who are religious have lower levels of depression compared to those who do not, both before and during the lockdowns, which is consistent with much of the literature. It can also be seen that the increase in depression during the lockdown periods was lower for these groups, compared to those who do not identify with a religion and are not religious.

In (a) of Figure 1 it can be seen that levels of depression vary by both type of religion and over time. It can be seen that Catholics generally have a higher level of depression compared to those who belong to other religions. Also that those belonging to 'Christian Other' showed a relatively large increase during the lockdown period (Wave 11), compared to most other religious groups.

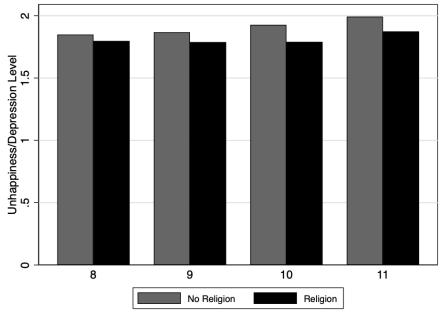
In (b) of Figure 1 it can be seen that depression increased during the lockdown period for both those who belong to a religion and those who do not. However, it is also evident that the increase was less for those who belong to a religion. If we compare the pre-lockdown mean (for Waves 8,9 and 10) with that of the lockdown (Wave 11), the increase was 6.1 percent for people who do not identify with a religion, compared to an increase of 4.3 percent for those who do. This indicates that the increase in depression during the lockdown for people who belong to a religion was 29 percent lower compared to those who do not identify with a religion.

In (c) & (d) of Figure 1, we present the results for religiosity. Here, an individual is defined as religious if they consider that religion makes a difference to their life (whether it be a great, some or a little) and not religious if it makes no difference. Here we can also see that the increase in depression during the pandemic was larger for non-religious people than for religious people. Again, if we compare the pre-lockown mean with the lockdown mean, the increase is 6.3 percent for people who are not religious, compared to 4.4 percent for those for whom religion does make a difference. This indicates that the increase in unhappiness or depression was 31 percent lower for religious people, compared to non-religious people. When we break down the results by intensity of religiosity, the results become even more stark. For those who religion makes little or no difference, the increase during the lockdown was 6.3 percent. For those for whom religion makes some or a great difference, the increase was around half that, at 3 percent and 3.5 percent respectively. This breakdown suggests that it is not just being religious, but also the intensity of religiosity that is important when measuring the relationship between religiosity and coping.

While presenting the means over the waves can be useful in better understanding the changes in depression between the two groups during the pandemic and before, some care needs be taken in their interpretation, as we know from Table 1 that those who belong to a religion or are religious have different demographic characteristics to those who do, or are, not. These differences between the two groups underscores our empirical strategy which aims to exploit the same exogenous shock that falls on two groups that we know are different, at the very least in terms of their religious beliefs and demographic characteristics. That is, while both groups were equally 'treated', the groups themselves are different. This diverges markedly from a difference-in-differences approach where the two groups are assumed same, and ideally randomly allocated, but only one group is treated. This highlights the importance of our empirical strategy that measures both the overall relative change in depression between our two groups, and that also controls for time invariant individual characteristics and time varying demographic differences. Given that depression looks to be on an upward trend (over our whole sample period), the inclusion of age provides a provides an inbuilt time trend control at the individual level.



(a) No Religion and Religion, broken up



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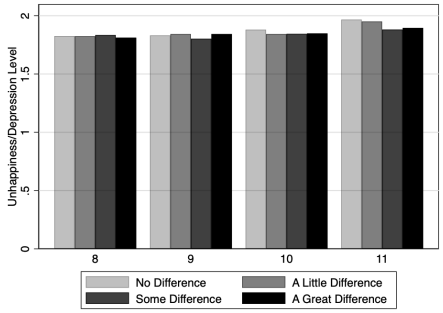
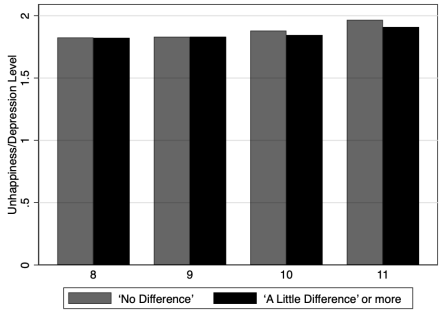


(c) No Religiosity and Religiosity, broken up



(d) No Religiosity and Religiosity

Figure 1: Religion and Religiosity trends over Waves 8 to 11

6 Results

We present our results under three main headings. The first is our main econometric estimates that measure the degree of religious coping during the UK lockdowns. The second presents our estimates for the first lockdown only, when churches and places of worship were closed. The third presents our estimates by religious denomination, and includes results for the first lockdown only, when places of worship were closed. All our results contain Rademacher weighted cluster adjusted standard errors. Consistent with the recommendations of Canay, Santos, and Shaikh (2021) we only report the p-values and not the standard errors.

6.1 Lockdown

In Table 2 we report estimates of both β, the lockdown dummy, and γ, the coefficient of the interaction term $\left(d_t^{lock}.\ d_i^{relig}\right)$ from Equation 1 above. γ is our coefficient of interest as it is the estimate of the difference in probability of depression among religious people during the lockdown periods, relative to the non-religious population.

The top section of the table contains results for those individuals who identify with belonging to a religion. Specifically, the d_i^{relig} variable takes the value of 1 if individual i identifies as belonging to a religion, and 0 otherwise (before the lockdown). The bottom section contain results for those who identify as religious (and accounting for intensity of religiosity). Here, d_i^{relig} takes the form of a categorical variable, where 0 = no difference to one's life, 1 = a little difference, 2 = some difference, and 3 = a great difference (again reported before the lockdown). For both measures (religion and religiosity) we present results for estimates with individual fixed effects (column 1), individual fixed effects + individual time varying controls (column 2), individual fixed effects + individual time varying controls + year fixed effects (column 3) + individual fixed effects + individual time varying controls + year fixed effects + lockdown interaction terms (column 4).

As can be seen from Table 2, β, the lockdown dummy is consistently positive and highly significant for the first three columns for both religion and religiosity. This confirms the well documented psychological cost of the pandemic lockdowns on UK society. For the last column, the coefficient turns negative (and significant) which is not unexpected, because these estimates include the lockdown interaction terms which could be expected to have a high degree of colinearity with the lockdown term itself. Importantly four our analysis, the coefficients and p-vales of γ are robust (and indeed strengthened) with the inclusion of the lockdown interaction terms.

Indeed, the coefficients of our variable of interest, γ are consistently negative for both *religion* and *religiosity*. A negative coefficient indicates that religious people were less likely to suffer an increase

in depression during the lockdowns, compared to non-religious people.

In terms significance for *religion*, it can be seen that the p-values for γ are below the 10 percent level for the first three columns for religion. For the final column, that includes the lockdown interaction terms, the coefficient grows (in absolute terms) to -0.059 with a highly significant p-value of 0.016. As discussed previously, religious people differ in terms of their demographic characteristics (for example, in that they are older more likely to be female) and some characteristics are known to have had more difficult lockdown experiences. Our results indicate that when accounting for potential demographic lockdown interactions, the magnitude and significance of γ increases.

In terms of significance for *religiosity*, the p-values are under or around the five percent level for the first three columns. Indicating that religious people (ie those for whom religion makes a difference to their life) were less likely to suffer from an increase in depression, compared to those who are non-religious. As above, the coefficient grows in both magnitude and significance with the inclusion of the lockdown interaction terms.

In terms of magnitude, we can compare (or subtract) γ to β, to better gauge their magnitudes. As can be seen for *religiosity*, γ is around one fifth to one quarter of β (columns 1-3). This a sizable magnitude and shows that religious people were much less likely to suffer an increase of depression during the pandemic lockdowns. For *religion* the magnitude of γ is even larger at around one half one third that of β (columns 1-3). It must be noted that the coefficients cannot be interpreted in a straightforward manner, given the categorical nature of our outcome and explanatory variables (for religiosity). Given the binary and categorical nature of our measures, our results should be interpreted in terms of a decreased probability of suffering depression.

In summary, our main econometric results provide evidence that religious people coped better during the UK pandemic lockdown. Also, when we include the lockdown interaction terms, the coefficients are larger and have higher levels of statistical significance. This suggests that religious people had demographic characteristics that were associated with worse mental health characteristics during the lockdown. Once controlling for these demographic lockdown interactions, the results provide stronger evidence that religious people coped better during the lockdown. Our results also highlight the distinction between *religion* (identifying with a religious group) and *religiosity* (it making a difference to your life), in that religiosity has a higher level of significant across the range of different specifications.

Table 2

Lockdown	(1)	(2)	(3)	(4)
	Religion	**Religion**	**Religion**	**Religion**
$\boldsymbol{\beta}$	0.111***	0.087***	0.098**	-0.227**
p-value	0.000	0.000	0.02	0.021
$\boldsymbol{\gamma}$	-0.043*	-0.043*	-0.042*	-0.059**
p-value	0.074	0.072	0.077	0.016
$\boldsymbol{R^2}$	0.584	0.584	0.584	0.585
Observations	15536	15536	15536	15536
	Religiosity	**Religiosity**	**Religiosity**	**Religiosity**
$\boldsymbol{\beta}$	0.114***	0.090***	0.100**	-0.229**
p-value	0.000	0.000	0.012	0.024
$\boldsymbol{\gamma}$	-0.023**	-0.022**	-0.022**	-0.029**
p-value	0.029	0.03	0.034	0.011
$\boldsymbol{R^2}$	0.583	0.584	0.584	0.585
Observations	15484	15484	15484	15484
Individual FE	Yes	Yes	Yes	Yes
Time Varying Controls	No	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Lockdown Interaction Terms	No	No	No	Yes

Notes: OLS estimates of Equation 1. β coefficient estimates are for the lockdown dummy . γ coefficient estimates are for the Relig x Lock interaction term. 'Relig' takes two forms; for Religion, it takes the form of a binary variable where 0 = not belonging to a religion and 1 = belonging to a religion. For Religiosity, it takes the form of 0 = religion makes no difference to one's life, 1 = a little difference, 2 = some difference, and 3 = a great difference. Time varying controls are: age, education, cohabitation status, with young children, physical health and employment status. Lockdown interaction terms are for each of the time varying controls and gender. Standard errors are wild bootstrap cluster adjusted at the country/region level with Rademacher weights. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.2 Closure of Places of Worship

Table 3 below provides estimates of Equation 1, but only during the first lockdown period when places of worship were closed (places of worship were not closed during the second lockdown period). These results help us to provide some insight into welfare costs of the closure of places of worship for religious people. However, it must be noted that the first lockdown period was different in other

ways too, including the uncertainty and fear in the early days of the pandemic. As can be seen, there are fewer observations, given that these estimates are from a subset of observations from the estimates above.

As above, the top section of the table provides results for *religion* and the bottom section contains results for *religiosity*. Given that the first lockdown occurred within the year 2020, we do not report results separately on the inclusion of year fixed effects as the γ coefficients are identical.

As can be seen, the results are somewhat different to above. While the coefficients for γ remain negative, they differ in two main ways in Columns 1 and 2. For *religion* they are larger (in absolute terms) and while they remain significant at the 10 percent level, the p-values are smaller indicating a higher level of significance. However, for *religiosity*, while the coefficients are slightly lower, the p-values are much larger, and no longer significant (when places of worship were closed). With the inclusion of the lockdown interaction terms the γ coefficient for *religion* is higher in magnitude than for both lockdown periods at -0.080 and significant at the five percent level. For *religiosity*, the coefficient the slightly smaller in magnitude and less significant.

These results show us that during the first lockdown those who identify with a religion coped better relative to those who don't. Indeed, the difference in coping for those who identify with a religion is larger for the first lockdown period, both in terms of magnitude and significance, compared to both lockdown periods together. However, for those who are religious (in that it makes a difference to their life) the results for the first lockdown period vary, with and without the inclusion of the 'closed' interaction terms. When they are included, the results tell us that religious people coped better than those who were not, but both the magnitude and significance of the difference is smaller, compared to both lockdown periods together.

Overall, these results show a divergence in results between identifying with a religion and being religious that was less apparent in the results from the lockdown periods overall (Table 2). While they show us that both those who identified with a religion and those who are religious coped better than those who were not, they also show us that those who belonged to a religion coped relatively better than those who were religious. That is, those who were religious coped relatively worse in the first lockdown period when places of worship were closed. We explore this issue in more detail in the next section, my measuring outcomes by type of religion and religiosity.

Table 3

Places of Worship Closed	(1)	(2)	(3)
	Religion	**Religion**	**Religion**
$\boldsymbol{\beta}$	0.123***	0.087***	-0.230
p-value	0.000	0.000	0.363
$\boldsymbol{\gamma}$	-0.060*	-0.058*	-0.080**
p-value	0.056	0.061	0.017
$\boldsymbol{R^2}$	0.581	0.581	0.583
Observations	9680	9680	9680
	Religiosity	**Religiosity**	**Religiosity**
$\boldsymbol{\beta}$	0.114***	0.077***	-0.242
p-value	0.000	0.001	0.366
$\boldsymbol{\gamma}$	-0.020	-0.019	-0.025*
p-value	0.128	0.147	0.058
$\boldsymbol{R^2}$	0.580	0.580	0.582
Observations	9648	9648	9648
Individual FE	Yes	Yes	Yes
Time Varying Controls	No	Yes	Yes
Lockdown Interaction Terms	No	No	Yes

Notes: OLS estimates of Equation 1. β coefficient estimates are for the lockdown dummy . γ coefficient estimates are for the Relig x Lock interaction term. 'Relig' takes two forms; for Religion, it takes the form of a binary variable where 0 = not belonging to a religion and 1 = belonging to a religion. For Religiosity, it takes the form of 0 = religion makes no difference to one's life, 1 = a little difference, 2 = some difference, and 3 = a great difference. Time varying controls are: age, education, cohabitation status, with young children, physical health and employment status. Includes year fixed effects. Lockdown interaction terms are for each of the time varying controls and gender. Standard errors are wild bootstrap cluster adjusted at the country/region level with Rademacher weights. * p < 0.10, ** p < 0.05, *** p < 0.01

6.3 Outcomes by Type of Religion and Religiosity

In Table 4 below, we present our results by religion during both lockdown periods and the first lockdown (when places of worship were closed). Due to our limited sample, we restrict our analysis

to religions that make up approximately 5 percent or more of the UK population. Due to their size, we also estimate separate results for the two largest Christian denominations, as well grouping those who belong to the remaining Christian denominations, which we label 'Christian Other'.

Column 1 presents the results for the interaction term $\left(d_t^{lock}.\ d_i^{type}\right)$ from Equation 2 that captures the change in depression by those who belong with a given type of religion, relative to the rest of the sample who belong to another religion. As can be seen, there is a high degree of homogeneity in outcomes across the different religions. Only 'Christian Other' had a significantly higher probability of increased depression during the lockdown periods, relative to the rest of the sample, which includes those who belong to a religion. As can be seen, the coefficient is positive (0.087) and significant at the 5 percent level. The 'Christian Other' grouping consists of those who belong to Christian denominations other than the Church of England and the Catholic Church (mainly consisting of protestant denominations).

Column 2 presents our results triple for the interaction term $\left(d_t^{lock}.\ d_i^{relig}.\ d_i^{type}\right)$ from Equation 3. This measures the difference in unhappiness or depression of those who are religious by type of religion, relative to those who are religious from other religions during the lockdowns. As can be seen below, there are few differences by religion among those who are religious. The one exception is that the coefficient for Islam is positive (0.116) and significant at the 10 percent level. This result indicates, that among those that are religious (that is, religion makes a difference to their life), Muslims were more likely to have increased depression during the lockdowns.

Columns 3 and 4 provide results, for Equations 2 and 3, but only during the first lockdown period when places of worship were closed. As can be seen, there are fewer observations, given that these estimates contain a subset from the estimations above (that cover the two main lockdown periods).

As mentioned above, while many religions emphasise both individual and communal prayer and worship, they diverge significantly in terms of concrete requirements and practices. In this regard, some are more stringent in terms of their requirements on communal worship. As theorised by Iannaccone (1992), some groups may require more stringent obligations, that may even lead to increased religious satisfaction and commitment, as a person's religious satisfaction can depend on both their own inputs and others within the religious group. Obviously, great care must be taken in making broad statements about communal worship requirements, as many religions and churches have groups within them that may have different rules. Furthermore, sometimes the stated rules may differ from commonly practiced customs and norms. Nonetheless, Box 1 aims to summarise the requirements of the different types of religions and churches in the UK studied here. As can be seen, two groups do seem to differ in terms of *requiring* regular communal worship, Islam and the Catholic Church. As noted by Bentzen (2021), there was a large shift toward online services and private prayer during the pandemic that this helped provide a substitute for in-person communal

prayer and worship. However, one would expect that that it would serve as an imperfect substitute for those who were normally *required* to attend weekly communal worship.

As can be seen in Column 3 below, that reports the interaction term from Equation 2, there was no-difference by religion in probability of depression during the first lockdown when churches and places of worship were closed. This result indicates that individuals from no one religion or church, relative to the rest of the sample, coped better or worse during the first lockdown when places of worship were closed. This is despite religious people, on the whole, having a lower probability of unhappiness or depression during the first lockdown (Table 3).

Column 4 reports the results for the triple for the interaction term from Equation 3 that measures the difference in depression of those who are religious by type of religion, relative to those who are religious from other religions during the first lockdown when churches and places of worship were closed. Here we see that there were two religious groups that had a higher probability of unhappiness or depression, relative to the rest of the sample who are religious. Here we can see the coefficient for Catholic is positive (0.111) and significant at the 10 percent level. The second is Islam which is also positive (0.189) and significant at the 10 percent level. It is noteworthy that these are the two groups who impose mandatory weekly attendance (at least on a portion of their adherents). These results provide suggestive evidence that the closure of places of worship had heterogeneous negative welfare impacts, with the religious in some religious groups suffering disproportionately.

Table 4: By Religion During the Lockdowns and when Places of Worship were Closed

By Religion	(1)	(2)	(3)	(4)
	Lockdown	Lockdown	Closed	Closed
	Religion	Religiosity	Religion	Religiosity
Christianity				
θ	0.71	-0.014	0.024	-0.044
p-value	0.107	0.78	0.629	0.515
R^2	0.573	0.573	0.569	0.568
Church of England				
θ	-0.008	-0.012	0.007	-0.047
p-value	0.816	0.726	0.857	0.262
R^2	0.573	0.573	0.569	0.568
Catholic				
θ	-0.003	0.059	0.007	0.111*
p-value	0.969	0.212	0.909	0.067
R^2	0.573	0.573	0.569	0.569
Christian Other				
θ	0.087**	0.022	0.003	-0.026
p-value	0.033	0.279	0.945	0.579
R^2	0.573	0.573	0.569	0.568
Islam				
θ	-0.083	0.116*	-0.005	0.189*
p-value	0.136	0.089	0.942	0.052
R^2	0.573	0.573	0.569	0.569
Hinduism				
θ	0.050	-0.037	0.007	-0.225
p-value	0.549	0.7	0.95	0.184
R^2	0.573	0.573	0.569	0.569
Observations	8004	7984	4860	4844

Notes: Columns 1 & 3 contain estimates of the Equation 2 (Type x Lock) interaction term. Columns 2 & 4 contain estimates of the Equation 3 (Type x Religious x Lock) interaction term. Columns 1 & 2 use the lockdown dummy term (Lock) whereas columns 3 & 4 use the closed dummy term (Closed). All OLS estimates include individual FE, time varying controls (age, education, cohabitation status, with young children, physical health and employment status), year fixed effects and lockdown interaction terms. Standard errors are wild bootstrap cluster adjusted at the country/region level with Rademacher weights. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

7 Discussion

Religiosity may help people deal with crises through coping mechanisms. Within the social sciences, the religious coping hypothesis dates back to Marx and Freud, who suggested that in times of hardship, all religions provide individuals with a higher power that provides comfort (Clark 1958; Bentzen 2019). After the 9/11 attacks, 9 out of 10 Americans coped with their distress by turning to religion (Schuster et al., 2001). During COVID-19, Google searches for prayer increased dramatically (Bentzen 2021). Over half of the global population prayed to end the pandemic (Bentzen 2021). Not only did people resort to prayer during the pandemic as an alternative means of practicing religion, but the demand for religion also increased. It is clear that religion may provide coping mechanisms during pandemics. First, religion may be used as a coping mechanism when the event is unpredictable. This has particular relevance in an epidemic as health events favour emotion-focused coping (Folkman and Lazarus, 1980). Among adults who dealt with stressful events, the most common coping strategies are faith in God, gaining strength in God, and prayer, even compared to church participation (Koenig et al., 1998).

In this study we explore the link between religion and coping in the United Kingdom. It should be said at the outset that compared to many other countries, the United Kingdom is less religious on average. Nevertheless, our econometric results do demonstrate that religious people coped better during the pandemic lockdowns.

While our results show that religious people were less likely to suffer from increases in depression during the lockdown, we are unable to provide evidence why this is the case. It could be that it is the hope and consolation that religion may bring to people, or something else. While our empirical approach uses measures for religion and religiosity taken before the pandemic (to mitigate the selection into religion problem) and a number of lockdown interaction terms (to mitigate for potential confounders) we cannot rule out that our results are being driven by some unknown or unobserved variable that is linked both to religion and lockdown mental health outcomes. However, what we do know is that our results, showing that religious people were less likely to suffer from increases in depression during the pandemic lockdowns, get stronger with the inclusion of the lockdown interaction terms.

Significant other findings from this study are that we found little difference in coping across different religions during the lockdown periods. The one exception was that those who belong to 'Christian Other' had a higher probability of increased depression during lockdown periods, relative to the rest of the sample who belong to a religion. The grouping of Christian Other mainly consists of Protestant groups, other than the Church of England. Among those that are religious, in so far as religion makes a difference to their life, Muslims were more likely to have increased depression,

even though for Muslims as a whole, were no more likely to have increased depression during the lockdowns. These findings may have implications for how we think about religious beliefs as opposed to religious membership in both Christian and non-Christian religions.

Finally, when investigating if some religious groups coped better when places of worship were actually closed, the findings showed that no one religion or church, relative to the rest of the sample, coped better or worse during the first lockdown when places of worship were closed. Our findings also provide suggestive evidence that the closure of places of worship had heterogeneous negative welfare impacts, with the religious in some groups suffering disproportionately. In particular, religious Muslims and Catholics suffered disproportionately. It is also noteworthy that it is these two religious groups who have the most stringent requirements for physical presence in relation to communal worship (in normal times). These results also show that imposing the same rules on heterogeneous groups can have very different welfare implications.

If one we were to ask if religious people cope better in a crisis, an examination of the shock of the COVID-19 pandemic would suggest that the answer is yes, even in a society such as the United Kingdom that is not particularly religious, compared to many other parts of the globe. The findings of this study may then also have policy implications for future pandemics in terms of what to do about closures of places of worship during a pandemic.

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Appendix

Table A1 Aggregate Measures for Mental Health

	Likert	**Caseness**	**Likert**	**Caseness**
Lockdown	**Religion**	**Religion**	**Religiosity**	**Religiosity**
γ	-0.327**	-0.206**	-0.128*	-0.097**
p-value	0.043	0.029	0.06	0.013
$\boldsymbol{R^2}$	0.655	0.600	0.654	0.600
Observations	15536	15536	15484	15484
Places of Worship Closed	**Religion**	**Religion**	**Religiosity**	**Religiosity**
γ	-0.364*	-0.180	-0.045	-0.037
p-value	0.072	0.12	0.593	0.461
$\boldsymbol{R^2}$	0.650	0.588	0.649	0.588
Observations	9680	9680	9648	9648

Notes: OLS estimates of Equation 1.GHQ Likert converts answers to 12 questions of the General Health Questionnaire (GHQ) to a single scale by recoding so that the scale for individual variables runs from 0 to 3 instead of 1 to 4, and then summing, giving a scale running from 0 (the least distressed) to 36 (the most distressed). GHQ Casness converts answers to 12 questions of the GHQ to a single scale by recoding 1 and 2 values on individual variables to 0, and 3 and 4 values to 1, and then summing, giving a scale running from 0 (the least distressed) to 12 (the most distressed). γ coefficient estimates are for the Relig x Lock interaction term. 'Relig' takes two forms; for Religion, it takes the form of a binary variable where 0 = not belonging to a religion and 1 = belonging to a religion. For Religiosity, it takes the form of 0 = religion makes no difference to one's life, 1 = a little difference, 2 = some difference, and 3 = a great difference. Time varying controls are: age, education, cohabitation status, with young children, physical health and employment status.. Includes year fixed effects. Lockdown interaction terms are for each of the time varying controls and gender. Standard errors are wild bootstrap cluster adjusted at the country/region level with Rademacher weights. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Box 1: Requirements for Communal Worship by Religion or Church

Religion or Church	Requirements on Communal Worship
Church of England	Anglicans believe that the Christian life involves regular praise and prayer, both private and public.
Christian Other	This group is made up of many different, primarily Protestant, churches that emphasise an individual relationship with God.
Catholic Church	Catholics are expected to attend Sunday Mass each week.
Islam	Muslim men are obliged to go to Friday midday prayers (Jummah) except if they are ill or too old to attend.
Hinduism	Hindus may worship at home or in temples (Mandirs).

Source: BBC Bitesize (https://www.bbc.co.uk/bitesize)